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INTRODUCTION AND WELCOME

The Editors

The International Doctoral Research Centre (IDRC; www.idrcentre.org) was created by like-minded researchers who wish to promote excellence in doctoral and post-doctoral research.

The IDRC hosts two annual research seminars – the European Research Seminar held in April and the American Research Seminar held in September. For details about locations, submission guidelines, and other information about these annual seminars, please visit www.idrcentre.org.

In addition to the two annual seminars, the IDRC publishes an annual journal: the Journal of International Doctoral Research (JIDR).

The IDRC provides doctoral associates and experienced post-doctoral researchers with a forum for presenting and discussing their research at one of the annual seminars. These seminars are an opportunity to get feedback from and exchange comments and views with experienced researchers. Specifically the IDRC provides a forum for peer review of a researcher's current ideas and thoughts which enable him/her to formulate future research plans or unblock problems with current research. A benefit of the IDRC includes building a close network of experienced researchers.

To submit an abstract to one of the IDRC seminars, please forward your working paper to: patjoynt@online.no.

To submit a manuscript for blind peer review for publication to the JIDR, please forward to: jidr.submissions@idrcentre.org

Regards,

Editorial Board of the JIDR
Directors of the IDRC (www.idrcentre.org)

MANUSCRIPT PREPARATION

To help us with the submission process, please follow the preparation checklist prior to submitting your manuscript. Submissions may have to be returned to authors that do not adhere to the following guidelines. We thank you for your assistance.

CHECKLIST

- Manuscripts should not have been previously published nor submitted to another journal for consideration. If the manuscript has appeared elsewhere, please ensure that you have permission for it to be published in the JIDR and that you acknowledge such a release (see the style guide).
- Please ensure that the electronic file is in Microsoft Word or RTF format.
- Please check that the text adheres to the stylistic and bibliographic requirements outlined below.
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Manuscript stylistic and bibliographic requirements

- As a guide, articles should be between 15 and 20 pages in total, including figures, graphs, charts, tables, references, etc.
- A title of not more than eight words should be provided.
- A brief autobiographical note should be supplied including:
  - Full name
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  - E-mail address
  - Full international contact details
  - Brief professional biography.
- Copyright release/acknowledgement (if necessary).
- Authors must supply an abstract of no more than 500 words.
- Although optional, authors are encouraged to provide up to six keywords which encapsulate the principal topics of the paper.
- Headings must be short, with a clear indication of the distinction between the hierarchy of headings. All headings are to be left justified. The first hierarchy is to be bolded and use title format (each key word capitalized with the exception of words such as ‘a’, ‘the’, ‘of’, etc.) The second order of hierarchy is to be bolded and have only the first word capitalized.

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- Notes or Endnotes should be used only if absolutely necessary and must be identified in the text by consecutive numbers, enclosed in square brackets and listed at the end of the article.
- All Figures (charts, diagrams, line drawings, web pages/screenshots) are to be embedded directly into the MS Word document in the proper location in the document.
- References to other publications must be in APA style and carefully checked for completeness, accuracy and consistency. This is very important in an electronic environment because it enables your readers to exploit the Reference Linking facility on the database and link back to the works you have cited through CrossRef. You should cite publications in the text: (Adams, 2006) using the first named author's name or (Adams & Brown, 2006) citing both names of two, or (Adams *et al.*, 2006), when there are three or more authors. At the end of the paper a reference list in alphabetical order should be supplied:
  - ***For books***: Surname, Initials (year), *Title of Book*, Publisher, Place of publication.

  e.g. Harrow, R. (2005), *No Place to Hide*, Simon & Schuster, New York, NY.
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  e.g. Calabrese, F.A. (2005), The early pathways: theory to practice – a continuum, in Stankosky, M. (Ed.), *Creating the Discipline of Knowledge Management*, Elsevier, New York, NY, pp. 15-20.
  - ***For journals***: Surname, Initials (year), Title of article, *Journal Name*, volume, number, pages.

  e.g. Capizzi, M.T. and Ferguson, R. (2005), Loyalty trends for the twenty-first century, *Journal of Consumer Marketing*, Vol. 22 No. 2, pp. 72-80.
  - ***For published conference proceedings***: Surname, Initials (year of publication), Title of paper, in Surname, Initials (Ed.), *Title of published proceeding which may include place and date(s) held*, Publisher, Place of publication, Page numbers.

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  - ***For unpublished conference proceedings****:* Surname, Initials (year), Title of paper, paper presented at Name of Conference, date of conference, place of conference, available at: URL if freely available on the internet (accessed date).

  e.g. Aumueller, D. (2005), Semantic authoring and retrieval within a wiki, paper presented at the European Semantic Web Conference (ESWC), 29 May-1 June, Heraklion, Crete, available at: http://dbs.uni-leipzig.de/file/aumueller05wiksar.pdf (accessed 20 February 2007).
  - ***For working papers****:* Surname, Initials (year), Title of article, working paper [number if

available], Institution or organization, Place of organization, date.

e.g. Moizer, P. (2003), How published academic research can inform policy decisions: the case of mandatory rotation of audit appointments, working paper, Leeds University Business School, University of Leeds, Leeds, 28 March.

- ***For encyclopedia entries (with no author or editor)****: Title of Encyclopedia* (year) Title of entry, volume, edition, *Title of Encyclopedia*, Publisher, Place of publication, pages.

e.g. *Encyclopaedia Britannica* (1926) Psychology of culture contact, Vol. 1, 13th ed., Encyclopaedia Britannica, London and New York, NY, pp. 765-71.

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- ***For newspaper articles (authored)****:* Surname, Initials (year), Article title, *Newspaper*, date, pages.

e.g. Smith, A. (2008), Money for old rope, *Daily News*, 21 January, pp. 1, 3-4.

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e.g. *Daily News* (2008), Small change, 2 February, p. 7.

- ***For electronic sources***: if available online the full URL should be supplied at the end of the reference, as well as a date that the resource was accessed.

e.g. Castle, B. (2005), Introduction to web services for remote portlets, available at: http://www-128.ibm.com/developerworks/library/ws-wsrp/ (accessed 12 November 2007).

Standalone URLs, i.e. without an author or date, should be included either within parentheses within the main text, or preferably set as a note (roman numeral within square brackets within text followed by the full URL address at the end of the paper).

DIVERSITY IN FOCUS AND SHOWCASING THE DOCTORATE JOURNEY

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JIDR's Contribution to the Research Field

This forth volume of the JIDR is devoted to a wide range of research themes, which are all linked to the concept of diversity; both implicitly and explicitly. In addition, this volume showcases research related to the doctorate journey. As the mission statement and title of our journal suggests, our goal is to promote excellence in publications with a focus on both doctorate studies and also on research disseminated from specific doctorate studies. Many studies claim that less than 1% of the US population alone hold a doctorate degree http://www.census.gov/hhes/socdemo/education/data/cps/2014/tables.html. And some statistics suggest that, in a global context, depending on their course of study, as many as five out of six students drop out of their doctorate program before reaching their final year. At both the University of Reading and Norwegian Business School BI (where the authors are affiliated),the rigorous doctorate programs produce outstanding PhD candidates. As top ranking Financial Times ranked business schools, high expectations, high commitment and a high level of student support is important to us. Nevertheless, no more than half of those who start the journey with us choose to finish. In next year's journal, empirical data will be presented which investigates variables which impact the 'safe navigation of the doctoral voyage'. Elements such as choice of research methodology, professional background, family issues, career path, gender and choice of supervisor all impact the success rate of PhD candidate. Two of our articles this year therefore showcase the doctoral research journey. These contributions are provided by Dr Clare Stone and Dr Claudette Knight and are discussed below.

Back to our key journal theme of 'diversity': findings from this year's articles highlight a number of recurring and yet unresolved issues in global resaerch. Last year we mentioned the following aspects of diversity, and we continue with these issues this year:

- Geographical Diversity - Canada, USA, Scotland, Norway, Poland and England are represented.
- Disciplinary Diversity - Public and white collar crime, qualitative methodologies, culture and production, the process before and after taking a doctorate, and particle physics and the search for answers by describing the experiment itself.
- Content Diversity - Here we summarize the abstracts and/ or introductions to each of the articles in this year's issue.

Doctor Clare Stone

The methodology section of a doctorate thesis is often the major challenge for any researcher. What to choose? Quantitative or Qualitative and the many approaches offered in each area. Stone presents a reflective account of how and why the principles of Interpretative Phenomenological Analysis (IPA) were used in her doctoral research to capture competence for social work practice. The model developed is illustrated by a flow chart, and is presented to encourage novice researchers to have confidence to personalize methods to meet the needs of their research project.

Doctor Claudette Knight

Doctor Knight publication on "the glass ceiling" was presented in last year's JIDR issue before she had taken her viva exam. She presented a summary paper of the thesis at the Wisconsin Research Seminar in 2014, and after three blind reviews a summary article was accepted for publication in the Journal. After receiving her doctorate in 2015, she addressed the issue of the Dual Citizen Path ahead in the author's words. The reflection provides some learnings, observations, and plans of one individual who has taken a doctorate and is interested in contributing to her future both academically and professionally.

Doctor Katarina Pajchel

Doctor Pajchel is the second researcher we have asked to present part of her PhD thesis in the

JIDR Journal. She works for CERN in Switzerland, and the University of Oslo accepted her thesis in 2010. The thesis abstract and introductory chapter are presented in this issue of the JIDR. Sections include background, the way we work, the ingredients, the continuation the experiments. The thesis was accepted by the Faculty of Mathematics and Natural Sciences.

Doctors Michael Benson and Petter Gottschalk

Criminal research can be a real challenge. Benson and Gottschalk explore the differences between the public and private sector in terms of the prevalence and characteristics of white-collar criminals found in both sectors. The study is based on a sample of 369 convicted white-collar criminals in Norway from 2009 to 2013.

Doctor Tor Grenness

This is the longest article in this issue. The main reasons for this is that the article addresses national cultures and economic performance areas where much research has been done on each variable, but seldom combined. The author has been able to link both variables and present the research results from 27 member countries in the European Union.

Final Remarks

The way research is done is going to change a great deal in the next few years! We have tried to address these challenges by acknowledging that diversity is a key. As one can conclude from the above short summary of the diversities in each article, this year's issue is continuing to address these challenges.

Diversity also presents an added dimension in the refereeing process. During the past few years we have used up to four blind reviews for a single paper in the process of accepting articles for publication. A multidisciplinary approach is often necessary in order to make the final decision on publishing. The Journal accepted close to 50 % of the papers submitted this past year. This is higher than it was for previous years. Amendments play an important role here, and the suggestions from the reviewers helped improve all the articles that were accepted for this issue. In summary, we have to thank the Professors and other researchers who gave their time to help improve the quality of the JIDR 2015!

DEVELOPING METHOD TO MEET THE NEEDS OF THE RESEARCH

Dr Clare Stone

University of Central Lancashire. England

ABSTRACT

This article presents a reflective account of how and why the principles of Interpretative Phenomenological Analysis (IPA) were used in doctoral research to explore the phenomenon of competence for social work practice. Research that is hermeneutic in nature situates power and influence with the researcher and therefore careful selection of method and a reflexive approach are essential. For an insider-practitioner researcher, who aims to consider perspectives of lived experience, the hearing of and theorisation from participants' voice is paramount. Therefore when designing research consideration is required to ensure alignment and coherence between the research questions, methodology and method to be able to hear voice, to work toward generating credible insights and to draw conclusions that the professional community will find value in. This article explores how IPA was adapted to enable engagement with the depth and breadth of co-constructed qualitative data. This adaptation included drawing upon the phenomenological principles of hermeneutic circling and bracketing, resulting in the development of an individualised three stage data analysis model. This model is illustrated by way of a flow chart and is presented to encourage the novice researcher to have confidence to personalise method to meet the needs of their own research project.

Key Words: Interpretative Phenomenological Analysis, voice, hermeneutic circling, bracketing and practitioner research.

1. Introduction

As a novice researcher, I initially set out to look for a recipe of how to analyse data and thought that a book would provide a step by step guide to answer my research questions. However, my journey became one of an 'iterative decision-making process' shaped by a circular moving backward and forward between methodology 'objectives, research questions, and design' (Carter & Little, 2007:1323). Just because I considered my research to be phenomenological in nature did not mean that I had a blueprint or fixed set of procedures at my disposal but it did mean that I had an understanding of what could be known and how I could come to know it (ontology and epistemology) (Mason, 2002). Therefore, the selection and design of method was influenced by my methodological stance and by the questions I set out to answer. My research aim was to understand perspectives about a phenomenon. Yet, the constructivist ontology and interpretive epistemology of phenomenology situates power with the researcher in terms of voice because they decide what and how to research, whose voice is heard, what questions to ask, how the voice is interpreted, and in writing the researcher also has editorial rights over whose voice and which parts of interview data are included (Alcoff, 2009; Jackson & Mazzei, 2009). My research questions were designed to understand the perspectives of others yet interpretive research methods had the potential to situate a great deal of power with me as the researcher and in recognising this I felt the need to maintain focus on the voice of the participants within the methods employed.

As a practitioner researcher undertaking credible and ethical research was most important as I continued to work in the research setting alongside the research participants after completing the doctoral journey. Therefore, I aimed to work towards giving the best possible representation of participants' voice whilst acknowledging my own constructions and interpretations and this included careful consideration of how I was hearing voice within the data generation process and all stages thereafter. Drawing upon the work of Jonathan A. Smith (Smith, Jarman, & Osborn, 1999; Smith & Osborn, 2008), and maintaining a focus on the research questions and methodology, I began to explore a range of techniques to assist me to engage with the voice of the participants. This resulted in the development of a three-stage data analysis method, which drew upon hermeneutic circling alongside Interpretative Phenomenological Analysis (IPA), which enabled me to engage with the depth and breadth of voice within data. This paper presents

a descriptive account of my bespoke method to encourage other novice researchers to go confidently, be intuitive and experimental in their approach to qualitative data analysis. It is my intention that students of research may gain confidence to personalise method to meet the needs of their own research projects.

2. Phenomenological Research

My doctoral research used phenomenological methodology to understand how practice educators construct the competence phenomenon. Practice educators are social work practitioners that supervise, teach and assess social work students on practice learning placements and make a recommendation to the awarding university whether a student is 'fit to practise at the point of qualification' (SWRB, 2010:1). Although this responsibility situates them as important in the gatekeeping for the social work profession, how they recognise competence had previously been under researched in the UK. I engaged with 17 practice educator participants who collectively had 252 years of social work experience and had worked with 520 students and therefore were able to 'illuminate the phenomenon of' competence for social work practice (Ajjawi & Higgs, 2007:616). My research aimed to interpret perspectives of the competence phenomenon from participants' lived experience and in the semi structured interviews I asked questions, such as:

- What do you understand by the term 'fit in practice'?
- How do you recognise competence in final year social work students?
- What do you think makes a student competent to practice social work?
- Do you find it easy to decide if a student is competent to practice social work / fit in practice?
- What do you take into consideration when making your decision?
- What sources of evidence do you use to inform your assessment?

As phenomenology is interested in thinking, rather than behaviour, phenomenological analysis generates representation of perspectives rather than a description of what participants actually do in practice. I considered that the interpreting and theorising element of Interpretative

Phenomenological Analysis (IPA) to be more relevant to my research questions than traditional descriptive phenomenology (Pringle, Drummond, McLafferty, & Hendry, 2011) as giving thought to the 'essence' of the phenomenon and exploring meaning moves the research further than mere description (Dahlberg, 2006). IPA was relevant to my research as I was concerned with individual perspectives and was not seeking to produce an objective statement about what competence is (Giorgi & Giorgi, 2008; Smith & Osborn, 2008). Interpreting and theorising by way of IPA aims to 'understand what the particular respondent thinks or believes about the topic under discussion' (Smith, 1996:263). Therefore in my research 'it is the perception of [competence] which is significant rather than [competence] per se' (Smith, 1996:269-270).

My phenomenological research used semi structured interviews to gain understanding of perceptions, insights (Costley, Elliott, & Gibbs, 2010), experiences and understanding (Cousin, 2009) of the competence phenomenon as constructed by the practice educator participants. According to Smith and Osborn (2008) the semi structured interview is likely to be the best way to capture data for Interpretative Phenomenological Analysis because they enable the use of both tour and probe questions to generate rich data and capture perspectives and experiences in detail (Lodico, Spaulding, & Voegtle, 2010). I prefer the term 'generation' of data rather than 'collection' or 'capturing' as it more closely represents the co-construction process that occurred during the interviews. As the interviewer I did not 'excavate' the data rather my interpretation of what was said or implied during the interview influenced the co-construction process (Holstein & Gubrium, 1995) and the way that I was able to adapt questions and use participants' own words to encourage them to elaborate resulted in 'a seemingly natural conversation with the interviewee' (Melia, 1997:34). I found the fluidity of the semi structured interview enabled the participants to introduce topics and issues that I had not previously expected and rich data about competence for social work practice was generated.

The 'scholarly approach' of phenomenology is used to 'interpret meaning from everyday lived experiences' (Vandermause & Fleming, 2011:375) and although 'the interpretive account should illuminate the world of the participants, articulate taken-for-granted meanings, practices, habits, skills, and concerns' these are all subject to recall, current position, and the ability to find the right words to describe experience (Benner, 1994:xviii). The interpretivist position therefore does not make claims of provable truths as interpretation is subjective and to use the words of

Grix (2004) is likely to be 'messy'. This messiness arises from what we know and how we come to know it and involves complex inter-subjectivity and multiple layers of interpretation. During the interviews the participants and I co-constructed data through this interpretive process and Sarantakos (1998) suggests it is the job of the phenomenologist to 'unravel' the picture (Sarantakos, 1998:56). My approach to unravelling the picture (or making sense of the data) was therefore complex as there were multiple lays of interpretation compounded by my own knowledge and understandings as a practitioner researcher. My positionality is both that of an insider and outsider; like the interview participants I am a social worker and qualified practice educator yet as an academic I no longer practice social work. I am therefore on a sliding continuum moving between insider and outsider (Hockey, 1993) in a 'third space' or 'space between' (Dwyer & Buckle, 2009:60) which allows one to be both an insider and outsider at the same time. Hockey (1993) points out that insiders are familiar and understand language and behaviour of the participants yet cautions that insiders may not be objective, they may take things for granted, may be too familiar and therefore overlook key things.

Therefore during analysis and theorisation I had to be aware that the data had been co-constructed through multiple layers of interpretation all of which I, as a practitioner researcher, had influenced and had to some degree insider understanding. Smith and Osborn (2008) suggest there is no one way to analyse data within phenomenology and like other qualitative research methodologies the researcher has to individualise their approach. King and Horrocks (2010) advise the procedures and techniques ought to meet the needs of the research project and although Smith offers a four stage process of IPA he too advocates for the researcher to adapt it to their 'own particular way of working' because 'qualitative analysis is … a personal process' (Smith et al., 1999:220).

'IPA has been developed specifically within psychology' and is increasingly being employed within health and social science research (Rodriguez & Smith, 2014:479). For example Beestin, Hugh-Jones and Gough (2014) 'followed the procedures for IPA as outlined by Smith et al. (1999) and Smith and Osborn (2003)' in their research of the impact of maternal postnatal depression on men (Beestin, Hugh-Jones, & Gough, 2014:721). IPA was used a 'guiding framework' to research being a non-drinking student (Conroy & de Visser, 2014:540) and used to understand the experience of self-disgust in females with depressive symptoms (Powell, Overton,

& Simpson, 2014). Each of these research projects appear to have followed a similar process of coding each participant's transcript before considering connections and themes across participants' accounts. My adapted approach also closely matches the same initial coding process as described by Smith and engaged in a 'cyclical' process of looking in and between participants accounts (Smith et al., 1999:224 - 225). However like Ajjawi and Higgs (2007) I too found value in using the principles of hermeneutic circling because it offered me and additional way of engaging with participants accounts and what follows is a descriptive and reflective account of my personalised method to engage with voice in the generated data. I present a three stage process with each stage illustrated by way of a flowchart and all stages are illustrated together at the end of the document.

3. A Personalized Model for Doing Interpretative Phenomenological Analysis (IPA)

During the first stage of data analysis I needed to engage with the text for meaning which Mason (2002) calls interpretive reading because you construct 'a version of what you think the data means or represents, or what you think you can infer' (Mason, 2002:149). To do this I listened to the interview sound files and read each transcript a number of times and repeatedly asked myself 'what is this an example of' which helped me to focus on interpreting the meaning. The phrase 'what is this an example of' was inspired by the work of Ely (1991) who uses the term 'think units' (Ely, 1991:145). As Ely advised, I interrogated the data to identify the key messages within the text and this helped me to attach a code (name, term or phrase) to represent my understanding. Using a hard copy of the transcript of the interview I highlighted sections of text and in the margin wrote a code to reflect my interpretation and this technique of engaging with text and asking myself 'what is this an example of' inductively generated many codes. The codes were my interpretation of what I understood the practice educator participant had experienced or was inferring. The codes identified my interpretation of the meaning within the text.

When I had fully coded the first interview I then uploaded an electronic copy of the transcript into the software programme NVivo and highlighted and attached codes exactly as I had done on the hard copy. This coding exercise was undertaken with each subsequent interview text usually

before the next interview was conducted which helped to stop me feeling overwhelmed by data, but more importantly, it assisted with the planning for the subsequent interview. I was able to recognise new and unique perspectives and use probe questions more effectively during the interviews. During the coding process I frequently came up with new coding names and when I revisited previously analysed transcripts it was often possible for me to see similar instances that I had previously missed (Hammersley & Atkinson, 1995). An example of this is when I used the coding title 'practice educator role' for the first time. On revisiting previous interviews I was able to identify instances where other practice educator participants had also been talking about their role but I had not previously recognised this. I was then able to reconsider the text in the light of my developing interpretations and this frequently resulted in my recoding extracts of data and making links between codes. A second example is when the participant I call Alice discussed how challenging practice learning placements can be for students and how she tries to give students every opportunity to succeed. When the transcript of the interview with the first participant (Hazel) was revisited she too had mentioned giving students the opportunity to succeed:

> "Coz I think it's only fair you should give somebody a really good run and you know a fair chance." (Hazel)

The technique of revisiting text in light of new and potential insights helped to identify common themes across data. Figure 1 illustrates how the data was continually revisited in light of new understandings and insights. NVivo was a useful data management tool as it enabled me to change codes and add multiple codes to textual extracts easily. As my thinking and understanding evolved I coded and recoded data many times.

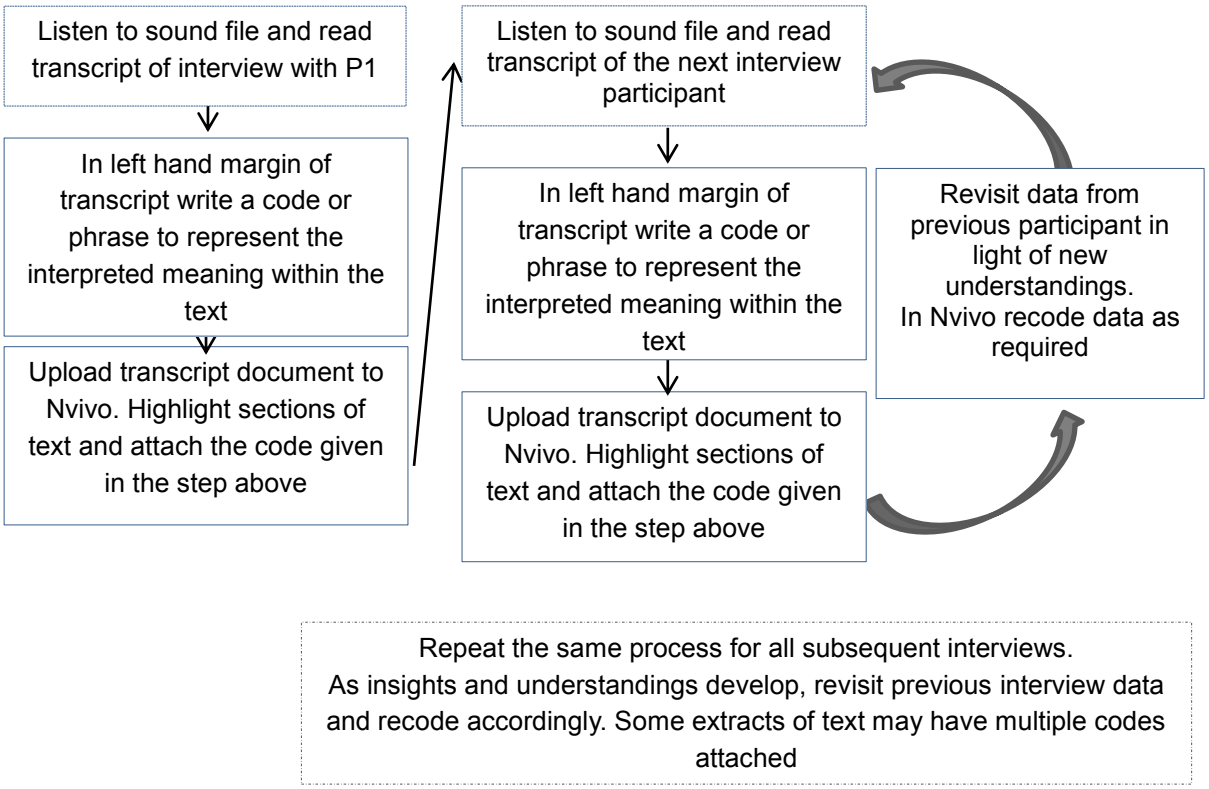

Figure 1. Stage one: Coding.

The second stage of my analysis process further developed insights by looking at all data which had the same coding title and is illustrated by way of a flowchart (see figure 2). The NVivo programme has the capacity to organise data by clustering together extracts with similar codes (Edwards & Weller, 2012). I was therefore able to produce a document within NVivo that included all instances coded the same way and this enabled me to interpret and theorise within codes, create sub codes and look for relationships between codes. For example by looking at the 155 extracts of text, which I had coded 'competence is', I was able to create eleven subordinate codes to further my understanding of competence:

- Ability to do social work
- Achieving
- Attitude
- Attributes

- Independence
- Knowledge-academic ability
- Learning
- Not the finished article
- Relationships
- Skills
- Values

Breaking data down in this way helped with understanding how practice educators constructed the competence phenomenon. This example illustrate how my coding titles changed and my insights developed through the process of continually revisiting data:

> "in some ways, it is a self-preservation skill to be able to just do the job and switch off, isn't it to some extent" (Alice)

When I asked myself 'what is this an example of' I initially thought Alice was describing the nature of social work and I used the code 'social work is'. Like Alice, Mark also spoke about social work practice and this extract below was also coded 'social work is':

> "the locality team and transition in particular isn't the worse bit of social work you'll do but it is very emotionally intense, practically intense, it's an awful time, it's an inevitable time, but an awful time for young people and families" (Mark)

When I looked at the multiple instances within the code 'social work is' I realised that the practice educators were not just describing the practical aspects of the job but were also highlighting that social work is a very difficult and demanding profession. The participants articulated their feelings of being overworked, working with very complex and challenging individuals and were doing this demanding job without adequate supervision. To assist with the interpretation process I recoded all instances where participants described the difficulties of being

a social worker to 'social work is difficult'.

On the first reading of this extract from the interview with Carl I thought he was suggesting that the role of the practice educator is to give students real work experiences and I used the code 'practice educator's role':

> "they've got all the things that they've always had with partners and children and in laws and parents, yeah, it is tough but, again, it's take the negatives out and say well, this is preparing you for the real work" (Carl)

However, by making links and connections to other participants' accounts I began to consider that Carl was looking beyond the practice learning placement into post qualifying practice. During interview Pamela said:

> "The newly qualified is supposed to have a protected case load and that does not always happen" (Pamela)

Interrogating data in light of my developing understanding I was able to consider that Carl, Pamela and other participants were perhaps describing the experiences of newly qualified social workers (NQSW). Although I asked questions about final year social work students the practice educators were not isolating the practice learning placement from the experiences students will have when they graduate. Looking across data at those extracts I had coded as 'the practice educators' role', 'service users', 'social work is', 'NQSW' and 'experiences', I was able to draw the inference that practice educators were identifying the need for students to develop resilience for social work practice. In different ways they had all been drawing upon their lived experience that to do the very difficult job of social work resilience is needed and 'resilience for social work' became a new code and a superordinate theme to help me interpret the meaning within the text. It was through the process of immersing myself in interview data and looking across texts that helped me to engage with the voice of participants and explore their perspectives of competence for social work practice.

The first stage of coding individual texts, and the second, which is to look across the range of interview data (which have both been described above), is a commonly practiced data

analysis process and it proved to be a useful way for me to engage with data. However, my desire to attend to voice within data encouraged me to further engage with the texts.

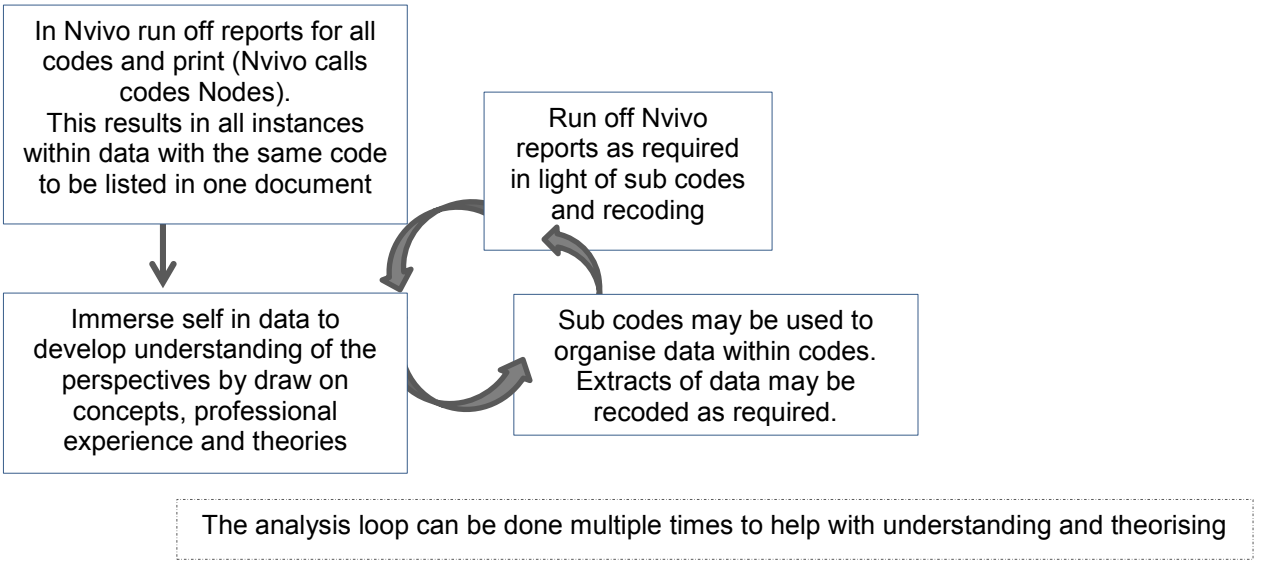

Figure 2. Developing insights.

4. Hermeneutic Circling

Attaching initial codes to textual extracts and then looking between and across codes helped me to engage with the breadth and depth of text to begin to understand, interpret meaning and theorise. However when I broke data down into coded extracts, removed them from their original context and merged parts of text with other similar instances there was a real possibility of misrepresenting the participant. Cutting data up and moving it about can result in the unique perspective within the participant's whole account being lost. Returning to phenomenological literature for guidance I found the principle of hermeneutic circling to be a helpful way to reconceptualise my interpretive approach because 'for the hermeneutic tradition, the hermeneutic circle describes a means for testing our interpretation of a given text' (Warnke, 2011:266). It involves 'continuously moving backwards and forwards between the literature, the research texts and the earlier analysis, moving from parts to whole following a process informed by the

hermeneutic circle' (Ajjawi & Higgs, 2007:625). Hermeneutic circling moves the researcher between understanding the whole by understanding the parts and vice versa. Cohen et al. (2000) discuss how parts of text need to be understood in relation to the whole and the whole understood in relation to the parts. Similarly Gadamer et al. (2004) claim the 'hermeneutical rule' requires one to 'understand the whole in terms of the detail and the detail in terms of the whole' (Gadamer, Weinsheimer, & Marshall, 2004:291).

Hermeneutic circling is an approach or an 'ontological philosophy' but it is not a defined procedure (Debesay, Nåden, & Slettebø, 2008:58). The principle guided me to consider a circular interpretive relationship enabling me to look deep into individual text and also draw my lens out to look at the whole and what I designed is illustrated in figure 3. The initial coding exercises in stage one and stage two of my analysis process fragmented whole interviews and to ensure that I understood the whole I constructed vignettes which I wrote in the first person as though they were practice educator narratives (Ely, 1991). The vignettes were constructed by listening to the interview recording and reading the transcript multiple times to understand each participant's main perspectives. I wrote a few sentences for each participant to summarise their main themes and I was influenced by the topics the participant had introduced themselves or had repeatedly returned to during the interview. Like the rest of the data analysis process it is important to acknowledge that this activity was subject to my own interpretation and I decided what to include and what phrases to use within these vignettes. Rather than reproduce the participants' whole accounts the construction of vignettes was a 'productive activity' in which I produced my own understanding of meaning using a mix of my words and those of the participants (Gadamer et al., 2004:296). The vignettes are 'multivocal' and the example included here uses speech marks to differentiate those words spoken by the participant and those of myself as narrator summarising the lengthy interview text (Mason, 2002:177).

4.1 Vignette constructed for Liam

> "I try not to flood them as soon as they come in", I gradually give them a few cases and responsibility, and by the end of placement I "take a back seat" because I want the student to "step up". But to do this depends on "how much they want to learn". It is ok for the student not to know everything and make mistakes but they must have "underpinning values" in relation to "what they say and think about service users".

> Students need to "be able to communicate well in difficult environment[s]" and understand "relevant legislation and relevant procedures". They will not learn everything on placement because "I don't think you can ever know everything" I certainly don't. Working here is difficult "I can barely cope with how different it all is and that's creating massive stress, sickness and all that". Despite that, professionalism is essential and I don't want them to complain and say "I'm exhausted". "I really enjoy [being a practice educator], I've always enjoyed it, something I've always wanted to get into … but I never realised how difficult it was just balancing that along with your own work commitments and I think it's, it's a shame that that's not recognised more" by my employer. People should only be a practice educator it if they have the time because it is a "massive commitment". (Liam)

The value of writing the vignettes was twofold. First by listening to the entire interview, I was able to focus on the whole, uncut messages of each participant. It was possible for me to hear their voice and consider what was important to them. The second value of the vignettes is in terms of confirming the original interpretations made during the coding exercise. Although the coding exercise chopped sections of text and moved them into groups the vignettes gave me confidence that the meanings did not appear to have been diluted or lost. The vignettes reinforce the main arguments both across the participants' accounts and also linked to the codes I had previously generated. Warnke (2011) suggests that one gains 'legitimacy for our interpretations when … we test our understanding of the meaning of each part of a text against our understanding of the meaning of the whole and…' vis versa (Warnke, 2011:266). Although the vignettes included some unique instances, on the whole I was able to see the similarities between the generated codes and the main messages within the vignettes. It is important to acknowledge that I interpreted data in both of these analytical methods so one may expect a degree of similarity. However it is my experience that the vignette construction and principle of hermeneutic circling added value to my research in terms of analysis and theorisation because it enabled me the opportunity to engage with the same text but in a slightly different but complimentary way to hear participants' voice and perspectives about competence for social work.

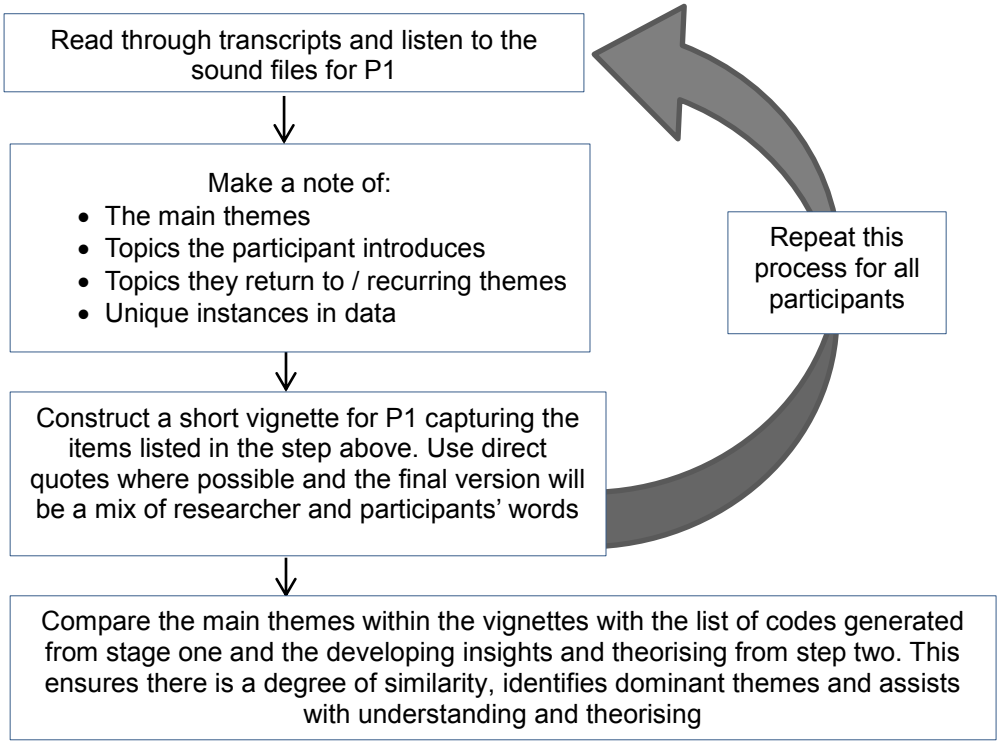

Figure 3. Hermeneutic circling

5. Bracketing and Credibility

The three stage data analysis process I developed afforded me different ways to immerse myself in data to understand practice educator's perspectives of the competence phenomenon. Smith (1999) reminds researchers that there is no prescribed way to do IPA and 'the crucial part of the analysis remains the particular interpretative analysis the investigator brings to the text' (Smith et al., 1999:238). As the sole investigator on my doctoral journey I was aware that my research choices had significant influence on the hearing, interpretation and presentation of voice. Gadamer's (2004) writing on hermeneutics gave me the confidence to interpret my own meaning whilst at the same time to acknowledge the potential limitations of the approach. 'The use of hermeneutic phenomenology enabled the exploration of participants' experiences with further abstraction and interpretation by the researchers based on researchers' theoretical and personal knowledge'(Ajjawi & Higgs, 2007:616). As Gadamer suggests I do not have 'better

understanding' or 'superior knowledge' or 'superiority of conscious' rather it is likely that I 'understand in a different way, *if [I] understand at all*' (Gadamer et al., 2004:296, italics in original text). I agree with Gadamer's points and have taken great care to be aware of my own experiences, knowledge and expectations when listening to and interpreting text. I attempted to follow Mitchell's advice and take off my 'discursive lens' (being an insider practitioner researcher as discussed above) and listen to the participant's voice with 'soft ears' (Mitchell, 2009:84-85).

Bracketing is a common phenomenological term and a traditional Husserlian approach requires the researcher to suspend their 'own preconceptions, beliefs and prejudices so that they do not influence the interpretation' (Roberts, 2013:215). As well as this Husserlian objective position, there is a contrasting use of bracketing which is more akin to Heidegger's hermeneutic acceptance which acknowledges subjectivity and one's influence within the research (Roberts, 2013). It is at this end of the continuum (the acknowledgement of influence) that I engage with bracketing because as a practitioner researcher I had experiences and knowledge of the phenomenon being researched and had many views and opinions which could not be suspended. As an insider researcher it was important for me to acknowledge my identity, position and influence on the research (Creswell, 1998; King & Horrocks, 2010). I therefore use the term bracketing to highlight and draw attention to my influence, attitude and to elucidate taken for granted assumptions (Salter, 2013). Throughout the research process I bracketed by drawing attention to my influence on all aspects of my research rather than considering the research process to be neutral and objective. Bracketing in this manner is reflexive practice which 'does not limit bias but brings it to the forefront' (Clancy, 2013:15).

Bracketing has served as a useful tool for reflexivity in my work as it has enabled me to recognize my prejudices, preconceived notions and labels that I attach. I have attempted to 'locate' myself as I am 'inevitably and inextricably implicated in the data generation and interpretation process' because as a practice educator, social worker and academic I had knowledge, experiences and views about competence for social work at the outset of the research (Mason, 2002:149). Gadamer (2004) calls this 'fore-meaning' as individuals do not approach situations as blank pages (Gadamer et al., 2004:270). I attempted throughout the research to acknowledge my fore-meaning to enable me to be more open to hear the life world of the

participants from their position rather than imposing my own views and labels as I interpret and draw conclusions. An example of this is my view of competency based education and training (CBET). Working in a school of social work I have been frustrated by the tick box approach to assessing individual competencies and my prejudice was reinforced by the wealth of literature on the limitations of CBET for the assessment of professional practice. I began the semi structured interviews expecting to hear practice educators criticising CBET and by clearly acknowledging what I expected to hear through bracketing I was able to be open to hear an alternative view. The participants appeared to perceive competence for social work practice in a different way than I expected and they were not overtly critical of the competency approach. Attention to my own prejudice and bias enabled me to hear and 'understand the meaning of another' and therefore see the text 'present itself in all its otherness' (Gadamer et al., 2004:271 & 272). Ajjawi and Higgs (2007) use 'van Manen's (1997) term *hermeneutic alertness* to explain how researchers 'step back to reflect on the meanings of situations rather than accepting their pre-conceptions and interpretations at face value' thereby recognising the importance of reflexivity (Ajjawi & Higgs, 2007:620).

Through having alertness to my potential influence at all stages of the research process and in particular in relation to the analysis, theorisation and the conclusions that I was drawing, I considered it appropriate to return to the practice educators to check out the appropriateness of my developing insights. Cohen et al. (2000) suggest the phrase 'reducing bias' covers reliability, accuracy, rigour and goodness (Cohen et al., 2000:85). It has been my intention to acknowledge my bias throughout my research project to produce credible insights because as a social work academic practitioner researcher I have to live with any mistakes that I make and cannot just walk away from the research site nor from the participants (Costley et al., 2010). As I began to share my understandings and insights I needed to do so from a position of confidence in my work knowing that it had been constructed with integrity and that the community find value in my conclusions. Going back to the community of practice educators and inviting them to provide feedback on my developing understandings maintained coherence with my ontological and epistemological positions of 'jointly creating an understanding'; there is no one objective way to construct the phenomenon and I wished to heightened my alertness 'to multiple ways of seeing' (Carter & Little, 2007:1321).

One event that I hosted was for a group of nine practice educators whom I engaged in a card sort activity to rank statements about competence 'into a continuum of significance' (Jahrami, Marnoch, & Gray, 2009:178). The participants' discussions during the sorting process were captured on a voice recorder and were a useful 'spur for deeper and richer analysis' (Bloor, 1997:49; Ellingsen, Størksen, & Stephens, 2010). The event was similar to a focus group and proved to be an important opportunity to review and check my developing understandings to ensure that interpretations were valid and of value to the practice educators themselves. A seminar for practice educators and an international conference provided the opportunity to begin to share my findings and the discussions and feedback gave me further confidence that my interpretation, analysis and theorisation was constructed in a way that the community were able to find value in and identify with. As is common in doctoral research I kept a research diary, engaged in dialogue with a critical friend and worked alongside my supervisory team to ensure that I was reflective, reflexive and working to produce credible research.

6. Conclusion

My research set out to understand more about the competence phenomenon and through semi structured interviews I asked participants to draw upon their lived experiences of working with social work students. Rather than aim to produce an objective statement to describe competence my phenomenological research was more hermeneutic in nature and it was important for me to recognise the multiple layers of interpretation at play. IPA was a useful framework to enable me to begin coding data however my desire to hear voice and at the same time acknowledge the complexities of interpretation led me to develop a more personalised method. By attending to 'the theoretical and disciplinary bases [of] methodology' I was able to develop a 'nuanced and flexible way and to feel personally confident in [my] practice rather than blindly following a recipe' (Carter & Little, 2007:1324). In deciding which methods to employ congruence with the research questions and underpinning philosophical framework makes a phenomenological study 'valid' (Pereira, 2012:19). The phenomenological principles of hermeneutic circling and bracketing were important additions to my research and both are conducive to the ontological and epistemology of phenomenology. Both of these phenomenological principles accept there is no one way to approach qualitative data rather there are multiple ways to arrange, interpret and

theorise.

I constructed vignettes to enable hermeneutic circling which enabled me to further engage with voice in a different but complementary way. The analysis of data was not a linear process because I looked at sections of texts and at whole texts, I looked within codes and across codes, I considered individual accounts for uniqueness and all accounts for common ground. The three stages of analysis evolved out of my wish to theorise and draw conclusions from hearing the voice of participants and at the same time recognise my potential influences. These influences came from my positionality of practitioner insider doctoral research student and bracketing by clearly drawing attention to these served as a useful reflexivity tool. By recognising my preconceptions, knowledge and experiences as a practitioner I felt that I was endeavouring to produce credible and trustworthy research, and findings that the practice learning community would recognise and find value in. These are important to me as a practitioner researcher as I continue to practise within the setting of my research and have on-going relationships with a number of the participants. It is also aligned to my social work values of honesty and integrity. I aimed to give the best possible account and strive to produce credible interpretation rather than risk individuals feeling that I have misrepresented their perspectives. I make no claims about truths nor do I propose that the conclusions I drew from my interpretations are the only way to construct meaning. However I found bracketing and reengaging with practice educators were important additions alongside my three stage IPA process (see illustration four) to give me confidence that I was endeavouring to produce credible and trustworthy research. In this article I share my three stage model to encourage others to consider how method can be drawn upon and adapted to meet the needs of their own research projects.

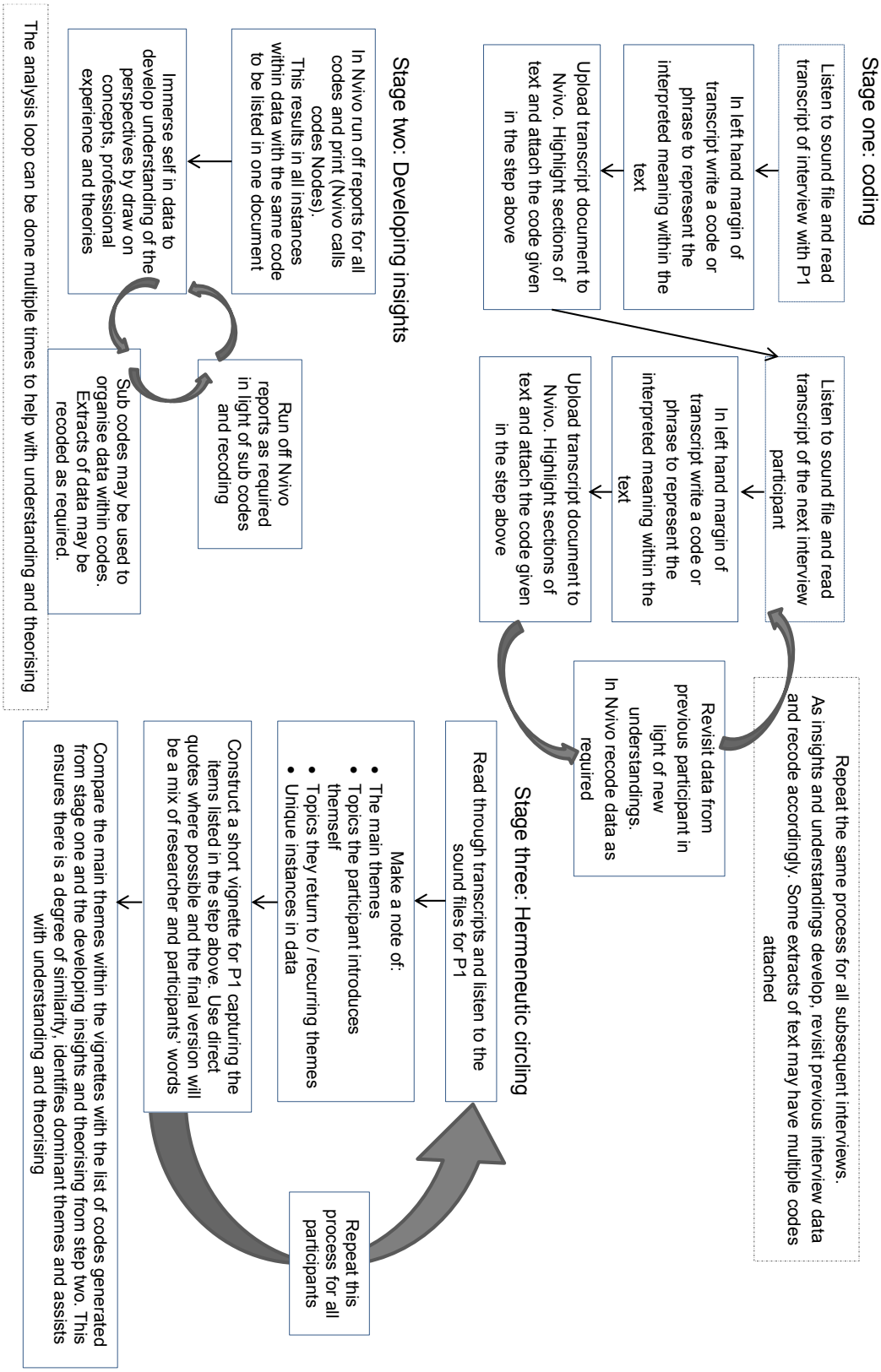

Figure 4: The three stages

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ON BECOMING A DBA: A SHORT REFLECTION

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ABSTRACT

Unlike the PhD, it is difficult to find books or articles that focus exclusively on how to successfully complete professional doctorates such as the Doctor of Business Administration (DBA). This paper contributes to knowledge on this topic by outlining some of the experiences and key learnings of a recent DBA graduate and outlining her future plans. The concept of "dual-citizenship" is explicitly explored because DBA researchers, who are typically seasoned working executives, will likely need to determine strategies to successfully navigate and integrate the academic and industry realms while pursing their doctorate. This dual citizenship is equally important to maintain following graduation if there is an intention to continue to conduct research or teach while simultaneously working as an industry practitioner. The article is a reflective account and does not purport to be authoritative; however, it aims to provide some useful ideas and guidance to those en route to doctorate or pondering their next steps after graduation.

Key Words: DBA, doctoral journey, dual-citizenship, glass ceiling, practitioner research, reflection.

1. Introduction

Books and articles providing guidance on how to successfully obtain a doctorate focus on PhDs, and, on occasion, briefly discuss professional doctorates such as the Doctor of Business Administration (Dunleavy, 2003, Kearns et al., 2006, Phillips and Pugh, 2007, Murray, 2011, O'Toole, 2015). Also, to this researcher's knowledge, there are few, if any, published books, or peer-reviewed articles, on how to proceed after a Doctor of Business Administration (DBA) degree is completed. This short article aims to address the dearth of literature on these interrelated topics by reflecting on one researcher's path to DBA and outlining her future plans.

My view is that the phrase "Becoming a DBA" refers not only to the journey required to successfully complete a doctorate: it is equally about the path taken after graduation. In order to fully become a DBA, the new graduate needs to determine how to effectively, and continuously, integrate research knowledge and skills into their corporate career. In essence, "Becoming a DBA" is an ongoing state of successfully blending academia with industry.

This short reflection is not comprehensive or authoritative. Instead, it illustrates some learnings, observations, as well as one individual's plans, with the sole objective of providing insight to those who are contemplating pursuing a DBA, or in the midst of their doctoral journey.

2. The Path to DBA

The DBA is one of a class of professional doctorates that emerged in the 1990s. Like a PhD, the DBA degree requires an original contribution to academic theory, but it also requires a demonstrated contribution to management practice (Phillips and Pugh, 2007). Individuals pursuing their DBA tend to be seasoned executives who are looking to undertake research on a part-time basis while simultaneously working in an industry setting (Kozma, 2015).

My DBA was completed at Henley Business School in the United Kingdom on September 25, 2015. I started the degree in October 2009 on a part-time basis while working full-time as a Human Resources executive in the Canadian financial services industry. My thesis research focused on the relationships between leadership, gender, and promotion. During the later stages

of my doctoral journey, I completed publications in both academia and industry (Knight, 2013, Knight, 2014). Initially, I balked at pursuing publication due to concerns about detracting time and energy from my thesis research. However, I quickly learned that my assessment of this undertaking was wholly incorrect. Publishing established a very high standard for quality, which in turn demanded more rigorous thinking about my hypotheses, analysis, and findings. In addition, publishing required multiple revisions of the original submission to incorporate reviewer feedback and to create a succinct final product, which substantially improved my editing and writing skills. So, although publishing initially appeared to be a detour from my thesis it became an accelerant. Both the refined thinking and enhanced writing skills resulting from publishing were directly transferable to my thesis and, in my view, enabled a faster completion of my doctorate.

In order to chronicle my doctoral journey I created a blog, www.becomingadba.com, in October 2010, and have written 213 posts, one each week, since inception. Initially, the practice of weekly reflection, required for regular blog posting, seemed like an isolated task that would eventually be useful to others. However, similar to writing for academia and industry, I quickly realized that blog posting was an important enabler to the completion of my doctorate. The act of formally writing a short post each week ensured that I regularly considered recent undertakings and often prompted the realization that I had made more progress than initially thought. This was very important for maintaining momentum and a positive outlook, both essential psychological benefits given the challenges and substantial time commitment associated with doctoral research (Dunleavy, 2003, Phillips and Pugh, 2007, Murray, 2011). Moreover, there were additional unanticipated benefits from blog writing, such as positive feedback from other DBAs candidates, which buoyed my spirits and expanded my academic network.

Like other DBA candidates, my plan has always been to remain in the corporate arena during, and after, completing my DBA. I have always intended to utilize my “dual citizenship”, as both a researcher and industry practitioner, by continuing to conduct research in the near term, and teaching university courses, on a part-time basis, in the longer term. For me, operating simultaneously in both academia and industry provides a unique perspective that can be valuable in both domains. For example, I used my industry knowledge to design a data collection strategy that resulted in the collection of 483 completed surveys, a 93% response rate, for my thesis.

Conversely, I have been able to apply quantitative research techniques to evaluating human capital challenges and opportunities to deliver greater value to my employer.

The benefits of combining expertise from domains with similar interests, but that typically operate separately, was reinforced by Gordon and Yukl when discussing leadership research: "In our opinion, the challenge of leadership researchers is to bridge the gap between the academic and practitioner worlds" (Gordon and Yukl, 2004 p. 356). More recently, researchers in the field of human capital formed a similar conclusion about the benefits of bridging across research domains (i.e. economics, entrepreneurship, human resources, organizational theory) in order to advance and extend their field (Nyberg and Wright, 2015). However, these researchers highlighted that adopting a more integrated and collaborative approach in the human capital field would not be without substantial challenge given the different language and assumptions that govern the respective disciplines.

The observations of the challenges associated with bridging across domains highlighted by Nyberg and Wright (2015) are similar to the hurdles that I encountered while pursuing my doctorate as I sought to operate successfully in both industry and academia. Understanding the ground-rules, assumptions, and language of the academic realm was a substantial challenge that required careful navigation throughout my doctoral journey. O'Toole accurately summarizes my experience: "University research culture is like going to a foreign country" (O'Toole, 2015 p. 29). More specifically, operating in the academic domain, either at a research colloquium or in discussions with researchers, required a conscious, and ongoing, effort to change my language and commentary to fit into academic culture. Now that I have completed my doctorate, ensuring that I can comfortably adjust to fit into the academic domain will likely require additional effort given I will be primarily immersed in the corporate world.

In addition to adjusting my language and commentary to fit into research culture, I have learned to be thoughtful and selective when integrating academic concepts into industry. For example, I am judicious when introducing academic theory to work colleagues for several reasons. First, there is a high value placed on commonly understood terminology. Second, immediate action, with tangible outcomes and measurable benefits, is essential. Finally, while my employer is keen to enhance the customer experience through innovation, new approaches also need to align with the existing and emerging corporate culture.

Therefore, the challenges associated with operating simultaneously in both the academic and corporate arenas are likely to continue. However, my experiences to date suggest that the benefits of a doctoral degree, including theoretical and empirical knowledge as well as heightened critical thinking skills, are valuable assets for an industry practitioner. Also, the understanding of the practical realities and nuances of organizations, as well as industry relationships, are valuable assets when designing and conducting academic research. In short, the benefits of dual-citizenship far outweigh the challenges. The next section provides an outline of my future plans.

3. The "Dual-Citizen" Path Ahead

An integral dichotomy emphasized during my doctoral journey was the importance of planning while simultaneously remaining open to new ideas and opportunities, and then adjusting plans accordingly. Hence, I have recently created plans for the future with a full understanding that they are likely to change. I plan to continue my full-time corporate role, which is especially enjoyable given the challenges, changes, and growth that characterize the Canadian financial services industry (MacDonald et al., 2012, Brizland, 2014, McVay, 2014). I also have three additional goals as a dual-citizen of academia and industry, which I aim to achieve in the next five years.

The first goal involves writing additional articles for peer-reviewed journal publications based on my thesis data. This will likely be two papers, one with a quantitative-focus and based on completed analysis, and the other with a qualitative-focus and based on thesis data collected but not yet analyzed. My immediate next steps include refining the list of journals that are optimal for future publications and understanding the protocol and practices required for joint publications. I hope that at least one future publication is completed with another researcher as I suspect that this type of collaboration will enhance my critical thinking and writing skills.

The second goal involves collecting new data in the field of executive promotion, with a focus on understanding factors that contribute to promotion to the C-Suite in corporations. One finding from my thesis research was that there is no statistically significant relationship between leadership style and promotion (Knight, 2015). This finding is contrary to an implicit, and

sometimes explicit, assumption in gender and leadership research, that leadership style matters for promotion (Eagly et al., 2003, Vinkenburg et al., 2013). Some researchers suggest that other variables, such as impression management (Singh et al., 2002), networking (Luthans, 1988, Kumra and Vinnicombe, 2008), or contextual factors such as life experiences and executive search firms (Atewologun and Doldor, 2013) may be important for promotion. This research notwithstanding, academic research on the path to the C-Suite is sparse (Beeson and Valerio, 2012, Vinkenburg et al., 2013). Ideally, my new research on this topic will be a case study. This approach will allow the collection of detailed information, from multiple sources, about one organization which, although not representative, can contribute to providing a deeper understanding of this topic (Creswell, 2009, Yin, 2009). I aim to then use findings from the case study to conduct additional quantitative research on this topic based on data collected from multiple organizations.

"When you learn, teach; when you get, give" (M. Angelou as cited in Winfrey, 2014). This quote from American poet Maya Angelou captures the reason for my final goal, which is to provide formal, and informal, guidance and support to doctoral researchers. It is well known that the doctoral journey is a challenging and rewarding solo pursuit (Dunleavy, 2003, Phillips and Pugh, 2007, Murray, 2011). However, if my experiences are representative, the path to doctorate is best achieved with the advice and encouragement of others. I have learned a great deal and received many gifts in the form of innumerable instances of guidance and support from both academic and administrative members of universities in Canada (Rotman School of Management), Norway (*BI Norwegian* Business School) and the United Kingdom (Henley Business School). I have been on the receiving end of many rewarding relationships for six years and I will end this reflection with a brief description of how I plan to reciprocate.

In a few months, I hope to become a Peer Mentor to a researcher pursuing the Henley DBA. Whereas the precise details of this role are to be confirmed, key accountabilities will likely include evaluating assignments and acting as a sounding board throughout the first 18 months which culminates in a MSc in Business and Management Research. I also look forward to aiding doctoral researchers as requested directly, and, also indirectly, through the continuation of my blog www.becomingadba.com. Finally, the intent of this short article has been to provide guidance to individuals traversing the lengthy and arduous DBA journey. I trust that my

reflections and commentary have provided useful insight strategically, tactically, and psychologically into “Becoming a DBA” to those en route to doctorate or contemplating their next steps after graduation.

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SEARCHES FOR SUPERSYMMETRY IN MULTI-LEPTON FINAL STATES WITH THE ATLAS DETECTOR AND RELATED CHALLENGES

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ABSTRACT

The ATLAS experiment at the Large Hadron Collider (LHC) is designed to address the open questions related to high-energy particle physics. Challenging experimental conditions require a worldwide-distributed computing environment, which allows the sharing of the workload and provides all collaboration member access to data and computing resources. NorduGrid is one of the three Grid flavors used by physicists for the LHC experiments. This paper will describe the implementation of the ATLAS computing model in the NorduGrid environment. This computing infrastructure is an essential tool used for facilitating physics analysis. One of the main goals of the ATLAS physics program is to search for Supersymmetric extensions of the Standard Model. In many cases, such models predict final states with three or more leptons. This paper investigates the potential of the ATLAS detector to discover Supersymmetry in trilepton final states. The analysis follows a jet inclusive and exclusive path aimed at two different types of trilepton events. The area of lepton isolation has been studied in more detail leading to some suggestions for optimization of the isolation requirements. Analysis strategies developed for the constrained SUSY model with gravity mediated symmetry breaking, mSUGRA, are applied on a novel set of points generated within the MSSM24 model. The first collision data collected in December 2009 and corresponding Monte Carlo simulation have been compared in order to obtain a preliminary impression of the understanding of the detector. Outreach activities carried out during the PhD project are also reported in the article.

Key Words: experimental particle physics, Super Symmetry, ATLAS, distributed computing, outreach

1. Introduction

The material presented in a theory introduction for a particle physics article is a summary of the writer's knowledge gleaned from courses and literature. The challenge is of course to choose a good selection of the material and present it in a clear way, possibly with an original twist. In the present case, part of the project has been general public outreach. It is therefore hoped that the reader accepts this choice of specific flavor for this introduction with its very basic character aimed at an audience without a particle physics background. It is based on the writer's experience in the field of outreach gained during her PhD project and reflects aspects of this work. Similar introductions have been presented in a radio lecture and several public lectures (Pajchel, 2009; K. Pajchel, 2010; Pajchel, 2011)

In writing for a general public audience, the challenge is to explain how physicists work, the very process of scientific endeavor, physicists' motivation, questions currently being asked, and struggles in finding answers. While physicists share their own excitements and fascination, they also have to justify and explain why this effort is interesting, valuable and important, in relation to a broader scientific, cultural and social perspective. The outline of the general introduction is as follows: Section 2 describes the process of particle physics research with its interaction between theory and experiment, Section 3 introduces the various building blocks and forces found in Nature following a historical path. In Section 4, our attention is turned toward the starting experiments at the Large Hadron Collider (LHC) and the searches for new phenomena. Finally, Section 5 presents the basic experimental methods of high-energy physics.

2. The Way We Work

Particle physics as the quest for fundamental building blocks of Nature finds its roots in the ancient Greece where the philosopher Democritos (460-370 B.C.) claimed that all things were built up of indivisible particles, atomos. The objects studied in particle physics today are much smaller than the building blocks that are currently called atoms. However, the idea and the questions are the same as in the antique: What are the fundamental constituents and laws of matter?

In order to better understand how we explain the various processes, why we claim the things we claim, and how we can convince even the funding agencies to actually invest in our experiments, let us look for a moment at how particle physicists work. Roughly speaking, they fall in two categories: theoreticians and experimentalists.

Theoretical physicists use fascinating mathematics as the language to describe all particles and forces within a framework called quantum field theory. One of the things that has really puzzled several of the greatest physicists is that Nature actually can be understood, even in great depth and detail, and it can be described by mathematics. Mathematics is after all in its very foundation built on logic and created by human beings, which could in a certain sense allow us to call it a humanistic discipline.

Thus, the theoreticians try to build mathematical models that describe the particles and forces in a correct way. The formulas are like the DNA code of the theory, which contain information about all particles and what processes they are involved in, how they are created, and how they decay. There is room for much creativity, but of course, the theories must be confronted with experiments in order to decide what is right and what is wrong. At the same time, the theories must also respect the laws of mathematics and their mathematical structures. These are actually some of the most fruitful guidelines in the development of new ideas. During the development of particle physics in the 20^{th} century, we have seen many examples of theoreticians who, trusting that Nature is mathematical, could say: “given this is correct” and “if this equation is to be solved” or “in order to complete this picture”, then we expect to observe certain new particles or processes.

That is where the experimentalists enter the scene and try to construct experiments and analyses that as unambiguously as possible can decide what the correct theory is. Often there are many models on the market and one has to bear in mind that the picture is changing depending on the energy conditions (scale) of the experiment. Repeatedly we see that theories or descriptions of phenomena are not wrong, but rather we learn that they have a limited validity and thus we have to look for a broader, more general picture. Such theories with a limited validity range are often called effective theories.

Nevertheless, despite the prophetical voices of the theoreticians, Nature is always capable

of surprising with things nobody had thought of. There is always a two-way communication. The experimental results are a continuous input in the theory calculations and models.

It is exactly this fascinating dialog between the mathematical theories and experiments that has unfolded before us the overwhelming picture of some of the fundamental constituents of Nature. Yet, we are far from done. In many cases we ask why something can happen at all. An answer of the type "quantity X is negative" may be perfectly correct, nevertheless, it does not make us much wiser. The next question would naturally be; why is it negative? Therefore, we continue to seek for even deeper and more general insight.

3. The Ingredients

All matter can at the most fundamental level be described as built up of indivisible particles. How these are created and decay, how they interact with each other, how they come together and create new particles, is governed by fundamental forces which will be described next. Not all types of particles can "feel" all of them. Which category a particle belongs to is very closely related to which forces it "feels", and this fact defines the classes of particles. Just by knowing which type a particle belongs to, information is gleaned about which processes it can get involved in.

The notion of force is familiar from everyday life. However, in the quantum mechanical world of particle physics it is more correct to speak about interactions, and these are mediated by special particles which are called force carriers. One could imagine an interaction between two particles as two persons on skates that throw a ball to each other. The person who throws the ball will experience being pushed backwards. The person who catches it will have the same experience. One can say that the ball has transferred some energy between these two.

Energy is another key notion and is found in nature in many different forms. It is the foundation of all there is, the actual raw material. Einstein's famous formula shows the relation between energy E and mass m.

$E = mc^2$

If one wants to create a particle with mass one needs an energy equivalent to the mass multiplied with the speed of light, c, squared. As the speed of light is very high, 3 × 108m/s, one needs a lot of energy to create particles with substantial mass. On the other hand, mass can also be transformed into energy and in effect release large amounts of energy. Some examples: the nuclear reactions in the sun as well as in nuclear plants, provide energy according to this relation.

3.1 The Leptons

After this introduction of the fundamental concepts, let us see how the strange world of particles unfolded during the last 100 years. The first glimpse of it appeared in 1897 when Thomson discovered the electron. During the first 35 years of the 20th century, one had identified all particles that build up the ordinary matter as seen around us. These are the lightest particles in their respective classes. As they are light, they are also stable which means they do not disintegrate, or in other words decay to other particles. For the sake of completeness, it is the electron, and the proton and neutron. The two last-named build up the nucleus of the atom. This was a great success, but of course, there was the ever present question: Are these particles fundamental or are they made up of even smaller particles?

The early discoveries were done through observations of radioactive sources, which provided particles with relatively low energy, or cosmic radiation. The Space is a constant source of highly energetic particles which collide with the atoms of the atmosphere and shower the earth with different sorts of particles. It was in the cosmic ray studies that one in 1937 observed a new particle that seemed to be just like the electron only 200 times heavier and apparently did not have any purpose. The surprise was very well formulated by Isodor Isaak Rabi who upon hearing the news asked: “Who ordered that?”.

During these years, we have two interesting examples of how theory and observation mutually interacted. In 1927-28, Paul Dirac laid the foundation of the quantum theory of electrodynamics, also called QED. The theory described interactions between particles carrying electrical charge. He also formulated the relativistic equation describing the electrons.

In his own view, it was a beautiful and mathematically compelling equation, and it had a great predictive power. Nevertheless, it provided a solution which despite its mathematical

correctness, seemed to be unphysical. In physics, there are several examples of such redundant solution, but in this case, Dirac claimed that it had a meaning and he interpreted it as an electron with an opposite electric charge, a so-called positron. Four years later in 1932, Carl D. Anderson made observations of a particle that could only be interpreted as an electron with positive charge. This was at the same time a first evidence of anti-matter.

Another example of theory preceding observation is found in the history of the mysterious neutrino. Wolfgang Pauli proposed in 1930 that the missing energy measured in the decay of neutrons into a proton and electron, a so-called β-decay, could be explained by an unobserved new particle. Since it would have to be electrically neutral and light it was named by Enerico Fermi neutrino, the little neutral one, however, in other respects it is an electrically neutral friend of the electron. Fermi published also in 1934 a more complete theory of beta-decay which included the neutrino. The idea was considered so speculative that the scientific journal Nature refused publishing it.

Around 1950 one had discovered several processes, which were assumed to be of the same nature as the β-decay and also described by Fermi's theory which became known as the weak interaction. The existence of the neutrino was experimentally confirmed first in 1953 by Frederick Reines and his colleague Clyde L. Cowan, Jr. The problem with neutrinos is that they really live up to their name. They can penetrate matter barely noticing it exactly because they interact only through the weak interaction. Actually, a very large number of neutrinos from space is passing undisturbed through us and through the Earth.

Nevertheless, sometimes Nature takes the lead. In 1960, one discovered at the Brookhaven laboratory that the muon, the "Who-ordered-that" heavy sibling of the electron also had an illusive neutrino partner. The confusion was ever growing when the SPEAR experiment at the Stanford Linear Accelerator (SLAC) in 1975 reported that they had discovered an even heavier "electron". It was a purely experimental adventure where one did not really have any theoretical reason for expecting a new particle. One wanted to explore the unknown, and Nature surprised.

The new heavy particle was called tau, τ . It is 17 times as heavy as the muon and since it appeared to be an electron-like particle, one assumed that also the tau had its own neutrino. The

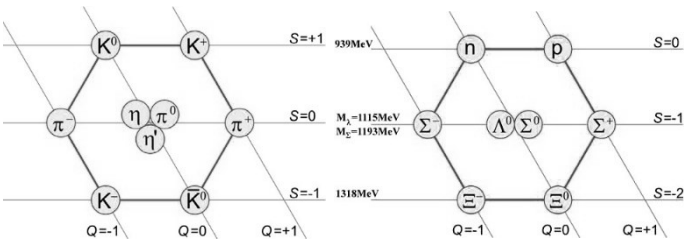
argument was that the picture would be incomplete without it. It was finally completed in 2000 when the existence of the tau neutrino was confirmed at Fermilab, the high-energy physics laboratory outside Chicago. There are very strong evidence that there are not more than three families, each with an electron-like particle and its neutrino partner. As a group they are all called leptons, "the light ones" in Greek. Which interactions do they get involved in? The electron-like particles, the electron, muon and tau, are charged and interact via the electromagnetic force mediated by the massless force carrier particle photon. The photon is actually nothing else than the very familiar light particle, the only particle we can actually "see". The electrically neutral neutrino is excluded from that game, but the weak interaction involves all leptons. This force is mediated by particles, which contrary to the photon, are actually rather heavy and this force has therefore a very short range. These are called the W ± and Z0 particles and were finally discovered in 1983 at CERN, the European high-energy physics laboratory outside Geneva, long after they had become part of the theory. Although this force is very weak compared to the electromagnetic interaction, we would not exist without it. We depend on it indirectly as it governs various nuclear processes, for example those in the Sun.

3.2 The Quarks

This was so far the story of the leptons. What happened with the protons and neutrons? Protons are positively charged so there is a repulsive force between them. Nevertheless, together with the neutrons they build up the atomic nucleus and actually stick quite tightly together. The force that is responsible for keeping the nucleus together must therefore be much stronger than electromagnetism and for this reason it was called the strong force. In the fifties and sixties one managed to collide particles at ever growing energies and a whole spectrum of new strongly interacting particles were discovered. Physicists were overwhelmed. J. Robert Oppenheimer suggested that for once one should give the Nobel prize to a physicist who did not discover a new particle, while Enerico Fermi claimed "Young man, if I could remember the names of these particles, I would have been a botanist.".

This particle zoo opposed the intuition of physicists which always goes in the direction of simple principles which involve only few fundamental factors. In 1964, Murray Gell-Mann and George Zweig proposed independently the so called quark model. It offered a classification

scheme built on the assumption that these strongly interacting particles were built up of even smaller constituents: quarks. Such particles built up of quarks are denoted by the common name hadrons, yet another word from Greek, meaning the “thick” or “heavy”. The quarks were assumed to have fractional electrical charge (±2/3 or $\mp$1/3) and other quantum mechanical features which defined how they coupled in pairs or triplets. If a particle is made of two quarks, the combination must be such that the charges add up to +1, −1 or 0 in which case it is electrically neutral. Such particles are called mesons. For example, the π-meson, is built up of the two lightest quarks: up and down. A positively charged pion π+ is made of an up quark (u, charge +2/3) and anti down (denoted by bar $\bar{d}$ and with charge +1/3), so $u\bar{d}$. To get the negative pion one simply flips the charge of the quarks and a π− is made of $\bar{u}d$. In addition, there is also a neutral pion π0 made of a mixture of $u\bar{u}$ and $d\bar{d}$. In the fifties, one started observing a new particle with a mass almost four times the pion mass, relatively long lifetime and it decayed into pions. Abraham Pais postulated a new quantum number called strangeness related to the heavier strange quark s (charge -1/3). This quark could explain the appearance of a new family of mesons called K-mesons.



(a) (b)

Figure 1. (*a*): Nonet of the lightest mesons . (*b*): Octet of the lightest baryons.

Quarks can also make up triplets called baryons. Most familiar are the proton made of uud (charge 1) and the neutron udd (charge 0). Take now the proton and change the d with an s quark, and one gets the slightly heavier Σ+ particle (charge 1).

With the three quarks, one could group the observed composite particles in symmetry patterns, in groups of 8 or 9. Figure 1 shows on the left the nonet containing the lightest mesons,

among them the π and K-mesons. On the right, there is the octet of the lightest baryons with the familiar proton and neutron in the upper row.

In the beginning, the schemes had some holes, but the particles predicted by the quark model were actually found, even with the anticipated mass and charge. This is again a good example of how theory could point ahead and the discoveries were considered as great support of the quark model.

One of the most compelling evidence of the quarks was the discovery of the so-called J/ψ particle in 1974. By this time one knew of three quarks, the up (u), down (d) and strange (s). The J/ψ was much heavier and had a longer lifetime than the other known unstable hadrons. The hypothesis was that it had to contain a new type of quarks, a so-called charm quark (c) and that it was a bound state of a c and anti-c. If this was correct, one could expect a whole new family of particles where the charm formed particles with the three already known quarks (u,d and s). If these were found, it would be a great confirmation of the model. As the experiments developed and could study collisions at even higher energies one could once again build up a beautiful pattern of new and heavier hadrons. After the discovery of the c quark one could set up two complete families of quarks, two in each, just like for the leptons.

The confirmation of the existence of the quarks was strong, despite the fact that no one had observed them directly. Quarks are said to be the most social particles as they are always found in groups of two or three and never alone. This is explained by the nature of the strong force that keeps them together. It is mediated by the massless gluon particle, which acts almost like a rubber band. The farther one pulls two quarks apart from each other, the stronger the force between them. If one "pulls" hard, instead of two free quarks, the energy which is put into this process will turn into new quarks that gather into new bound states. This is actually the production mechanism responsible for the hadron-zoo. However, this productivity had to follow some unbreakable quantum mechanical rules. Quarks with exactly the same properties cannot form a bound state. Some quantum mechanical property has to make them unique in the group. When the experiments on the contrary discovered combinations of quarks that seemed to be identical, one had to introduce a new quantum number that could distinguish them. It was called "color": red, green and blue. This color charge, which is assigned to quarks and gluons, is an analogy to the color theory in optics. Bound states of quarks are always color neutral, so-called

white. Like in electrodynamics where the charges define repulsion or attraction, the color charge is the key to the understanding of gluon mediated strong interactions. Therefore, the theory describing the strong interactions involving quarks and gluons is called quantum chromodynamics (QCD) using the Greek word for color "chroma"

Table 1

*Particles and their interactions (EM: Electromagnetism; *: Relatively tiny masses gravity is negligible)*

Particles	Weak	EM	Strong	Gravity
Neutral leptons, neutrinos	Yes	No	No	"Yes"*
Charged leptons e,μ,τ	Yes	Yes	No	"Yes"*
Quarks	Yes	Yes	Yes	"Yes"*

The discoveries in the hadron world did not end with the c quark. In 1977, Fermilab studied proton collisions which produced muon pairs that showed clear evidence of a new particle with a well defined mass. These were suggested to involve an entirely new quark, which was called bottom, or b-quark. Like in the previous cases, one could study a completely new rich spectrum of new particles in a higher mass range. Although it could fit into the quark model, one had no explanation why there should be a third family or if there were more than three families. However, the model was already convincing enough to predict that the third family also consisted of two quarks where the b-quark was accompanied by a heavier quark called "top" (t). Indeed, it is heavier. It weighs more than a silver atom and it was not until 1995 that one had the technology to collide particles at energies high enough to afford to make a pair of such heavy beasts. This discovery was also done at Fermilab.

In the nineties (1989-2000), the Large Electron Positron (LEP) accelerator at CERN made a number of precise measurements which involved all known particles, except the top quark. One of the main objects of study was the Z^0-particle, one of the weak force carriers. Observations of

how it decayed provided very strong evidence that there are only three light families of leptons and quarks. The discoveries of the particles in the third families of leptons and quarks, together with the studies of force mediating particles, so- called bosons, completed the picture, which we today call the Standard Model (SM) of matter and forces.

To summarize the journey so far. The Standard Model of particle physics includes three forces: electromagnetism, the weak and the strong, each mediated by a force carrier particle - photon for electromagnetism, $W^{\pm}$ and Z^{0} for the weak and gluon for the strong force. The matter particles are classified in two main groups: leptons and quarks, each consisting of three families with higher masses for each. Figure 2 shows a schematic overview of the building blocks of the Standard Model, while Table 1 summarizes which interaction the different particles can get involved in.

The 12 matter particles have also their respective anti-particles. In Nature, quarks are only found in composite particles consisting of two or three quarks and form a rich flora of so-called hadrons.

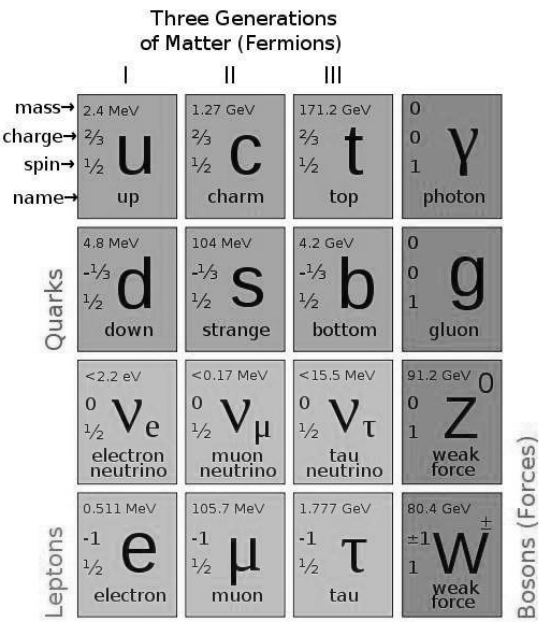


Figure 2. The Standard Model of particle physics

4. The Continuation

All experimental results so far show an astonishing agreement with the Standard Model. Nevertheless, there are some open "alarming" questions. The Standard Model does not include gravity. Of course, all things that have mass, including the particles, feel gravity, however at the microscopic scale it is negligible compared to the other forces. To this day, it has not been possible to formulate a mathematical theory of gravity along the same pattern of quantum fields as for the other interactions.

Another long-standing challenge is the question of the origin of mass. The simplest formulation of the equations describing the Standard Model contains massless particles and every straightforward introduction of mass would ruin the theory. The mass has to be introduced in a clever way and such a mechanism was developed in 1964 by a number of physicists. Today it has become known as the Higgs mechanism. If this is the correct solution, one should be able to observe in experiments the so-called Higgs particle. The LEP experiments did not find it, but set a minimum limit on the mass of the Higgs, while the Fermilab experiments have recently excluded a higher mass interval. As the search is closing up on the Higgs, one awaits with great expectations the start-up of the Large Hadron Collider (LHC) at CERN. LHC was in fact designed to cover the whole energy range where the Higgs particle should be if the mechanism it indicates is the correct answer.

One of the most important paths of current studies is to look for extensions of the Standard Model. Despite of the great success of the model, there is a number of observations and features in the theory that strongly indicates that the simple picture of Figure 2 is not the whole picture. One of the most compelling theories on the market is Supersymmetry (SUSY) whose basic idea is to add a so-called supersymmetric partner to every known Standard Model particle. These partners are equal in all respects, except for one quantum mechanical property called spin and of course mass. Since we have not found them yet, it is assumed that they are heavier than the familiar Standard Model particles. In addition to fixing several serious problems in the Standard Model, it also offers a candidate for the dark matter. This matter, whose nature is as of today unknown, is assumed to make up as much as 23% of the total mass in the universe. It is called dark because it is not visible in any other way than through gravitational effects. With the

present list of particles physicists can only explain the visible part of the mass of the universe, meaning basically the stars, which account for only 4% of the mass of the universe. This leaves us with the question how to explain the remaining 73%. Currently it is assigned to the elusive dark energy.

In addition, there are many other exciting ideas that will be up for testing at the LHC. More fundamental theoretical frameworks suggest that space itself may have extra dimensions in addition to the four familiar ones. This would again have an impact on gravity and under special conditions would allow us to observe gravitational effects like gravitons – gravity mediating particles – or even mini black holes.

These and many other questions are on the to-do list of the physicists in the coming years. The situation at the moment is similar to what we have experienced several times earlier. There is a very convincing and beautiful theoretical framework and an impressive list of measurements which confirm the theory or contribute to more and more precise estimates of the still unknown factors. All this accumulated knowledge, both theoretical and experimental, points clearly beyond the Standard Model towards a larger and more general picture. Another fascinating feature is that the more general theories we deal with and the higher energies we study, the more important becomes the link to astrophysics, cosmology and the early evolution of the universe.

It is this insight and trust in the fruitful interplay of theory and experiment that has been a driving force behind the enormous LHC-project.

I hope that this brief historical introduction of the Standard Model has shown how physicists work. Learning from the past, even though most of the new physics we plan to search for at the LHC are hypotheses, we strongly believe that LHC will reveal something, although not necessarily exactly what we prepare for, but definitely something.

5. The Experiments

When we speak of particles with high energy, we think of particles at very high speed, but also of particles that in themselves carry a lot of energy due to their high mass. Creating heavy

particles is “expensive” with respect to energy. As we are already familiar with all the lighter particles and want to create new and heavier ones, we need to somehow get hold of the energy that is required. This is done by accelerating particles to a very high speed, close to the speed of light, using an accelerator machine. The ones used in the most recent experiments at Fermilab and at CERN are shaped as large circles. At the LHC we send packages or so-called bunches of protons into the ring and accelerate them using electromagnetic field. The charged protons can be deflected by magnetic fields. The accelerator ring is therefore mainly built up of 15 m long magnets, which look like thick pipes. In the very center, the protons are passing through two narrow beam pipes. The magnetic fields are used to guide the protons around the 27 km long circle.

Once the protons revolve at tremendous speed in both directions, in order to “release” the energy and create new particles, they are at certain points lead to collide. In such collisions, the accumulated energy of the fast particles is transformed in various interactions into new particles. In order to observe them, the collision points are at the center of barrel shaped detectors.

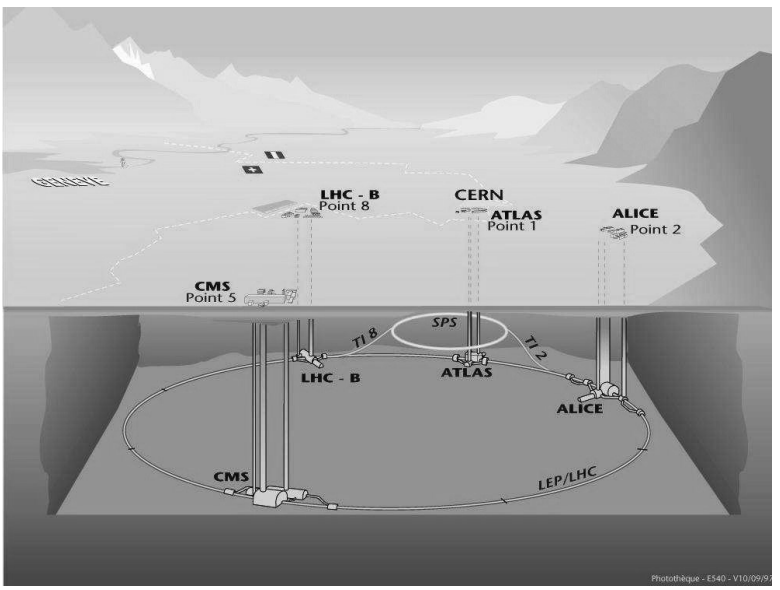


Figure 3. Overview of the LHC accelerator at the border between Switzerland and France approximately 100 m underground. ATLAS in situated at Point 1.

The rarely produced heavy particles have usually a very short lifetime and decay into other lighter particles which fly out in all directions into the detector that registers them as they pass by. A detector is like a large digital camera with millions of sensitive "pixels" throughout the whole volume. The information about the particles inside the detector is read out and tracks and energy deposits are reconstructed. There is no way to directly see what happened at the collision point, so all we can do is to use the particles registered in the detector to reconstruct the short-lived particles that were created in the collision and try to guess which type of process it was. A more detailed description of the LHC and in particular the ATLAS detector can be found in my PhD thesis (K. M. Pajchel, 2010).

Like the other detectors at the LHC, ATLAS is designed to collect as much as possible and as precise as possible information about the particles that pass through it. This leads to enormous amounts of data that needs to be processed, stored and distributed to the physicists. In order to handle and analyze the data we need a global computing facility, a so-called Data Grid, where a number of computing centers around the world share the work load. This system will be described in more detail in my thesis (K. M. Pajchel, 2010).

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PUBLIC SERVICE MOTIVATION THEORY: DIFFERENCES BETWEEN WHITE-COLLAR CRIMINALS IN THE PUBLIC AND PRIVATE SECTORS

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ABSTRACT

Public service motivation theory suggests that individuals tend to work in the public sector based on values that are different from the values of people who work in the private sector. This article explores differences between the public and private sector in terms of the prevalence and characteristics of white-collar criminals found in both sectors. Based on a sample of 369 convicted white-collar criminals in Norway from 2009 to 2013, this study shows that the prevalence of convicted white-collar criminals in the public sector is substantially lower than in the private sector. Furthermore, white-collar criminals in the public sector are significantly older, and they work in significantly larger organizations.

Key Words: white-collar crime, public sector, private sector, statistical analysis, Norway

1. Introduction

White-collar criminals are individuals who commit occupationally related financial crimes in a professional or organizational setting where they have legal access and can hide misconduct in legitimate transactions (Benson & Simpson, 2015). White-collar crime is a global problem of enormous dimensions. Fraud, financial manipulation, and corruption we find to varying degrees in every economy and society in the world. White-collar crime occurs in both the private and the public sectors of an economy.

Public service motivation theory seeks to explain why individuals choose public service over work in the private sector, given the perceived disparity in pay scale, advancement opportunities, and overall work environment (Kjeldsen & Jacobsen, 2013). We apply this theory to answer the following research question: *What differences can be found in the prevalence and characteristics of white-collar criminals in the public versus the private sector?*

2. Literature Review

2.1 White-Collar Criminals

A white-collar criminal was typically a member of the privileged socioeconomic classes in society (Sutherland, 1949) who is involved in illegal activities and commits nonviolent acts for financial gain (Gottschalk, 2014). The white-collar criminal is a person who commits crime in a professional setting, where criminals conceal and disguise their criminal activities in organizational work as law-abiding behavior (Pontell et al., 2014). The criminal has power and influence; he forms relationships with other persons or professionals, which protect him from developing a criminal identity, and he enjoys trust from others in privileged networks (Benson & Simpson, 2015). White-collar crime refers to offenses committed in an organization by those who indulge in dishonest activities either by themselves or using agents for financial gain (Schoepfer et al., 2014).

Law enforcement targeted at white-collar criminals tends to be non-aggressive and often discrete not only because of the upper class affiliation. Another reason for a more privileged

position compared to street criminals is the white-collar defendants' ability to recruit top defense lawyers who conduct both symbolic defense and substantive defenses, as well as information control, in their work for white-collar clients (Gottschalk, 2014). It is well known that having a well-qualified and possibly famous attorney increases one's chances of a favorable outcome in any legal dispute. Some individual white-collar offenders avoid criminal prosecution because of the class bias of the courts, where defendants typically belonged to the same social class as judges and attorneys (Tombs & Whyte, 2003).

When white-collar criminals appear before their sentencing judges, they can usually & correctly claim to be first-time offenders. According to Slyke and Bales (2013), theory and empirical research often have agreed that white-collar offenders benefit from leniency at the sentencing stage of criminal justice system processing. Croall (2007) argues that the term "crime" is contentious, as many of the harmful activities of businesses or occupational elites are not subject to criminal law and punishment but administrative or regulatory law and penalties and sanctions. Therefore, very few white-collar criminals seem to be put on trial, and even fewer higher-class criminals are sentenced to imprisonment. Another reason for the low prosecution and conviction rate for white-collar criminals is the extraordinary broad and vaguely defined offenses in criminal law for white-collar crime (Hasnas et al., 2010).

2.2 Public and Private Service Motivation Theory

Public service motivation theory suggests that some individuals work in the public sector based on their values, which from private sector values. Public sector values include a desire to contribute to the well-being of society in general through their work (Nalbandian and Edwards, 1983; Wright, 2007). The theory attempts to explain why individuals choose public service or private service (Kjeldsen & Jacobsen, 2013; Perry et al., 2010; Wittmer, 1991). This question has been studied in terms of how the work environment can create and facilitate public service motivation (Moynihan & Pandey, 2007) and measurement validity and reliability (Coursey & Pandey, 2007: Kim & Vandenabeele, 2010).

The concept of public service motivation is a theorized attribute of government employees that provides them with a desire to serve the public. It has been defined as 'an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions or

organizations" (Perry & Wise, 1990). The theory attempts to explain why some people choose careers in the government and non-profit sectors despite the potential for more financially lucrative careers in the private sector. While job positions in the private sector can be more financially lucrative, they also tend to be very limited in scope with little or no impact on society. Conversely, job positions in the public sector can be less financially lucrative but tend to have a wider scope with a greater potential impact on society. Research into such correlates reveals that public service motivation varies among employees, and it is difficult to generalize regarding the motivations of everyone who works in the public sector. Research has been done to identify antecedents to public service motivation, exploring the impacts of political and religious socialization, professionalism, political ideology, and individual demographic characteristics on preference for public service employment (Perry, 1997). The findings suggest that childhood, religious, and professional experiences all contribute to the development of public service motivation. Similarly, Perry et al. (2008) found that religion and volunteer experiences are significantly related to public service motivation. Because of this positive relationship between volunteering and public service motivation, some of the determinants of volunteering are useful in our study. Because higher educational attainment and being female have been shown to positively influence propensity for volunteering (Perry et al., 2008), we could expect education and gender to influence whether or not an individual takes part in white-collar crime. An interesting note in the Perry et al. study (2008) is that, while they were investigating public service motivation. Their sample consisted of volunteers that were not public sector employees, suggesting that education level and gender could be important to our study irrespective of whether the crime was in the public or private sector.

Many of the general theories that explain white-collar crime in the private sector are also relevant in the public sector. An example is rational choice theory, which postulates that government officials may take calculated risks when benefits seem to outweigh costs (Paternoster & Simpson, 1996; Shover & Hochstetler, 2006). Another example is opportunity theory, which suggests that attractive criminal opportunities may arise in the public sector because of weak controls and absence of credible oversight (Benson & Simpson, 2015; Benson et al. 2009). A third example is strain theory, which argues that individual level strains can be alleviated via financial crime, such as low pay or threats to employment status (Messner & Rosenfeld, 2013; Passas, 1990). A fourth and final example is social learning theory suggesting at local and

organizational based attitudes, value orientations, and rationalizations are conducive to involvement in white-collar crime (Brathwaite, 1989; Sutherland, 1949).

3. Research Method

Our data come from a content analysis of reports about white-collar crime in the two main financial newspapers in Norway: "Dagens Næringsliv" and "Finansavisen". Both of these papers are conservative-leaning business newspapers. In addition, the business-friendly national daily newspaper "Aftenposten" regularly reports news of white-collar criminals and so it was included in the study. Left-wing newspapers such as "Klassekampen" very seldom cover specific white-collar criminal cases, although they do report on the problem of white-collar crime in general.

The use of newspaper reports to assess involvement in white-collar crime is not without potential problems. Williams (2008) found that media coverage of white-collar crime cases tries to make sense of stories by selectively coding and communicating information to a variety of audiences. He argues that the media is not simply a device for reproducing narrowly hegemonic views of white-collar crime, but rather an active player that shapes regulatory meanings, moves markets, and sometimes encourages the very types of practices that may lead to corporate scandals.

Dagens Næringsliv, Finansavisen and Aftenposten were studied on a daily basis from 2009 to 2013 (five years) to identify stories reporting on white-collar cases and the people involved in them. A person was defined as a white-collar criminal if he or she satisfied the following criteria: (1) he or she committed an offense in a deliberate and purposeful manner as part of professional activity linked to regular business activities; (2) the offense involved large sums of money or large losses for others; (3) the offender had been portrayed in the paper as being successful and having high social status and a position of some power and access to organizational resources. In short, our approach to defining white-collar crime is consistent with the approach championed by Sutherland (1940) and other well-known white-collar crime scholars (Braithwaite, 1989). We focus on offenses committed by people of high social status and respectability in the course of their occupations. All of the registered offenses involved individuals working in organizational

settings (Benson & Gottschalk, 2016).

Verification of facts in newspaper accounts was carried out by obtaining court documents in terms of final verdicts. After registering newspaper accounts as an important indication of a white-collar offender, the contents in newspaper articles were compared to and supplemented by court sentencing documents, which typically range from five to fifty pages in Norwegian District Courts, Courts of Appeal and Supreme Court. Thus, we reduce the effects of counter measures by firms and individuals to cover up for their wrongdoings (Zavyalova et al., 2012).

4. Research Results

The three newspapers noted above were reviewed from 2009 to 2013 to identify stories reporting on cases of white-collar crime. Three hundred and sixty-nine criminals were registered in this five-year period in Norway (Gottschalk, 2015). There were 344 convicts in the private sector and 25 convicts in the public sector as listed in table 1. Thus, the public sector fraction of the sample is 7%.

In 2013, Norway had a population of 5 million people. There were 2.4 million persons working that year, out of which 1.7 million were in the private sector and 0.7 million were in the public sector. Public sector employees make up approximately 29% of the Norwegian work force, while 71% of Norwegian workers are employed in the private sector. However, as noted above, only 7% of the reported cases of white-collar crime between 2009 and 2013 involved public sector employees. This figure is substantially lower than would be expected if the prevalent rate for public sector white-collar crime approximated the proportion of public sector employees. This finding lends support to public service motivation theory about white-collar crime.

Besides the low prevalence rate, there are other differences between public and private sector white-collar criminals. White-collar criminals in the public sector are significantly older than private sector criminals. Detected public sector criminals are 50 years old on average when they commit crime, and they are 55 years when they are sentenced to prison in a Norwegian court.

Public sector criminals receive a prison sentence of 2.5 years on average, as listed in the Table,

which is slightly higher than private sector criminals. This is surprising, since the sum of money involved in crime is lower, only 15 million as compared to 50 million Norwegian kroner. Private sector criminals are somewhat wealthier and work in smaller organizations, but these differences are statistically not significant. There are more people involved in a crime case in the private sector, but again, this difference is not significant.

Table 1

Comparison of private sector criminals versus public sector criminals based on Gottschalk (2014, 2015)

Total 369 white-collar criminals	**344 criminals in private sector**	**25 criminals in public sector**	**T-statistic difference**	**Significance of t-statistic**
Age convicted	48 years	55 years	-3.111	.002
Age at time of crime	43 years	50 years	-3.386	.001
Years in prison	2.3 years	2.5 years	-.683	.495
Crime amount	50 m NOK	15 m NOK	1.119	.264
Personal income	388 000 NOK	329 000 NOK	.409	.683
Personal tax	182 000 NOK	118 000 NOK	.903	.367
Personal wealth	3.0 m NOK	.6 m NOK	.885	.376
Involved persons	3.4 persons	2.7 persons	1.447	.149
Business revenue	208 m NOK	379 m NOK	-1.885	.060
Business employees	123 persons	266 persons	-1.918	.056

5. Discussion

Public service motivation theory predicts that the rate of white-collar crime in the public sector should be lower than in the private sector because of the values typically held by people who work in the public sector. These values promote the ideas of community service and the importance of the overall welfare of society in general. People who hold such values should be less inclined, therefore, to harm the public welfare by engaging in financial fraud or embezzlement in their work places. Although the low fraction of white-collar criminals in the public sector (7%) as compared to the fraction of the workforce in the public sector (29%) is

consistent with public service motivation theory, there are other possible explanations. For example, opportunity theory can be introduced as a source of explanation. Opportunities may be more limited in the public sector, where rules and controls rather than goals dominate the culture. Rules imply that adherence to rules is both desired and controlled. Deviant behavior is difficult, because norms and guidelines are explicit and known. The focus is on how you do your work, rather than what you achieve in your work (Gottschalk, 2015).

Furthermore, the public sector is dominated by a security culture. For example, information systems security is taken much more seriously, often at the expense of user access and ease of use (Chekwa et al., 2013). Increased information technology security reduces opportunities for fraud. In the area of procurement, public procurement may be less efficient and more bureaucratic, but at the same time provide fewer opportunities for fraud (Hawkins et al., 2011).

Opportunity theory suggests that criminal opportunities are an important cause of white-collar crime. Without an opportunity, there cannot be a crime. Opportunity manifests itself by legitimate access, spatial separation, and appearance of legitimacy (Benson & Simpson, 2015). We argue that the extent of opportunity is dependent on the position and the situation. Public sector executives seem to have less opportunity to commit crime when compared to their colleagues in the private sector.

Opportunities to commit financial crime by white-collar people are more available in the private sector. The private sector is dominated by goals. Rules can be bent and possibly broken to achieve goals. Focus is on what you achieve in your work, rather than how you do your work. Dodge (2009: 15) argued that it is tough rivalry that makes people in an organization commit crime:

> "The competitive environment generates pressures on the organization to violate the law in order to attain goals."

The private sector is driven by goals, while the public sector is driven by following rules. Goals cause strain. Agnew (2005) identified three categories of strain: failure to achieve positively valued goals, the removal of positively valued stimuli, and the presentation of negative or noxious stimuli. Strain theory posits that each type of strain ultimately lead to deviance for

slightly different reasons (Agnew, 2005).

The American dream suggests that everyone in America has an opportunity to become monetarily successful. High white-collar crime rates may be attributed to the commitment to the goal of material success as experienced in the American dream. It is caused by an overemphasis on success in exposed assets (Schoepfer & Piquero, 2006), and it is not matched by a concurrent normative emphasis on what means are legitimate for reaching desired goals (Pratt & Cullen, 2005).

In addition to difference in opportunities and rules versus goals, other possible factors to explain the difference in the fraction of convicted white-collar criminals include detection rate, recruitment profile, and perceived compensation.

Next, there is the issue of whether or not different people are attracted to work in the public versus the private sector. Pedersen (2013) found that public interest is positively associated with attraction to public sector employment and negatively associated with attraction to private sector employment.

Reilly (2013) compared public versus private sector pay and benefits in terms of lifetime compensation. Competitive compensation is a key factor in ensuring that the public sector can recruit and retain a high-quality workforce (Sakellariou, 2012). In Norway, there is a general impression that employees on average are compensated well in the private sector compared to the public sector. However, employees in a sector tend to compare their salary with others in the same sector, and compensation variation is smaller in the public sector than in the private sector.

Because our study includes only cases that were of sufficient notoriety or newsworthiness as to garner newspaper coverage, our sample is similar (but not identical) to the high profile white-collar cases investigated by Steffensmeier et al. (2013). Because our study is limited to cases that were successfully prosecuted, our findings may not be generalizable to the broader population of undetected or unprosecuted white-collar cases.

6. Conclusion

This article has explored differences between the public and private sector in terms of the frequency and characteristics of white-collar criminals. Based on a sample of 369 convicted white-collar criminals in Norway from 2009 to 2013, this study showed that the frequency of convicted white-collar criminals in the public sector is substantially lower than in the private sector. Furthermore, white-collar criminals in the public sector are significantly older, and they work in significantly larger organizations.

Future research may explore reasons why there is a discrepancy in the frequency of white-collar criminals in the public versus the private sector. One potential reason is the lack of opportunity since public sector is rule based and full of control mechanisms. Another potential reason is lack of motivation since public sector employees are motivated by the larger picture of public service. Finally, a third reason is lack of detection or a lower detection risk since public sector employees may be subject to less suspicion of financial crime when compared to white-collar individuals in the private sector.

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NATIONAL CULTURE AND ECONOMIC PERFORMANCE: A CROSS-CULTURAL STUDY OF CULTURE'S IMPACT ON ECONOMIC PERFORMANCE ACROSS THE 27 MEMBER COUNTRIES OF THE EUROPEAN UNION

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ABSTRACT

This paper examines the impact of national culture on variations in economic performance among the European Union countries. In order to explain differences in economic performance we have used two data sets: The scores of the EU countries on Hofstede's five cultural dimensions, and the scores on economic performance from The Global Competitiveness Report (GCR) presented by The World Economic Forum. What we found was that countries with high scores on Power Distance and Uncertainty Avoidance score low on economic performance, while high scores on Individualism have a positive effect on economic performance. Although a multiple regression analysis did not reveal valid results about which dimension that consistently explains variations in economic performance, the overall explained variation of the model is high enough to support the conclusion that national culture contributes to explain variations in economic performance across the European Union countries.

Key Words: National culture, economic performance, cross-country differences, Hofstede

1. Introduction

Discussions of culture in general, let alone discussions of a possible link between culture and aspects of economic development, have generally not been seen as important among the mainstream professionals within the parameter of economics. For them, the term culture represents some kind of unimportant, irrational, messy noise, which requires ceteris paribus clauses (Thompson, 2002). Nonetheless, during the recent years there seems to be a growing interest in the role culture plays in analyses of economic development. Examples such as Huntington (1998), and Harrison and Huntington (2000) with their common affirmation of the importance of culture for economic development, has set a new standard for explanations of variations of economic growth across countries.

In the present paper, we have chosen the 27 member countries of the European Union (EU) as our research objects. The reason for this is that the financial crisis, which began during the summer of 2007 and hit the global economy in September 2008, appears to have had a particular impact on the European Union where financial market turbulences led to credit shortage and resulted in investment reduction and dramatic repercussion on Gross Domestic Product (GDP). A rapid growth in unemployment started a vicious circle of decreased economy and increased challenges for many European Union members (Europa.eu,2009). Italy, Greece, Spain, and Portugal are examples of countries struggling with a heavy national debt, in addition to the consequences of the global financial crisis (Rooney, 2012).

In spite of the fact that economic instability has been a major problem among the EU countries during the recent years, there seems to be substantial variations across the member countries' level of economic performance. However, why do nations differ in this respect? Why do some countries advance and prosper while others lag behind? This is certainly no new issue, but the final answer to these questions is yet to come. Nevertheless, we do know that several factors play an important role in a country's economic performance. Porter (1990) listed a row of what he labeled "factor conditions", such as natural resources, climate, location, demographics, communications, infrastructure, sophisticated skills, and research facilities. Others (e.g. Legatum Prosperity Annual Report, 2011) mention such factors as macroeconomic policies, economic satisfaction and expectations, foundation for growth, and financial sector efficiency. National culture is not explicitly mentioned, but Porter (1990) at least has a brief discussion of the role that

culture plays in relation to a nation's competitive success. His view is that social norms and values obviously do have an impact, but he refrains from including culture in his analysis due to measurement problems.

Still, there are good indications that some societies are culturally more receptive to economic development than others (Inglehart, 1990), and the view that a nation's "societal profile" (Kogut, 1991) is one important "determinant" (Porter, 1990) of economic performance seems to gain growing support.

Obviously, cultural factors alone do not explain all of the cross-national variation in economic growth rates or economic performance, but there is no reason to doubt that cultural differences are an important part of the story (Granato et. al., 1996). An often mentioned example is the Confucian influenced economies of East Asia, which during the last decade has outperformed the rest of the world despite the fact that the South Asian countries are shaped by a wide variety of economic and political institutions. Consequently, there is good reason to believe that the economic growth of a particular country is not only determined by economic and political institutions; cultural factors are also important (Granato et. al., ibid).

According to Parsons (1964), a common set of norms mediate all interactions between individuals in a society. Acting in conformity with normative standards can be described as acting according to cultural attitudes (Shoham & Malul, 2012). Thus, cultural factors are also assumed to shape the economic environment (Freytag & Thurik, 2007).

2. Literature Review

2.1 The Concept of Culture

Culture is a vague concept. In the formal jargon of economists, culture can be translated as the social norms and the individual beliefs that sustain Nash equilibria as focal points in repeated social interactions (Greif, 1994; Myerson, 1991; Schotter, 1981; Tabellini, 2005). A more general definition is that culture refers to a system of basic common values that help shape the behavior of the people in a given society (Granato, et.al, 1996). Hofstede (1980, 2001) subsequently

moved the concept of culture to the cross-cultural arena by describing cultural (societal) values as "the collective programming of the mind that distinguishes the members of one group or category of people from another" (Hofstede, 2001:9). This programming typically happens early in life (Minkov & Hofstede, 2011), and leads to behavioral patterns that continue over time, shaping the institutional environment (Hofstede, 1980; Mueller & Thomas, 2001). Hofstede's primary achievement, however, was that he provided the social sciences with an empirical mapping of countries across four (later five) dimensions of culture, and thus met a growing academic hunger for structure concerning culture (Bond, 2002). There is little doubt that Hofstede's framework, where national culture is expressed in a number of cultural dimensions, has paved the way for researchers looking for ways to measure culture's impact. Impact on economic development may well be included here.

2.2 Culture and Economic Performance

In spite of the opening remarks of this paper, the view that culture is a fundamental determinant of economic development is not new (Tabellini, 2005).

The well-known Protestant Ethic thesis of Weber (1930), where he argues that the rise of Protestantism is a crucial event in modernizing Europe, is perhaps the most known example. Even though it is possible to argue that during the last fifty years of the twentieth century Catholic Europe showed higher rates of economic growth than the Protestant countries, Weber's more general concept, that certain cultural factors influence economic growth, represents an important and valid insight. Above, we have referred to Porter's (1990) remarks concerning culture's impact, and in a subsequent article he defined economic culture as "the beliefs, attitudes, and values that bear on economic activities of individuals, organizations and other institutions" (Porter, 2000:14). The assumption that such beliefs, attitudes and values are shared by people born and raised within a specific cultural context, leads us to look for ways to apply national culture as our independent variable.

2.3 Measuring National Culture

In order to measure national culture, this article will use the framework of Hofstede. The reason for choosing Hofstede over others, such as the measures used in the GLOBE study (House

et.al., 2004), is based on two main reasons. Firstly, the national cultures of all EU member countries have been measured by Hofstede, which is not the case with GLOBE. The second reason is that the number of cultural variables used by Hofstede are fewer which makes it easier to follow Shenkar's (2001) approach which claims that in using culture as an independent variable, each variable should be used separately, not as an aggregate. Consequently, in the present paper we have decided to use Hofstede's original five cultural dimensions in order to determine which particular dimensions have an effect on the economic performance, as well as on variations in economic performance across the 27 EU member countries. The decision to use Hofstede must also be viewed in light of the results of Kirkman et.al. (2006). They reviewed 180 studies from the last 20 years, using Hofstede's framework. They comment that his dimensions have successfully predicted variations between nation-states, and links between culture and organizational behavior. The five cultural dimensions by Hofstede (2001) can be described in this way:

1. *Power distance* – defines the extent to which a society accepts unequal distribution of power in institutions and organizations.

2. *Uncertainty avoidance* – defines the extent to which people in a culture feel threatened by uncertainty and ambiguous situations.

3. *Masculinity/femininity* – where masculinity indicates the extent to which the dominant values of a society are "masculine", e.g. assertive and aggressive, while feminine values typically will be modesty, solidarity and quality of life.

4. *Individualism/collectivism* – where individualism implies a loosely knit social framework, and collectivist cultures are characterized by in-groups.

5. *Long-Term Orientation* - emphasizes values associated with perseverance, persistence and they have a strong propensity to invest and save, while short-term orientated societies are directed towards the past and present, shows a low propensity to invest and save and focus on achieving fast results.

2.4 Measuring Economic Performance

As we have briefly discussed above, no single measure, or even a limited set of measures, can provide all the information needed in order to assess the economic performance of a firm or a country. In light of the failure to foresee the recent economic crisis, questions have been raised whether the measures used in order to assess not only the performance of firms, but of national economic performance as well are valid (Stiglitz et. al., 2009).

Consequently, in the present paper, we have sought to apply a measure of national economic performance which reflects the complexity of the task. The data presented by *The World Economic Forum (WEF)* in their *The Global Competitiveness Report (GCR)* contributes to the understanding of the key factors determining economic growth and helps to explain why some countries are more successful than others in raising income levels and opportunities for their respective populations. The GCR analyzes 142 major and emerging economies, including the 27 EU member countries. It contains a detailed profile for each of the economies featured in the study as well as an extensive section of data tables with global rankings covering over 100 indicators/variables (GCR 2011-2012). The variables are organized into *twelve pillars*, with each pillar representing an area considered as an important determinant of competitiveness (GCR 2011-2012, 45). Below, we provide a short description of the twelve pillars.

The twelve pillars of the GCR:

1. *Institutions*, i.e. the legal and administrative framework in a society
2. *Infrastructure*, i.e. the quality and extensiveness of roads, railroads, electricity supply etc
3. *Macroeconomic environment*, i.e. savings rate, inflation, government surplus/deficit
4. *Health and primary education*
5. *Higher education and training*
6. *Goods market efficiency,* i.e. ability to produce the right mix of products and services, as well as to ensure that these goods can be effectively traded in the economy

7. *Labor market efficiency,* i.e. high degree of flexibility and efficient use of talent
8. *Financial market development,* i.e. a sound banking sector, well-regulated securities exchanges, venture capital and other financial products
9. *Technological readiness,* i.e. level of technological adaption and ICT use
10. *Market size,* where the emphasize is on international markets
11. *Business sophistication,* i.e. quantity and quality of local suppliers, nature of competitive advantage and value chain breadth
12. *Innovation,* i.e. utility patents, scientific research institutions, government procurement of advanced technology products

(A more extensive description of the pillars is found in Appendix 3)

It is important to mention that even though the GCR measures each pillar separately, it is crucial to understand that these pillars are not independent. In fact, they tend to reinforce each other, both positively and negatively.

3. Research Purpose

As we have discussed above, our research purpose is to investigate to what extent national cultural differences and/or similarities among the European Union countries can contribute to explain variations in their economic performance.

In line with the recommendations of Shenkar (2001) we will be presenting consequences for each of the five dimensions with possible links to factors that are included in the measurement of economic performance. These will subsequently lead us to our hypotheses.

According to Hofstede (2001), in societies with a high level of Power Distance, people accept a hierarchical order in which everybody has a place and with no demand for further justification. People holding power are entitled to privileges that are often denied to the less

powerful. In these societies, there is a tendency for the administrative elites to be unrepresentative of the total population, leaving important decisions to be made by a select few. The unequal distribution of power also tends to pave the way for obedience as a central value (Tabellini, 2009), and according to Williamson and Mathers (2010), the existing literature suggests that high levels of obedience will negatively impact economic development.

Moreover, societies with high scores on Power Distance tend to be more corrupted (Husted, 1999), According to the WEF's twelve pillars, more specifically to the institutional pillar, corruption is viewed as a sub-variable that negatively affects administrative and political institutions of countries (GCR, 2011-2012).

Based on the consequences of the Power Distance dimension outlined above we propose the following hypothesis:

Hypothesis 1: Power Distance will be negatively correlated with economic performance measures

Hofstede (2001) further states that societies scoring high on Uncertainty Avoidance tend to be more resistant to change, people tend to be more stressed, anxious and neurotic in general. Studies prove that high levels of stress and anxiety result in several health problems (Stojanovicz & Marisavljevich, 2007). The fourth pillar in the GCR focuses on the health of the work force in a country, in which it states that unhealthy workers are less productive and cannot exploit their potential. This leads to increased costs to business, and consequently to costs to a country's economy.

In a high Uncertainty Avoidance society there is also a tendency for higher levels of conservatism and skepticism to what is different, and people tend to hold life long employments (Hofstede 2001). Hofstede also claims that innovators feel constrained by rules, and because of the conservatism, innovations are often resisted. This leads us to believe that countries with a high score on Uncertainty Avoidance tend to be less competitive than those with low Uncertainty Avoidance. For example Raluca (2011) emphasizes the degree of importance of innovation and knowledge as a boost for economy and competiveness. He claims that innovation is a growth driver for businesses, industries and countries as it reinforces their competitive position on the

markets, boosts their productivity and develops key competences. Raluca's suggestions also reflect the GCR's 12th pillar, which points out that innovation plays a crucial role in economic development. These views are consistent with Harper's (2003) who states that the general picture in high uncertainty avoidance societies is to be less likely to engage in the risk-taking essential for entrepreneurship. Thus, our next hypothesis:

Hypothesis 2: Uncertainty Avoidance will be negatively correlated with economic performance measures.

According to Hofstede (2001), masculine societies tend to focus on values associated with competitiveness, achievement and performance. People tend to have a "live to work" mentality and stress that money and things are more important than quality of life and relationships. Hofstede also states that gender roles are more defined and accepted by both women and men. There are fewer women holding management, political and government positions, and wage gaps are larger between the genders. The seventh GCR pillar states that the percentage of female participation in labor force influences labor market efficiency, which contributes to a higher score in the competitiveness Index. Moreover, in masculine societies, there is also a higher percentage of poor and illiterate. Also people in general hold a more negative attitude towards institutions and political establishments (Hofstede, 2001).

On the other hand, in feminine countries there is a higher percentage of educated people, more women hold higher job positions, and there is a stronger focus on equality in both gender roles and work positions (Hofstede 2001). Gylfason and Zoega (2003) analyzed possible correlations among education, equality and economic growth and they found that education seems to encourage economic growth by enhancing equality. The fourth and fifth pillars in the GCR also include quality of primary and secondary education, and enrollment rates as sub-variables in their measurement. The discussion above provides a basis for proposing the following hypothesis:

Hypothesis 3: Masculinity will be negatively correlated with economic performance measures.

In addition to the main characteristics of Individualism described previously, people in societies showing high levels of Individualism tend to make more independent decisions, which

help accelerating the process of decision-making (Hofstede, 2001). They are also more willing to take initiative and expect others to have personal opinions. In work situations, hiring and promotions are supposed to be based on skills and rules, and people tend to have longer working hours. Consumers read more books and are more interested and open to new technology, which indicates a direct link to the ninth pillar in the GCR - technological readiness. In politics, power is exercised by voters. Laws and rights are supposed to be the same for all. A larger share of national budget is spent on education and is consequently increasing the quality and the number of people pursuing higher education (Hofstede, 2001). In the GCR, the fifth pillar focuses specifically on higher education and training by including sub-variables, such as quantity and quality of both secondary and tertiary education. Based on these characteristics, the next hypothesis is:

Hypothesis 4: Individualism will be positively correlated with economic performance measures.

In societies scoring high in Long-Term Orientation, people tend to be more persistent and perseverant. In business, they tend to work towards building strong positions instead of expecting fast results; therefore they are having a stronger tendency for saving and investing (Hofstede, 2001). It is known that household savings are an important source of capital investment, and can be used as an indicator for long-term economic growth, (Aridas, 2011). The third pillar in the GCR looks at the countries' macroeconomic environment, where national savings rate is pointed out as an important sub-variable in the analyses of this pillar. Another factor in the GCR's measurements, which also can be influenced by the Long-Term Orientation's propensity for saving and investing, can be found under pillar number eight, which analyses the efficiency of financial market development.

Based on the above discussion, we ideally would have postulated the hypothesis that a Long-Term Orientation tends to positively influence a country's economic performance.

However, based on what we have discussed above, not least the fact that this dimension was developed in order to fit in with Asian cultures, we refrain from postulating either a positive or a negative relation between scores on this dimension and economic performance. Consequently, we change the hypothesis to:

H5: Long-Term Orientation will be neither positively nor negatively correlated with economic performance measures.

4. Method

The present study is based on a combination of two data sets. The first one is the results from Hofstede´s statistical studies. The results contain the countries he analyzed over the years and their respective scores on each of the five dimensions. The scores are ranged from 1 to 100, where 1 is the lowest and 100 is the highest.

The second data set is taken from The World Economic Forum Index 2012, where economic performance of countries has been measured by analyzing several factors, which we have presented above. The countries are ranged after their overall scores on competitiveness where 1 was the lowest and 7 was the highest. This data set represents the dependent variable, "economic performance" in our study.

Below we provide an overview of the EU-countries' scores on economic performance and on Hofstede's five cultural dimensions, i.e. our independent variables:

Table 1

EU countries' scores on economic performance and cultural dimensions in order of economic performance. (WEF Index, 2012; www.geert.hofstede.cultural/dimensions)

Countries	Economic performance	PDI	IDV	MAS	UAI	LTO
Sweden	5.61	31	71	5	29	20
Finland	5.47	33	63	26	59	41
Germany	5.41	35	67	66	65	31
Netherlands	5.41	38	80	14	53	44
Denmark	5.40	18	74	16	23	46
United Kingdom	5.39	35	89	66	35	25
Belgium	5.20	65	75	54	94	38
Austria	5.14	11	55	79	70	31
France	5.14	68	71	43	86	39
Luxembourg	5.03	40	60	50	70	64
Ireland	4.77	28	70	68	35	43
Estonia	4.62	40	60	30	60	82
Spain	4.54	57	51	42	86	19
Czech Republic	4.52	35	58	45	74	13
Poland	4.46	68	60	64	93	32
Italy	4.43	50	76	70	75	34
Lithuania	4.41	42	60	19	65	82
Portugal	4.40	63	27	31	104	30
Hungary	4.36	46	80	88	82	50
Malta	4.33	56	59	47	96	47
Slovenia	4.30	71	27	19	88	49
Latvia	4.24	44	70	9	63	69
Slovakia	4.19	104	52	110	51	38
Bulgaria	4.16	70	30	40	85	69
Romania	4.08	90	30	42	90	52
Greece	3.92	60	35	57	112	45

4.1 Validity and Reliability of the Data Sets

We are aware of the fact that Hofstede's work has been criticized for not having used representative country samples, for lack of face validity of his questionnaire, and complicated formulas for calculating the scores (i.e. Sweeney, 2002). However, his data has been used, and still are used in studies of cross-cultural issues published in leading journals. We posit that this supports our decision to use Hofstede's country scores as our independent variables in the current

study.

We also think that the validity and reliability of the Index developed and used by the Global Competitiveness Report are confirmed by the fact that the data stem from internationally recognized agencies, such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Monetary Fund (IMF), and the World Health Organizations (GCR, 2011-2012: 10). Furthermore, the World Economic Forum collects primary data through its own Executive Opinion Survey, which has been conducted annually during the past 30 years. The sample size is assumed to be quite representative, including over 15 000 surveys from 142 economies.

5. Analysis and Results

Before doing any formal statistical analyses, we created a scatter plot to explore the data visually and examine it for any distinct patterns and outliers (See Appendix 1).

We then proceeded by conducting a correlation analysis in order to measure the relationships between each of Hofstede's five dimensions and economic performance.

The results of the correlation analysis are listed and summarized in Table 2.

Table 2

Correlation Coefficients Matrix. Sample size: 26, Critical Value (1%): 2.79694

		PDI	IDV	MAS	UAI	LTO
IDV	Pearson Correlation Coefficient	-.5238	1.			
	R Standard Error	.0301				
	T	-3.0133				
	p-value	.0060				
MAS	Pearson Correlation Coefficient	.2455	.0961	1.		
	R Standard Error	.0392	.0413			
	T	1.2406	.4727			
	p-value	.2268	.6405			
UAI	Pearson Correlation Coefficient	.5424	-.5826	.1361	1.	
	R Standard Error	.0294	.0274	.0409		
	T	3.1640	-3.5126	.6730		
	p-value	.0042	.0018	.5074		
LTO	Pearson Correlation Coefficient	.0765	-.1478	-.2725	.0318	1.
	R Standard Error	.0413	.0408	.0386	.0415	
	T	.3759	-.7319	-1.3871	.1557	
	p-value	.7102	.4714	.1780	.8775	
EP	Pearson Correlation Coefficient	-.6161	.6240	-.2011	-.6033	-.3306
	R Standard Error	.0259	.0253	.0399	.0265	.0370
	T	-3.8317	3.9120	-1.0065	-3.7059	-1.7157
	p-value	.0007	.0007	.3241	.0011	.0991

5.1 Results

As can be seen from the table, the hypothesis that Power Distance is negatively correlated with economic performance measures was supported. The correlation coefficient $r=-0.616$ $(p<0.01)$ shows that there is a rather strong and significant negative correlation between Power Distance and economical performance.

We also found support for the hypothesis that Uncertainty Avoidance is negatively correlated with economic performance measures ; $r=-0.603$ $(p<0.01)$.

However, support was not found for the hypothesis stating that Masculinity correlates negatively with economic performance measures. Although the analysis shows a relatively week negative correlation, $r=-0.201$, the strength of this relation is not significant and consequently there is not sufficient evidence for supporting the hypothesis.

The hypothesis, which proposes a positive correlation between Individualism and economic performance measures was supported as can be seen from the coefficient *r=0.624 (p<0.01)* which shows a rather strong and significant positive correlation.

The hypothesis stating that there is no relation between Long-Term Orientation and economic performance measures has also been supported. Although the analysis shows a negative correlation between Long-Term Orientation and economic performance (*r=-0.331),* this result is not significant and consequently gives no reason to state such a relationship.

Even though we found support for four of our five hypotheses, in order to answer the question whether national culture as a whole explains variations in economic performance among the European Union countries, we also needed to examine the combined effect of all five dimensions. We therefore conducted a multiple linear regression analysis.

The results of the multiple regression analysis revealed that only Individualism and Long-Term Orientation have a significant impact on the dependent variable ($F=7.394$, d.f.5, $p<0.1$). However, the overall explained variance in the model is relatively high with an Adjusted $R^{2} =$ 0.561 (See Appendix 2) which nonetheless provides support for the assumed relationship between culture and economic performance.

6. Discussion

The results from the data analysis suggest that there is a relationship between national culture and economic performance.

At the same time, the result of the analysis where economic performance was regressed on the five cultural dimensions is less clear. Obviously, as can be seen from the correlation matrix (table 2), there is a substantial inter-correlation between the independent variables. Hofstede (2001) points out that inter-correlations between the dimensions do exist, and they should therefore always be taken into account when trying to find patterns between the dimensions and external data. Usually it is recommended that in order to minimize problems with multicollinearity, deviation scores (raw scores minus the mean) of independent variables should

be used (Aiken & West, 1991). This has not been possible in the present study due to the nature of the data used. However, the fact that the model explains a substantial part of the variance in economic performance (adjusted R_2=.56) gives us reason to believe that national culture contributes significantly to explain variations in economic performance.

6.1 Power Distance and Economic Performance

In our analysis we found a negative correlation between Power Distance and economic performance. Table 1 containing the two data sets, tells us that the countries scoring highest on economic performance also have a relatively low degree of Power Distance, while the countries scoring lowest on economic performance have a relatively high degree of Power Distance. This is in line with the results of a study by Papamarcos and Waston (2006), who found a significant negative correlation between Power Distance and economic growth as measured by GDP.

6.2 Uncertainty Avoidance and Economic Performance

As stated above, our hypothesis suggesting that Uncertainty Avoidance correlates negatively with economic performance was supported. Correspondingly, Papamarcos and Waston (2006) obtained similar results in their study. They too found a negative correlation between Uncertainty Avoidance and GDP growth.

In Table 1 we can see that the three countries scoring lowest on economic performance; Bulgaria, Romania and Greece all score above 80 on Uncertainty Avoidance. In fact, Greece, which is scoring the lowest on economic performance, is also scoring the highest on Uncertainty Avoidance.

One way to explain this is that there seems to be an association between levels of uncertainty avoidance and innovation. The measurements of innovation and knowledge in the Global Competitiveness Report seem to emphasize this notion. Here Greece and Romania score low on the innovation variable, while, Sweden and Denmark, which have the lowest scores on Uncertainty Avoidance, seem to have a strong focus on innovation according to the GCR. These results fit in with the results of a study carried out by Mazurkiewicz (2010), where he analyzed the impact of innovation on competitiveness and found that the more innovative, the more competitive.

6.3 Masculinity and Economic Performance

The hypothesis suggesting that Masculinity correlates negatively with economic performance was not supported. Although the result of the correlation analysis was negative (r= -.201), it was not strong enough to be significant.

The fact that our sample is small compared to what is normally recommended for quantitative research, makes it difficult to achieve significant results (Salkind, 2006). Moreover, the majority of the European Union countries have relatively low scores on Masculinity, meaning that the distribution of the sample mean is skewed, which can and probably has compromised the outcome in this case (Triola, 2011: 92).

Hofstede's description of masculine societies tend to focus on competitiveness, achievement and performance and a live-to-work mentality. These values suggest that people in these societies are more committed to their work and careers than people living in feminine societies. Consequently, these characteristics could as well have been indicated as drivers of a good economic performance. We therefore suggest that the operationalization of this dimension should be carefully studied in future researches.

6.4 Individualism and Economic Performance

We found support for our hypothesis proposing that Individualism correlates positively with economic performance. In fact, this dimension seems to have the strongest impact on economic performance (*r=0.624).* According to Hofstede (2001), individualism is positively related to economic development. As can be seen from table 1, there is substantial difference in the scores on Individualism among high and low performance countries. Sweden, Finland and Germany are the countries scoring highest on economic performance, while Bulgaria, Romania and Greece are scoring lowest. The two groups also have the highest and lowest scores on Individualism.

6.5 Long-Term Orientation and Economic Performance

The analysis for this dimension showed that there is a weak, but not significant negative correlation with economic performance. That the tendency goes in the direction of a negative

rather than a positive relationship between long-term orientation and economic performance may be understood in light of the role savings rates play in a county's economy. For example, according to Shoham (2009), and Shoham et.al., (2010) a major reason for the current global crisis is the change in savings rates, primarily in the USA. The tendency for people or businesses to save rather than to consume is, however, not only a consequence of whether or not times are perceived to be good or bad. The cultural value of future-orientation has been shown to affect saving rates regardless of economic times (Shoham & Malul, 2012). Consequently the more general norms of thrift and perseverance in long-term oriented countries lead people to save their money rather than to spend them, and saving, rather than spending will, according to Adam Smith (1776), not stimulate economic growth.

However, the majority of the European Union countries have relatively low scores on Long-Term Orientation (See Table 1). This is explained by the fact that this dimension was developed from Chinese values, and its conceptualization may not be well understood by western societies (Fang, 2003). Hofstede himself notes that the elements composing this dimension are not naturally registered in a Western mind (Hofstede, 2001). Additionally, Fang (2003) claims that this dimension is confusing by the fact that being long-term oriented, is not necessarily the opposite of being short-term oriented. While the other dimensions offer two contrasting alternatives, the two ends of Long-Term Orientation are interrelated with one another. This may also explain why we assumed that long-term oriented societies tend to perform well economically. We therefore suggest that the operationalization and validity of this dimension, especially as seen from a western perspective, should be treated with care in future studies.

6.6 Culture and Economic Performance

As we have already commented on, the multiple regression analysis revealed that only the variables Individualism and Long-Term Orientation are significant in the model. Several studies have shown that the application of regression analysis may produce misleading or problematic coefficient estimates. One of the reasons why, is that two or more independent variables may be highly correlated. The resulting multicollinearity can cause the regression model to assign a statistically insignificant parameter estimate to an important independent variable (Berry & Feldman 1985).

With reference to Table 2, which shows a correlation matrix for all the variables, we find a rather high level of collinearity among the measurements of Power Distance, Uncertainty Avoidance and Individualism (all slightly above 0.5). High correlations between the independent variables can lead to unstable coefficients, corresponding high P-values and wide confidence intervals in a multiple regression analysis, as it is difficult to identify which variables explain what (Wenstøp, 2006). This seems to confirm our concerns that there might be a presence of multicollinearity, which might falsely give us a reason to conclude that there is no linear relationship between Power Distance, Uncertainty Avoidance, Masculinity and Economic performance (Berry & Feldman, 1985). Effects of multicollinearity lead to that coefficient estimates may change erratically in response to small changes in the model or the data. Although multicollinearity does not reduce the predictive power or reliability of the model as a whole, at least within the sample data themselves, it still might affect calculations regarding individual variables. That is, a multiple regression model with collinearity between the independent variables can still indicate how well the entire bundle of independent variables affects the dependent variable. However, it may not give valid results about any individual independent variable, or about which variables are redundant with respect to others (Wenstøp, 2006). In such cases, it is commonly suggested that the variables causing the problem should be deleted from the equation. However, in this case each variable in the original equation is an indicator of a distinct theoretical concept and therefore we decided not to delete any of the variables.

Furthermore, consequences of miss-specified models are more serious than those of multicollinearity (Berry & Feldman, 1985). According to Berry and Feldman (ibid), the most reasonable thing to do here is to recognize a possible presence of multicollinearity and simply accept that the data available do not contain sufficient information to obtain estimates for individual regression coefficients.

We none the less think that the discussion above gives us basis to suggest that since the overall explained variance in the model is relatively high (Adjusted R^2= 56,1%), we have reasons to assume that national culture, as defined by Hofstede, may help to explain variations in economic performance.

7. Conclusion

The purpose of this study has been to test whether national culture could explain variations in economic performance among the European Union countries.

By conducting a correlation analysis, we found that three national cultural dimensions; Power Distance, Uncertainty Avoidance and Individualism have a significant effect on economic performance. As for Masculinity and Long Term Orientation no significant effects were found.

We recommend, however, that the suggestions and linkages found in this study must be carefully interpreted. Obviously culture alone cannot explain economic performance. Nevertheless, this study proposes that national culture should definitely be considered when trying to explain which factors influence economic performance. We are aware of the fact the use of EU countries, although both practical and appropriate for our research question, may limit the generalizability of our findings. Future studies that use samples from other regions may yield additional insights beyond ours here. It is reason to believe that continued and more detailed research into the largely neglected area of culture and economics, may lead to more revealing results in the attempt to explain economic performance of countries

Finally, we suggest that companies aiming to establish themselves in foreign countries, or governments considering any kind of international partnerships, should be aware of the fact that the cultural characteristics of a country might, to some degree, indicate possible challenges to achieve their economic goals. The results of this study should therefore help international business practitioners to better understand and take into account how cultural values are related to economic performance. This may prove to be a valuable insight for multi national companies when relevant location-specific advantages are evaluated.

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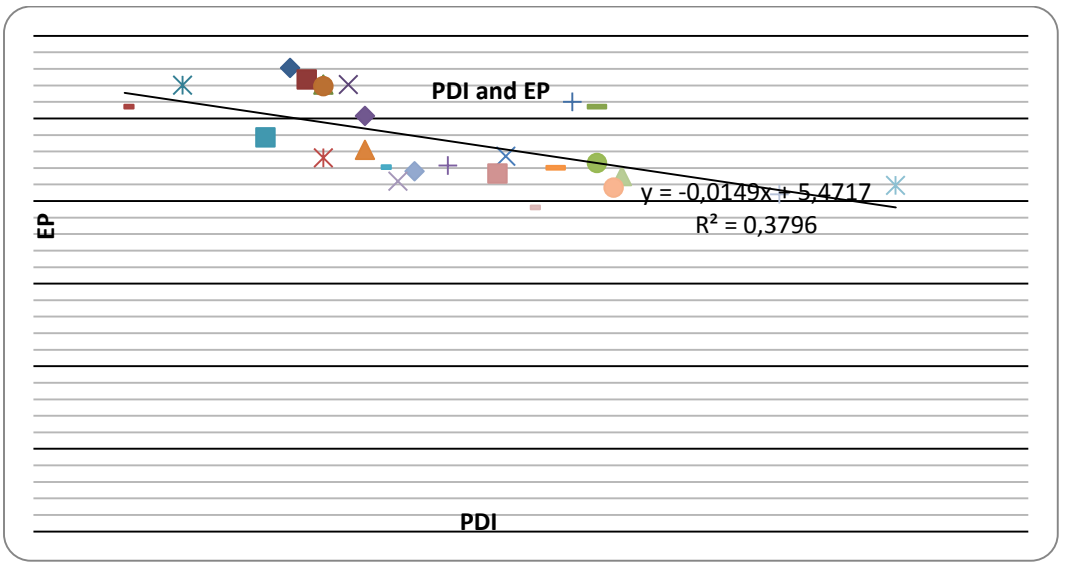
Appendix 1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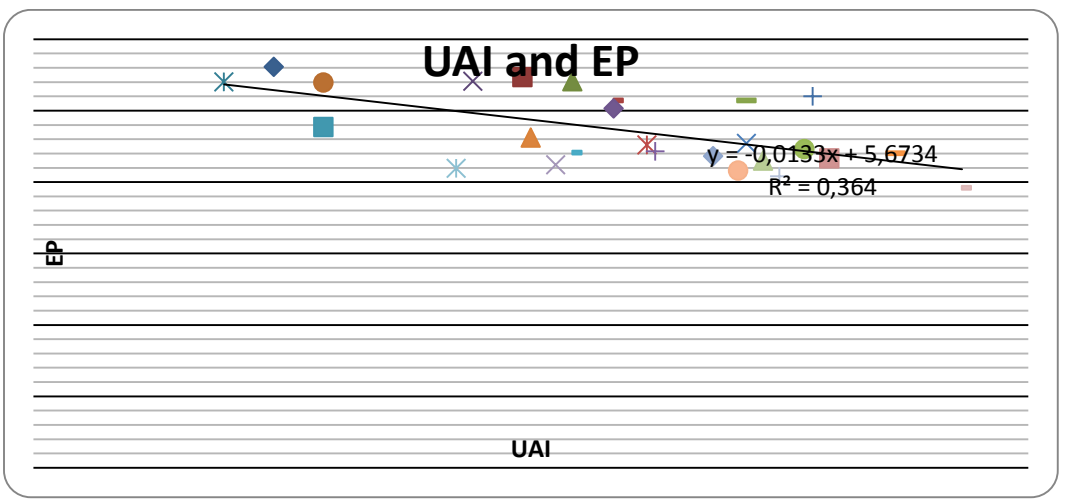
R² = 0,3796
EP
PDI


UAI and EP
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R² = 0,364
EP
UAI

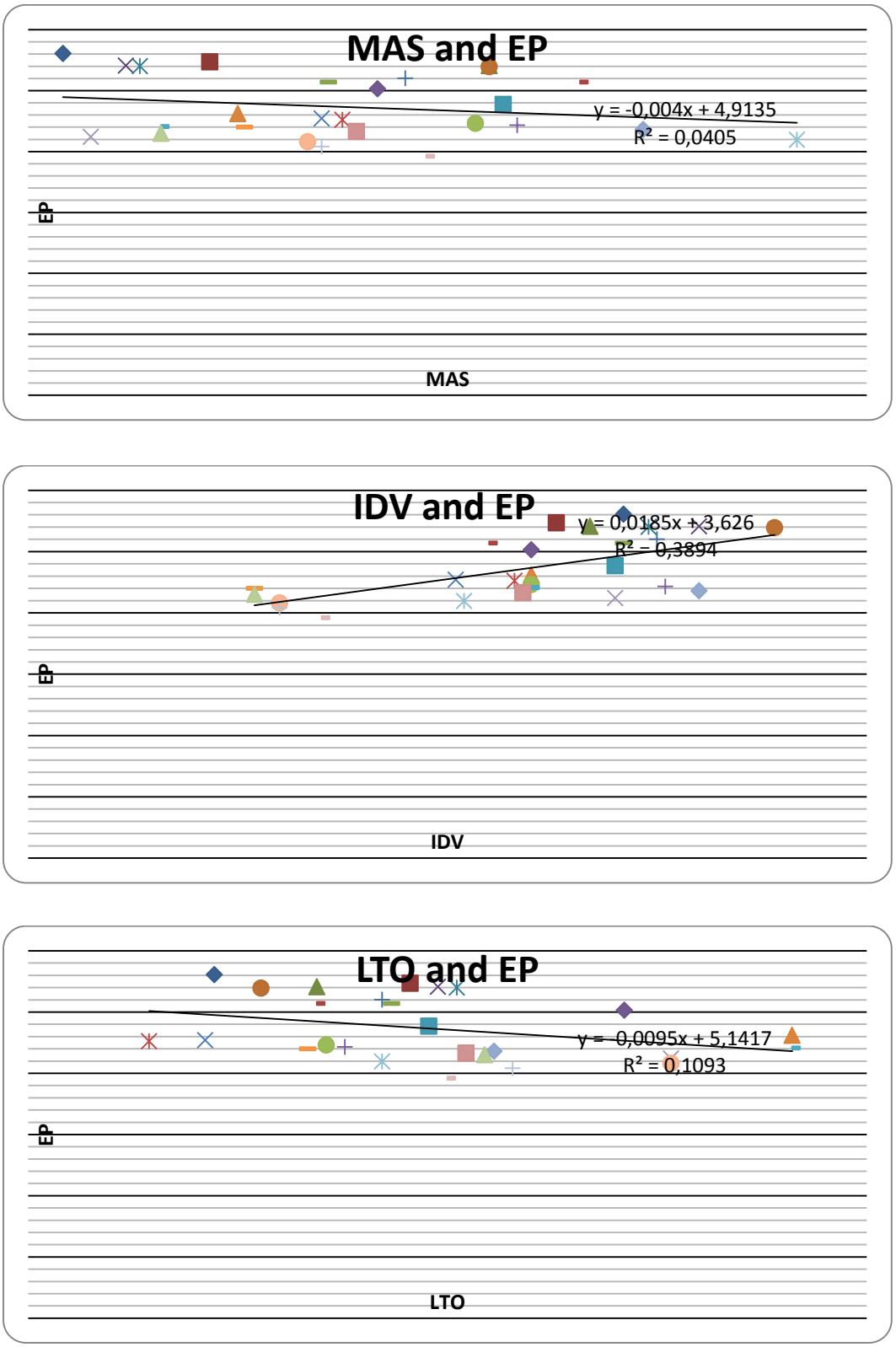

Figure 1-5. Scatterplots.

Appendix 2

Table 2

Linear Regression Analysis

*EP = 5.3878 - 0.0055 * PDI + 0.0101 * IDV - 0.0046 * MAS - 0.0053 * UAI - 0.0092 * LTO*

Regression Statistics	
R	.8056
R Square	.6488
Adjusted R Square	.5612
Standard Error	.3420
Total Number Of Cases	26

ANOVA

	d.f.	SS	MS	F	p-level
Regression	5.	4.3247	.8647	7.3940	0.0004
Residual	20.	2.3393	.1170		
Total	25.	6.6634			

	Coefficients	Standard Error	LCL	UCL	t Stat	p-level	H0 (10%) rejected?
Intercept	5.3878	.5740	4.3979	6.3777	9.3873	.0000	*Yes*
PDI	-.0055	.0041	-.0126	.0017	-1.2942	.2103	*No*
IDV	.0101	.0052	.0008	.0193	1.8970	.0724	*Yes*
MAS	-.0047	.0029	-.0098	.0005	-1.5623	.1339	*No*
UAI	-.0052	.0039	-.0120	.0014	-1.3720	.1851	*No*
LTO	-.0092	.0040	-.0161	-.0021	-2.2826	.0334	*Yes*
T (10%)	1.72472						

LCL - Lower value of a reliable interval (LCL)
UCL - Upper value of a reliable interval (UCL)

Appendix 3

The GCR Indexes

1. ***Institutions.*** The WEF states that the legal and administrative framework within which individuals, firms, and governments interact to generate wealth, determine the institutional environment. This variable includes several sub-variables, such as property rights, ethics and corruption, and undue influence. All of them seem to have an influence on economic performance. The WEF claims that the quality of the institutions influences investment decisions and the organization of production. Moreover, it plays a key role in the ways in which societies distribute benefits and bear the costs of development strategies and policies (GCR 2011-2012, 4).

2. Infrastructure. In th GCR, the WEF states that extensive and efficient infrastructure is critical for ensuring an effective functioning of the economy. Consequently, it is an important factor determining the location of activities and sectors that can be developed in a particular instance. Further, the quality and extensiveness of infrastructure networks significantly has impact on economic growth and reduce income inequalities and poverty in a variety of ways (GCR 2011-2012, 5). Under this pillar, there are sub-variables such as overall infrastructure quality, quality of port, air transport and railroad infrastructure, and quality of electricity supply and telephone lines (GCR 2011-2012, 5).

3. Macroeconomic environment. This pillar evaluates the stability of the macroeconomic environment, which includes sub-variables such as national savings rate, inflation, government debt, interest rate spread, real effective exchange rate and government surplus/deficit. In the GCR, WEF points out that although it is certainly true that macroeconomic stability alone cannot increase the productivity of a nation, it is also recognized that macroeconomic disarray harms the economy (GCR 2011-2012, 5).

4. Health and primary education. A healthy workforce is vital to a country's competitiveness and productivity. WEF explains that workers who are ill tend to be less productive and can't exploit their potential, which leads to business expenses. Further, the quality and quantity of basic education increase the efficiency of each individual worker. Lack of basic education can therefore become a constraint on business development, with firms finding it difficult to move up the value chain by producing more sophisticated or value-intensive products

(GCR 2011-2012, 5).

5. Higher education and training. This pillar measures secondary and tertiary enrollment rates as well as the quality of education as evaluated by the business community. Requirements for well educated workers, who are able to adapt rapidly to their changing environment is crucial for globalizing economies (GCR 2011-2012, 5). The quality of higher education and training is crucial for economies that want to move up the value chain beyond simple production processes and products (Schultz 1961).

6. Goods market efficiency. According to the description provided by the World Economic Forum, countries with efficient goods markets are well positioned to produce the right mix of products and services given their particular supply-and-demand conditions, as well as to ensure that these goods can be most effectively traded in the economy. This pillar includes sub-variables such as measurements of competition on both domestic and foreign levels, and quality of demand conditions (GCR 2011-2012, 7).

7. Labor market efficiency. The efficiency and flexibility of the labor market are critical for ensuring that workers are allocated to their most efficient use in the economy and provided with incentives to give their best effort in their jobs (GCR 2011-2012, 7). Labor markets must therefore have the flexibility to shift workers from one economic activity to another rapidly and at low cost, and to allow wage fluctuations without much social disruption (Almeida and Carneiro 2009). Here WEF presents two aspects: the first one is "flexibility", which includes sub-variables such as cooperation in labor-employer relations and flexibility of wage determination. The second one is "efficient use of talent", where WEF looks closer at pay and productivity, female participation in labor force and reliance of professional management.

8. Financial market development. Economies require sophisticated financial markets that can make capital available for private-sector investment from sources as loans from a sound banking sector, well-regulated securities exchanges, venture capital, and other financial products. In order to fulfill all these functions, the banking sector needs to be trustworthy and transparent, and financial markets need appropriate regulation to protect investors and other actors in the economy (GCR 2011-2012, 7). The Report analyses the efficiency of financial market and takes a closer look at the trustworthy and transparency in the banking sector of each country.

9. Technological readiness. The technological readiness pillar measures the flexibility, which an economy adopts on existing technologies to enhance the productivity of its industries. It puts emphasis on its capacity to fully leverage information and communication technologies (ICT) in daily activities and production processes for increased efficiency and competitiveness (Aghion and Howitt 1992). The Report focuses on the level of technological adaption in a country and ICT use.

10. Market size. The size of the market affects productivity since large markets allow firms to exploit economies of scale (GCR 2011-2012, 7). Here the WEF emphasizes international markets, which has become more and more important and common because of the globalization phenomenon. There is vast empirical evidence showing that trade openness is positively associated with growth. Additionally, trading within nation's borders also needs to be taken into account. This pillar measures both domestic and foreign markets.

11. Business sophistication. Sophisticated business practices are conducive to higher efficiency in the production of goods and services (GCR 2011-2012, 7). The WEF states that advanced operations and strategies of individual firms affect economy and lead to sophisticated and modern business processes across the country's business sectors. This pillar includes several sub-variables and focuses on the quantity and quality of local suppliers, nature of competitive advantage and value chain breadth. It also measures production process sophistication, extent of marketing, willingness to delegate authority and reliance on professional management.

12. Innovation. In the GCR, the WEF claims that in the long run, standards of living can be enhanced only by technological innovation. Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of integrating and adapting exogenous technologies (Aghion and Howitt 1992). Under this pillar the WEF measures capacity of innovation and looks at sub-variables such as quality of scientific research institutions and government procurement of advanced technology products. Furthermore, it measures how much companies are spending on research and development (R&D) and on which level universities and industries are collaborating on R&D. Additionally, it includes sub-variables such as utility patents and intellectual property protection.