Gordon Institute of Business Science
University of Pretoria

The Influence of Firm Size on Income Inequality.

Moushmi Vallabhbhai Patel

22066048

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirement for the degree of

MASTER OF BUSINESS ADMINISTRATION

13 January 2016

Abstract

Income inequality has attracted much interest in recent years and has become one of the key challenges of our generation. In countries where income earned through wages forms the bulk of an individual's wealth, disparity of wages can be a significant factor of income inequality. There has also been a growing trend in the world towards larger firms that have the ability to pay workers higher wages than smaller firms. For the purpose of this research paper, the researcher focuses on the wage segment of income inequality, and more specifically how the size of firms, over time, influences income inequality.

Using secondary data, in the form of listed companies' annual financial statements and various other data sources, the researcher conducted a study focusing on five developing (Indonesia, Philippines, India, Poland and South Africa) and five developed countries (United Kingdom, Germany, Sweden, Australia and the United States of America), totalling 644 sample firms, with the aim of assessing the following hypotheses: the first stated that the mean growth rate of average wages per employee for larger firms would be higher than smaller firms; the second stated that the mean growth rate of average wages per executive would be higher for larger firms than for smaller firms; lastly, within firms, the mean growth rate of average wages per executive would be greater than the growth rate of average wages per of the rest of the firms.

The findings suggest that, when considering all employees, larger firms do not pay higher increases in wage than small firms. However, executives in larger firms in the Philippines, India and South Africa have higher increases in their wages than executives in smaller firm. This may be a contributing factor to income inequality within those countries. Lastly, this paper looks at wage disparity within firms and the findings suggest a high prevalence of increasing wage inequality, within firms.

Keyword: firm size, income inequality, wage inequality

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

……

Moushmi Vallabhbhai Patel Date: 13th January 2016

Table of Contents

Abstract ..... **i**
Declaration ..... **ii**
1. INTRODUCTION TO THE RESEARCH PROBLEM **1**
1.1 Research problem *1*
1.2 Research scope *5*
1.3 Research aim *6*
2. RELEVANT THEORY BASE **8**
2.1 Income inequality *8*
2.1.1 Definition of income inequality 9
2.1.2 The causes of income inequality 10
2.1.3 The effects of income inequality 11
2.2 Wage inequality *12*
2.2.1 Causes of wage dispersion through skills 13
2.2.2 Firm size-wage effect 14
2.2.3 Performance pay, productivity and compensation at an executive level 17
2.3 Income inequality within developing and developed countries *19*
2.3.1 Criteria for developing and developed countries 20
2.4 Summary of literature review *21*
3. RESEARCH HYPOTHESES **23**
3.1 Hypothesis 1: Growth rates of average wages per employee in large firms versus wages in small firms *24*
3.2 Hypothesis 2: Growth rates of average wages per executive in large firms versus small firms *24*
3.3 Hypothesis 3: Within firms, does the growth rate of executive wages exceed that of the rest of the firm? *25*
4. RESEARCH METHODOLOGY **26**
4.1 Research design and methodology *26*
4.2 Unit of analysis *26*
4.3 Population of relevance *26*
4.4 Sampling *27*
4.4.1 Sampling method 27
4.4.2 Sample size 28
4.5 Data collection process *28*
4.5.1 Selecting the relevant index 29
4.5.2 Determining the sample of large firms 30
4.5.3 Determining the sample of small firms 31
4.5.4 Obtaining average wage per employee 32
4.5.5 Obtaining executive remuneration data 33
4.5.6 Calculating wage growth rates for the sample of large firms and small firms 34
4.6 Data quality and reliability *35*
4.6.1 Data checks for Bloomberg and Thomson Reuters data 35
4.6.2 Data adjustments for executive remuneration data collected from annual financial statements 36
4.7 Data analysis approach *37*
4.7.1 Hypothesis 1: 39
4.7.2 Hypothesis 2: 39

4.7.3 Hypothesis 3: 39
4.8 Ethical considerations 39
4.9 Research limitations 40
5. RESULTS 41
5.1 Descriptive statistics 41
5.2 Testing for normality 42
5.3 Hypothesis 1 43
5.3.1 Descriptive statistics 43
5.3.2 Inferential statistics and hypothesis testing 48
5.4 Hypothesis 2 50
5.4.1 Descriptive statistics 50
5.4.2 Inferential statistics and hypothesis testing 56
5.5 Hypothesis 3 58
5.5.1 Descriptive statistics 58
5.5.2 Inferential statistics and hypothesis testing 64
5.6 Other findings 67
6. DISCUSSION OF RESULTS 68
6.1 Introduction 68
6.2 Summary of actions performed 68
6.3 Analysis of the hypotheses tests 68
6.3.1 Discussion of Hypothesis 1 68
6.3.2 Discussion of Hypothesis 2 72
6.3.3 Discussion of Hypothesis 3 76
6.4 Chapter summary 80
7. CONCLUSION 81
7.1 Summary of research objectives 81
7.2 Summary of research findings 81
7.2.1 Summary of findings – growth rate of average wages for all employees of different sized firms 81
7.2.2 Summary of findings – growth rate of average executive pay of different sized firms 82
7.2.3 Summary of findings – growth rates of average wages within firms 83
7.3 Implications of research findings 85
7.3.1 Implication of wages for all employees in a firm 85
7.3.2 Implication of wages for executives at firms 85
7.3.3 Implication of wages within firms 86
7.4 Limitations of the research 86
7.5 Suggestions for future research 87
7.6 Concluding note 88
8. REFERENCES 89
9. ANNEXURES 99
Annexure 1 – Bloomberg description of indices 99
Annexure 2 – Data checks example 102
Annexure 3 – Histograms of data 104
Annexure 4 – Absolute values of average earnings at the beginning of the analysis 112

List of Tables

Table 1: Number of countries with rising and falling income inequality by region (early 1990s to late 2000s) 5
Table 2: Sample countries' stock indices 29
Table 3: Descriptive statistics for growth rates of average wage per employee for developing countries 44
Table 4: Descriptive statistics for growth rates of average wages per employee for developed countries 47
Table 5: Inferential statistics and results for hypothesis one – developing countries 49
Table 6: Inferential statistics and results for hypothesis one - developed countries 50
Table 7: Descriptive statistics for growth rates of average wages per executive for developing countries 52
Table 8: Descriptive statistics for growth rates of average wages per executive for developed countries 54
Table 9: Inferential statistics and results for hypothesis two - developing countries 57
Table 10: Inferential statistics and results for hypothesis two - developed countries 57
Table 11: Within firm differences between the growth rates of average wages per executive less the growth rates of average wages per employee for developing countries 59
Table 12: Within firm differences between the growth rates of average wages per executive less the growth rates of average wages per employee for developed countries 62
Table 13: Inferential statistics and results for hypothesis three - developing countries 65
Table 14: Inferential statistics and results for hypothesis three - developed countries 66
Table 15: Country inflation rates 67

List of Figures

Figure 1: The Top 0.1 Percent Income Share and Its Composition, 1916–2011 ... 12
Figure 2: Hypothetical Kuznets curve ... 20
Figure 3: Make up of Executive remuneration ... 34
Figure 4: Example of scatter plot for data check ... 36
Figure 5: Box and whisker plot of growth rates of average wages per employee for developing countries ... 45
Figure 6: Box and whisker plot of growth rates of average wages per employee for developed countries ... 48
Figure 7: Box and whisker plot of growth rates of average wages per executive for developing countries ... 53
Figure 8: Box and whisker plot of growth rates of average wages per executive for developed countries ... 55
Figure 9: Box and whisker plot of the within firm differences of growth rates of average wages per executive less the growth rate of average wages per employee for developing countries ... 60
Figure 10: Box and whisker plot of the within firm differences of the growth rates of average wages per executive less the growth rate of average wages per employee for developed countries ... 63
Figure 11: Determining whether firm size influences income inequality - hypothesis one ... 70
Figure 12: Determining whether firm size influences income inequality - hypothesis two ... 74
Figure 13: Determining whether wage inequality within firms is increasing - hypothesis three ... 77
Figure 14: Effect of wage growth rates, between and within firms ... 84

1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Research problem

In both developed and developing countries, the poorer half of the population often controls less than 10% of the wealth (Mohammed, 2015). The study of the income gap between the rich and poor, otherwise known as income inequality, has attracted much interest in recent years and has become one of the key challenges of this generation. The deepening income inequality was the first agenda point at the 2015 Davos World Economic Forum meeting held from 21 January to 24 January in Switzerland.

While some level of income inequality is necessary to encourage and incentivise people to produce, innovate, take risks and create wealth (Aghion, Caroli & Garcia-Penalosa, 1999; Milanovic, 2010; Deprez, 2015), there is a growing consensus that extreme and rising income inequality is problematic (International Labour Organisation, 2015). Countries from the United States of America (USA) to South Africa have seen the gap between rich and poor increase rapidly in the last 15 years alone.

The 2014 Oxfam statistic, complied by Byanyima (2015a), noted that just 85 rich individuals held more wealth than the poorer half of the world's population, making up 3.5 billion people. A year later in 2015, that figure became more extreme, with 80 billionaires having the same amount of wealth as the poorer half of the planet (Byanyima, 2015a). Oxfam further estimates that by 2016, the combined wealth of the richest 1% will overtake that of the other 99% of people on Earth (Byanyima, 2015b). The trend of income inequality has been rising and is likely to continue, unless it is stopped.

The inherent dangers of neglecting income inequality could possibly result in people, especially the youth, feeling disenfranchised and discouraged, could damage perceptions of fairness in society and adversely affect social outcomes and social cohesion, allowing people to become easy fodder for conflict (Cooper, McCausland, & Theodossiou, 2013; Mohammed, 2015).

Income inequality, in turn, reduces sustainable economic growth of countries (Chang, Liu, & Hung, 2013; Ostry, Berg & Tsangarides, 2014), undermines democracies, and cripples the hopes for sustainable development and a peaceful society (Mohammed, 2015).

Many factors are thought to contribute to income inequality such as: the export of manufacturing jobs from rich countries to poorer ones, which has often been accompanied by widening income inequality at both ends; the rise of certain sectors such as the financial and technology industries and; the growing importance and cost of higher education accompanied by falling tax rates for the wealthy (Deprez, 2015).

One of the many focus areas in recent years has been the growing disparity of wages where it is known that extreme wage inequality exists between executives at the top of the firm compared to the rest (Alvaredo, Atkinson, Piketty & Saez, 2013; Bell & Van Reenen, 2013). From 1979 to 2007, after-tax income for the top 1% of households grew by 275%, while it only rose by 18% for the bottom fifth. The top 1% of earners took home 95% of the gains in the first three years after the 2008 recession (Deprez, 2015).

The CEOs of the largest companies in the USA earned three times more than they did 20 years ago and at least 10 times more than 30 years ago, while most other workers have faced stagnant wages over this period (Hodgson, 2015).

This creates a significant problem in countries, such as the USA and United Kingdom (UK), where wages are a major source of household incomes, making up 70-80% of individuals total pre-tax, post transfers household income (International Labour Organisation, 2015). Therefore the labour market, where wage increases are determined, is seen as one of the causes of income inequality.

USA earnings inequality has increased greatly in the last three decades, but the trend is primarily due to rising differences in pay between firms, not growing gaps within them, In other words, the pay gap is rising not because the top earners within a firm are being paid so much more than their lower paid colleagues. It is climbing because some firms pay higher wages than others for the same skill level (Da Costa, 2015).

In addition to the rising income inequality, there has been a noticeable trend towards bigger firms in an economy (Boswell, 2014) and this trend seems to be accelerating ("The bigger, the less fair", 2015). Higher productivity and research and development within large firms raises the barriers for entry to new and presumably smaller, competitors, allowing them to entrench their position as larger firms within a couple of years.

In 2014, the 20 most profitable companies in the country accounted for nearly 37% of the total profits of the entire Fortune 500. That's up from 30% two decades ago (Gandel, 2015). Another reason for the growing firm-to-firm pay gap could be that in the modern economy, companies have become so specialised and lean that some attract high-skilled workers and others attract mostly low-skilled workers (Gandel, 2015).

Given the rising income inequality in the world, the ongoing trend of firms becoming larger and the consolidation of smaller firms (Boswell 2014), the question arises as to whether or not the size of firms in an economy has a role to play in the income inequality experienced thus far?

Studies conducted in developed countries indicated that larger firms (those employing more workers) tend to pay their employed workers higher wages than smaller firms, known as firm size-wage effect, which has long been recognised by researchers (Brown & Medoff, 1989; Idson & Oi, 1999; Barth & Dale-Olsen, 2011).

Idson and Oi (1999) documented that U.S. workers in large manufacturing plants of large firms (which is defined as a firm having more than 1000 employees) receive a wage premium of 62.6% relative to workers employed in small manufacturing plants of small firms (Barth & Dale-Olsen, 2011).

In a recent study conducted by Mueller, Ouimet and Simintzi (2015) covering the USA, the UK and other developed countries, it was concluded that wages of high-skilled jobs, such as director or engineers, increases with firm size whereas, wages of low- and medium-skilled jobs, such as a janitor or secretary, does not increase with firm size but in some instances slightly decreases over time. In addition, Mueller et al. concluded that the growth of firms over time, especially larger firms, positively relates to an increase in wage disparity and hence wage inequality.

Furthermore, the study highlights that wages for low and medium skill jobs do not increase with firm size due to automation of many jobs in large firms, and the promise of providing employees with better career opportunities and higher wages in the future.

Most studies that have been conducted on income inequality are focused on developed and advanced economies, showing a definite trend in the rise of income inequality over the last couple of decades. Recent studies conducted by the International Monetary Fund (IMF) have shown that inequality trends have been more mixed in emerging markets and developing countries, with some countries experiencing declining inequality (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, Tsounta, 2015).

However, the United Nations Development Programme (2013) conducted a study that included 84 developing countries to understand the trend of income inequality over a period of just less than 20 years:

Table 1: Number of countries with rising and falling income inequality by region (early 1990s to late 2000s)

Region	Falling	No Change	Rising	All
Africa	16	3	7	26
Arab states	3	1	2	6
Asia Pacific	5	2	6	13
European countries	2	1	16	19
Latin America	8	5	7	20
All	**34**	**12**	**38**	**84**

Source: United Nations Development Programme (2013).

Of the 84 developing countries, about half (38) had rising income inequality, while the other half (34) had falling income inequality. However, the average increase for the former group was 20%, while the average decrease for the latter group was 14% (United Nations Development Programme, 2013), indicating that rising inequality in emerging markets is growing at a fairly higher rate than falling inequality.

1.2 Research scope

While research has shown that large firms tend to pay more than small firms in developed countries, it is unclear whether growth rates of wages at larger firms would be greater than smaller firms over time, exacerbating the firm size-wage effect.

For the purpose of this research paper, the researcher will focus on the wage segment of income inequality, and more specifically how the size of firms influences wage inequality over a period of time and in turn income inequality.

The scope of this study is to assess the growth rates of wages earned in firms of different sizes. This will be done in order to understand the influence that the size of the firm has on income inequality over a period of ten years. This study covers both developing and developed countries, along with income inequality derived from wages, both within firms and between firms for each country.

1.3 Research aim

While most research around income inequality and wages focuses on how compensation at the top end of the pay scale drives income inequality, there is limited research around how the size of firms in an economy influences income inequality, over a period of time.

This research paper aims to contribute to the firm size-wage effect theory that states larger firms pay more than smaller firms, and the current study done by Mueller et al. (2015) that finds evidence that this theory is merely prevalent amongst higher skilled workers than lower skilled workers. Furthermore, income inequality may be driven by an increase in size of the largest firms in an economy. The researcher focuses the study on whether or not the growth rate of average wages at larger firms over period of ten years will exceed the growth rate of average wages at smaller firms. The study focuses on listed companies within developing and developed countries, which encompasses companies from different industries.

Should the growth rate of average wages of larger firms exceed the growth rate of average wages of smaller firms, this would imply that larger firms, on average, pay their employees more over time. This may lead to a yawning gap in wage earnings, which could contribute to overall income inequality.

Building on this, the researcher looks at whether or not being an executive at a larger firm result in a higher growth rate of wages compared to that of an executive at a smaller firm within a country. Lastly, this research paper looks

within the firm to understand whether or not an executive's wage would grow at a higher rate than the rest of the employees, within the same firm.

Due to the different income inequality trends that have been seen, where countries like the United Kingdom, Germany, South Africa have noted a rising trend in income inequality and countries like Philippines and Sweden have noted a declining trend in income inequality (United Nations Development Programme, 2013), the researcher has looked at both developed and developing countries, comparing the trends between firms and wages, using similar data sets, in the form of data from annual financial statements.

2. RELEVANT THEORY BASE

This section begins by examining income inequality and the main causes for it, as stated by various scholars, as well as the potential effect it may have has on society. The review then delves into the factors behind the dispersion of wage, focusing on new literature that suggests that firms may have a role to play in this. The researcher then offers a definition of the word "firm" and how sizes of firms are categorised.

This is followed by how the structure of wages changed towards performance pay that largely focused on earners at the top end of the firm, which ultimately impacted income inequality. Lastly, the researcher explored the different trends and reasons for rising and falling income inequality within some of the developed and developing countries.

2.1 Income inequality

With the wealth distribution between the rich and the poor widening around the world (Kaplan & Rauh, 2013), income inequality has become a continuously growing global phenomenon. At the start of World War I in 1914, 45% - 50% of the population in Europe and 40% in the USA earned the top 10% of the total income share. One century later, about 30% of population earned the top 10% of total income share in Europe and USA (Piketty & Saez, 2014). The rising rate of income inequality in the 2000's was greater than that of the 1990's (Meyer & Sullivan, 2013), sparking much debate over whether or not income inequality was good for society.

There are some scholars that defended the view that income equality was good for strong economic growth, as it was seen as the reason people in society progress and companies invested in research and development (Halter, Oechslin & Zweimüller, 2014; Mankiw, 2013). Mankiw (2013) argued that income inequality created incentives for entrepreneurs to innovate. Mankiw (2013) pointed out that people like Steve Jobs, co-founder of Apple, would not have

been incentivised to innovate for society as whole if he was not adequately compensated for it. In addition, Keeley (2014) argued that wealthy individuals are considered to be the source of investment for the economy, from which innovations are brought to society, which ultimately stimulates economic growth.

However, income inequality may be both positive and harmful to the economic performance of a country. Halter et al. (2014) proves that the short-term effect of income inequality on economic performance is positive, while the lagged effect of income inequality is negative. The increase in income inequality had a positive impact on the average growth rate of real Gross Domestic Product (GDP) per capita within the first five year period. On the other hand, it was found that post the five year period, an increase in income inequality reduced the average growth rate for the next five years following the initial one. Moreover, in the long-run, income inequality hampered sustained levels of growth by promoting expensive fiscal policy (Berg, Ostry & Zettelmeyer, 2012; Halter et al., 2014).

2.1.1 Definition of income inequality

In economic theory, inequality is defined as the discrepancy between the poor and the rich in terms of income distribution, distribution of wealth, education, employment, life satisfaction and happiness, both within a country, as well as between countries and geographical areas (Andrei & Craciun, 2015).

The Organisation for Economic Co-operation and Development (OECD) defines income inequality as an indicator of how material resources are distributed across society (OECD, n.d.). Investopedia (n.d.) defines this as the unequal distribution of household or individual income across the various participants in an economy. Income inequality is made up of income from employment, property income, income from the production of household services for own use and transfers received (International Labour Organisation, 2015).

The Gini index is the most common method for estimating the level of income inequality in countries (Malul, Shapira & Shoham, 2013). In 1912, Corrado Gini

created a measure for the extent to which the distribution of income among individuals or households in an economy deviates from a perfectly equal distribution, this is known as the Gini-coefficient (Ceriani & Verme, 2012). The Gini-coefficient ranges from 0 to 1, where 0 represents perfect equality, while an index of 1 implies perfect inequality (World Bank, n.d.).

2.1.2 The causes of income inequality

Over the last decade, there have been many studies conducted to determine what the causes of income inequality and the polarization of wealth in the world. This list varies from economic shifts like globalisation, (Bonica, McCarty, Poole, & Rosentha, 2013); rapid rising trade and financial integration (Koske & Wanner, 2013); technological advancements resulting in an increased demand for skilled-based technology (Weiss & Garloff, 2011; Nau, 2013; Koske & Wanner, 2013); labour market institutions (Nau 2013); changes in the way wages are paid to employees (Gabaix & Landier, 2008; International Labour Organisation, 2015); social changes like the greater propensity of high-income earners to marry each other (Bonica et al., 2013) to economic advantages such as inherence (Corak, 2013).

In addition, most countries' policies were focused on free market capitalism. This often resulted in less support for transfers of capital between the rich and poor, where the tax rates are generally lower for higher income earners (Alvaredo et al., 2013; Bonica et al., 2013). Within this system, policies resulted in the deregulation of a number of industries, especially financial deregulation, which allowed capital income, such as interest on capital and dividends, to grow at a rate of return that was higher than the rate of growth of an economy (Piketty, 2015) and, hence, increased the dispersion of wealth.

However, the rise in income inequality had been predominantly driven by increases in wages rather than investment gains (Bell & Van Reenen, 2013). Wage structure changes translated into a pronounced rise in both household

income inequality and consumption inequality, which implied a marked increase in the disparities of economic well-being (Autor, Katz & Kearney, 2008).

2.1.3 The effects of income inequality

The effects of income inequality had both intrinsic consequences such as fairness, ethical, moral, social; economic and political consequences.

Botos (2015) argued that equality was important for social cohesion, where everyone prevailed if they were industrious and talented; this purported a situation of fairness. However the reality of this was that if one was not productive and talented there was a high probability that one would not be able to break out of one's current situation.

Furthermore, education was seen as a key ingredient for social mobility as it enabled people to get high paying jobs. However, the best education in most countries became increasingly expensive over the last three decades (Rajan, 2010), making it close to impossible for those without wealth to obtain education and achieve equal opportunity.

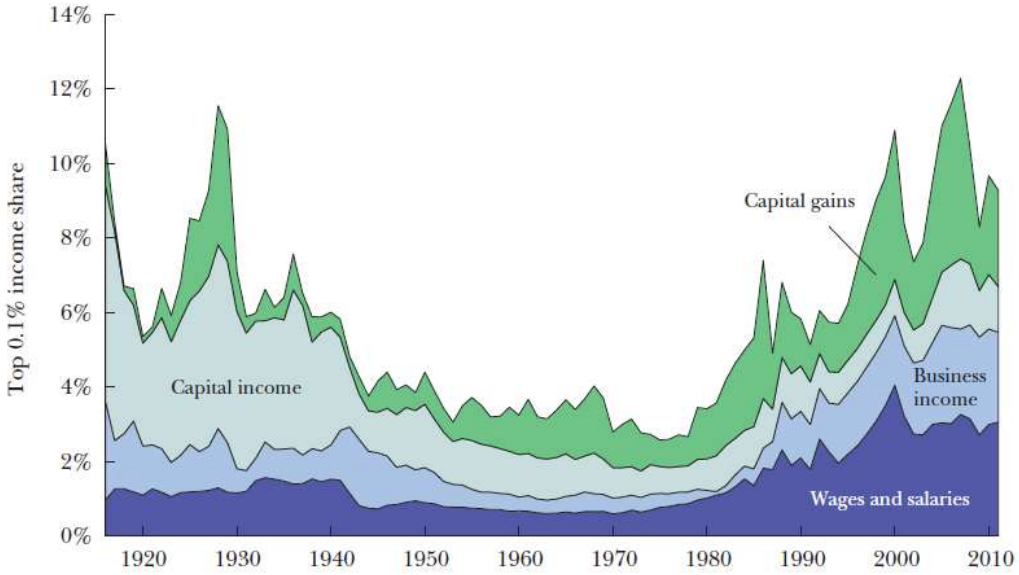
With this, the effects of income inequality tend to be viewed as a social evil, especially when it is associated with high poverty rates, which fuels social unrest within some economies (Kim & Tebaldi, 2013). Ultimately this causes political instability within a region, which result in legal systems being undermined and induces an inefficient state of bureaucracy (Halter et al., 2014).

Politically unstable regions usually resulted in weaker economic growth performance (Kim & Tebaldi, 2013). Stiglitz (2013) explained that inequality has a negative impact on economic growth. Higher inequality did not lead to more growth, but actually resulted in incomes decreasing or stagnating.

2.2 Wage inequality

The decades that followed World War II saw large economic growth for the western countries such as the USA, UK and France (Andrei & Craciun, 2015), and an increase in the overall jobs and wages. Since the 1970's there was an increase in wage dispersion, which resulted in a yawning gap between the rich and poor in USA (Van Reenen, 2011; Bell & Van Reenen, 2013; Mankiw, 2013; Piketty & Saez, 2014, Jones, 2015).

Figure 1: The Top 0.1 Percent Income Share and Its Composition, 1916–2011



Source: Piketty & Saez (2003) cited in Jones (2015).

In research conducted by Piketty and Saez (2003) they look at how the share of income of the top 0.1% of families in the USA have grown over the last century (as illustrated in Figure 1). Wage inequality (illustrated by the dark blue line) follows a J-shaped pattern in the long term: wage of the top 0.1% made up below 1% of the total USA wage earned before 1970s and thereafter it continues to raise. Autor and Dorn (2013) confirmed that this theory was also true for many advanced nations such the United Kingdom (UK), Germany and France.

Given the rising wage inequality in developed countries, the question arises as to what caused this deviation in wages?

2.2.1 Causes of wage dispersion through skills

Autor et al. (2008) identified that the rise in wage inequality in the USA appears to be explained by shifts in the supply of and demand for skills combined with the erosion of labour market institutions or job structures, such as labour unions and the minimum wage that protected the earnings of low- and middle-wage workers.

The rise of industrialised countries, over the last forty years, commanded a persistent demand for skilled labour (Mankiw, 2013). The demand for skills played a central role in reshaping the current wage structures and contributed to the rise of income inequality during the 1980s and the dispersion of wage growth that followed (Autor et al. 2008).

Furthermore, the constant change in technology and skill-biased technological changes had continuously increased the demand for skilled labour and this allowed a small number of highly educated and exceptionally talented individuals to command superstar incomes in ways that were not possible a generation ago. This resulted in a dramatic growth in the wage premium (Mankiw, 2013; Autor, 2014). By themselves, the above forces increased the earnings gap between skilled and unskilled workers, thereby increasing income inequality (Mankiw, 2013).

Within this pool of highly educated and skilled individuals, sometimes the demand for labour was focused on a particular skill. Barth & Dale-Olsen (2011) argued that if a firm wanted to employ many workers who had a particular skill, they had to offer higher wages to that group in order to attract and keep a sufficiently large labour supply of workers in that group.

In some circumstances the labour market produced an oversupply of workers which lead to some workers being over-qualified. Similarly, some workers might

have had fewer qualifications than the job required. This was known as skill mismatch and Slonimczyk (2013) identified that this as a source of wage inequality.

Another factor that was looked at, when considering the wage differentials, was whether a difference in wages existed between people with the same skills performing the same job criteria. Assuming a competitive labour force, one would expect that workers with the same characteristics and the same job would be paid the same amount. However, wages among workers with the same education and experience, accounted for majority of the increase in the variance of earnings (Autor et al, 2008; Slonimczyk, 2013). In other words, workers with the same skill and education were paid different wages by different firms, due to labour friction (Akerman, Helpman, Itskhoki, Muendler & Redding, 2013) and firm size.

2.2.2 Firm size-wage effect

The firm size-wage effect, where firms of different sizes pay very different amounts for the same quality of labour, was seen as another reason for wage dispersion. Brown and Medoff (1989) conclude that there is a positive relationship between firm size and wages earned by employees and that the larger employers (i.e. a firm that employees more than 1000 people) pay more for their labour than smaller employers (Brown & Medoff, 1989; Idson & Oi, 1999). However, Mueller et al. (2015) noted that this holds true whether the firm size was measured based on number of employees and revenue generated.

The Brown and Medoff (1989) literature was uncertain as to why larger firms pay more than smaller firms. Barth and Dale-Olsen (2011) argued that larger firms have to pay a premium in order to recruit and retain a larger pool of employees. Firms in competition with other firms may face an upward sloping supply curve for labour and are forced to pay more for labour in order to stay in the game.

At the same time, there are various scholars that established that larger firms, due to sheer size and resource base, have the ability to pay employees more than the competitive wage. This enabled them to seek the best employment that the market would offer (Krishna, Poole, & Senses, 2012; Husted, Henriques & Crane, 2013; Nell, 2014). This, in turn, increased firms' productivity, which ultimately allowed them to grow at a faster rate than smaller firms.

Furthermore, Mueller et al. (2015) suggested that in developed countries, firm growth was positively and significantly related to rising wage inequality. This could create a significant problem if countries are experiencing a growing trend toward larger firms in their economies as this could result in rising and growing wage inequality and ultimately increase income inequality.

2.2.2.1 Definition of a firm and firm size

According to neo-classical economics, a firm is defined as an economic unit that hires factors of production, and produces and sells good and services. The firm's goal is to maximise profit (Parkin, 2014). In this document "firm" is used interchangeably with the terms "company" and "organisation".

The European Union defines:

- *Medium-sized* firms as those that employ fewer than 250 employees, generate a turnover of less than EUR 50 million or have balance sheet totals of less than EUR 43 million;
- *Small-sized* firms employ fewer than 50 employees, generate a turnover of less than EUR 10 million or have balance sheet totals of less than EUR 10 million;
- Lastly, *micro-sized* firms employ fewer than 10 employees, generate turnovers of less than EUR 2 million or have balance sheet totals of less than EUR 2 million (Muller, Gagliardi, Caliandro, Bohn & Klitou; 2014).

Based on the above definition, by default a large firm will be defined as a firm that employs greater than or equal to 250 employees, generates a turnover of

equal to or greater than EUR 50 million or has a balance sheet total of equal to or greater than EUR 43 million.

Most countries employ similar definitions when determining firm size.

The definition offered by Mueller et al. (2015) was based on the number of employees. A large firm consisted of more than 250 employees and a smaller firm consisted of 250 employee or less employees. In addition, for part of their research they used revenue to determine firm size. However, Kaplan and Rauh (2013) and Gabaix, Landier and Sauvagnat (2014) used the value of market capitalisation to determine firm size.

Since studies used different measures for firm size and since this research has been conducted across different countries and focused on the largest firms in an economy, the researcher has measured large firms as a ratio of market capitalisation to the country's GDP. The researcher has set the criteria for large firms as: firm's market capitalisation to GDP ratio needs to consistently in the top 35% of the total population, over a period of 10 years.

When looking at medium- to smaller-sized firms, referred to as small or smaller firms, the researcher required turnover generated by a firm to be less than EUR 50 million on average, over the 10 year period.

2.2.2.2 Growing trends towards larger firms

Large firms have certain inherent advantages over smaller firms, where firm size not only affects production but also output into the market or the distribution of profits among stakeholders (Gall, 2010). Giovannettia, Ricchiutib and Velucchic (2011) illustrated that a relationship exists between the size of a firm and the likelihood of its survival. In particular, they argued that smaller firms have a lower likelihood of survival than larger firms. This is because larger firms have economies of scale which result in a significant competitive advantage over

smaller firms as they can produce larger outputs at lower costs than a smaller potential rival (“Barriers to entry”, 2004).

Larger firms also have a more established customer base and enjoy more repeat business. This in turn produces higher sales and profits which ultimately result in greater amounts of funds and resources. This track record of profitability allows larger firms access to more credit at a cheaper price. The ability for a firm to have cash enables them to expand and substantially invest more in innovation, in the form of research and development (Andries & Faems, 2013). In a competitive market, where inventions are quickly imitated, small inventor's investment often fail to pay off.

Once a firm is established in an economy, the incumbent firm also makes it difficult for potential entrants by employing tactics such as under-pricing products or spending excessively on things that would ensure the sustainability of their position in the market. Established firms create an environment where it becomes difficult for rivals, especially for smaller and new entrants, to compete. Large successful firms regularly buy out, take over, or merge with, smaller, less successful ones, in order to increase the wealth of firms so that they became bigger and bigger (Nell, 2014).

As a result, the trend of larger firms is only likely to accelerate into the future (Bollard, Klenow & Li, 2014).

2.2.3 Performance pay, productivity and compensation at an executive level

As the growth rate of large firms has increased over time, executive compensation has also increased by a similar factor, as larger firms have a higher willingness to pay for talent (Gabaix et al., 2014). Much of this rise has reflected a widening dispersion of labour income across the world (Koske and Wanner, 2013).

To add to the growing gap in wages over the last 20 years, Chang et al. (2013) explained that there has been a major change in the way wages for employees get paid. This referred to the increased use of performance pay which is linked pay to the productivity of the firm, and not just on wages or salaries set in advance, like that of non-performance-pay workers.

It is usually a small fraction of workers within a firm that are paid based on performance. This method of payment tends to be concentrated around executives at the very top end of a firm (Lemieux, Macleod & Parent, 2009).

Lemieux et al. (2009) investigates the relationship between the use of performance pay schemes and income inequality. Through his research, he estimated that performance pay accounted for about one-fifth of the growth in the variance of male wages between the late 1970s and the early 1990s and ultimately concluded that was precisely why income inequality has grown so dramatically over time.

Gabaix et al. (2014) argue that it is necessary for performance pay at an executive level to exist as this ensures that executives have a vested interest in the firm they work for, so that their decisions are made for the benefit of the company and its shareholders and not solely for themselves. They argued that the rise in Chief Executive Officers (CEO) pay reflects tighter corporate governance, as the success of the firm will ensure their financial success. In addition, performance pay increases are to compensate CEOs for the greater risk decisions that they make.

Piketty (2015) noted that in the USA, over the last 30 years, the rise of top income earners (like executives and CEO) was due, for the most part, to them earning substantially more than the remainder of the workers within that firm. He also noted that workers in the more successful firms get higher pay, especially in the top ranks, so the pay scale becomes more unequal, both within firms and between firms.

Thus, at the top end of the firm, wages (due to performance pay and share incentive structures) increased in line with the growth of the firm. In contrast, wages of the medium to lower end of a firm did not increase in line with the growth of firms, as wages were either invariant to firms growth or, if anything, slightly decreasing over time (Nell 2014; Mueller et al., 2015).

2.3 Income inequality within developing and developed countries

The rise in income inequality in the last two decades has affected most developed and developing economies. Developed economies, such as the USA, who have benefitted from the golden years of capitalism, however, these years also caused income inequality (Petit, 2010). Since the end of the World War II, there has been an extreme rise in the wealth of the top one percent of wealthy people in the USA, which was driven by innovation and industrialisation (Piketty, 2015). It has also shown that income inequality emerged along with a general quest for equal individual chances and meritocratic compensation (Petit, 2010).

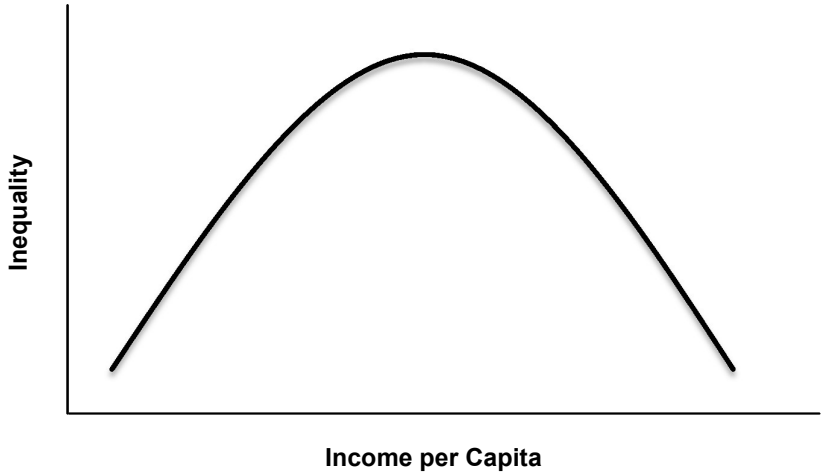
One of the other reasons for the rise in income inequality within the developed world has been the rise of globalisation and trade liberalisation which had opened up new channels for companies to find cheaper workers in different countries. This has seen some of the developed countries move their operations to developing countries, cutting jobs within developed countries and, to some extent, forcing wages to remain stagnant at the lower income levels (Corak, 2013; Akerman et al., 2013; Mishel, Schmitt & Shierholz, 2014).

However, it is argued that this shift of moving work from developed countries to developing countries and globalisation as a whole did open up opportunities for developing countries, which resulted in growth for these newly emerging economies (Munshi, 2012; Kunnanatt, 2013).

One of the most famous works done by Kuznets (1966) was the inverted-U hypothesis (detail Figure 2*),* according to which income distribution worsen during the early stages of economic growth but improved in the later stages. In

considering developing countries, one of the reasons why in certain circumstance inequality would not be as servere was due to the fact that developing countries lag developed countries based on this curve. Some developing countries moved on from their colonial past where income distribution was skewed towards the colonialist and as these countries emerged out of this, they could see an improvement in income distribution. However, there were limited studies in the developing world that consider the effects of Kuznets curve.

Figure 2: Hypothetical Kuznets curve



Source: Own construction based on Kuznets (1966)

However, on the other hand, there were empirical studies that showed that since the 1980s many developing countries have undergone major trade liberalisation and that greater economic integration across countries had seen an increase in inequality within developing countries (Lee & Vivarelli, 2006).

2.3.1 Criteria for developing and developed countries

According to the International Monetary Fund (IMF) system, countries are divided into advanced countries and developing countries, while the United Nations (UN) system divides countries into developing and developed countries. The World Bank (WB) divides countries into high-income and low- and middle income countries (Nielsen, 2013).

In 1989 WB defined high-income countries, as countries with a per capita Gross National Income (GNI) above US$6,000 and low-income countries, as countries with a per capita GNI below US$480. The UN uses a human development index. This index measures countries based on their achievements in longevity, education, and income. While the IMF did not explicitly define what constitutes an emerging and developed countries, it did include per capita income, export diversification and degree of integration into financial systems (Nielsen, 2013).

Since the WB only focused on income and did not take other aspects into account, the researcher has for the purpose of this research paper only taken into count the criteria that has been set by the IMF and UN.

2.4 Summary of literature review

The general consensus is that extreme income inequality is detrimental for society and can have an overall negative effect on economic growth and society's morale. As a result, this has become one of the major challenges of our time, where policy-makers and governments have agreed that this problem needs to be addressed.

There are many factors that influence rising income inequality, as explored in the above literature review, however the increase in wage dispersion is seen as a predominant driving factor. The disparity of wages has been growing at an increased rates over the last four decades and this becomes particularly important when a large part of an individual's wealth is derived from wages.

The literature review explores three major factors that contributes to the dispersion of wages between employees, which could have an influence on wage inequality.

The first factor looked at how the demand for skills played a central role in reshaping wage structure where highly skilled and educated workers were more

likely to earn higher incomes. However this would only happen if a particular skill is in demand. The literature also explored economic theory that highlights that the larger firms paid employees more than smaller firms, despite workers having the same qualification and experience, which is explained by the firm size-wage effect.

In recent literature it was established that firm growth is positively and significantly related to wage inequality. This becomes a problem when there has been an increasing trend of a greater concentration of larger firms within economies. Larger firm through their sheer size have the ability to entrench their position within an economy and swallow up small and upcoming firms.

Lastly, the literature explored the dispersion of wages caused by performance pay used to incentives executives by linking their pay to the performance of the firm. Based on this, it is understood that executives generally earn significantly more than the rest of the firms employees who have pay structures with much larger fixed components. This theme has contributed significantly to wage inequality within and between firms.

Most of the above studies have been conducted in developed countries and there is an argument that these theories may not hold true in developing countries. To date there are mixed results as to whether income inequality is increasing in developing countries or not, where some scholars have concluded that due to globalisation and the openness of trade income inequality has in fact decreased.

Using the above theories the researcher explores whether wages growth rates in a larger firms is greater than that of smaller firms for both developed countries (UK, Germany, Sweden, Australia and USA) and developing countries (Indonesia, Philippines, India, Poland and South Africa).

3. RESEARCH HYPOTHESES

The above literature review provided the basis from which the researcher investigated whether or not the growth rate of average wages per employee in larger firms would differ from that of smaller firms and, therefore, causing a deviation in earnings overtime. This deviation could possibly be a factor in the rise of income inequality, especially in countries where earning from employment forms a large part of an individual's overall income.

In particular, three hypotheses were investigated. The first looked at the growth rate of average wages per employee for larger firms within a particular country and compared this to the growth rate of average wages per employee for smaller firms within the same country. This was used to determine whether or not an employee's earnings increased at a higher rate if they worked for a larger firm rather than a smaller firm, over a period of ten years.

The second hypothesis looked at the growth rate of average wages per executive for larger firms and compared it to the growth rate of average wages per executive for smaller firms. This determined whether or not being an executive at a larger firm would result in increased earnings over a period of ten years, compared to an executive at a smaller firm.

Finally, the third hypothesis looked at the within-firm difference in growth rate of average wages per executive and the growth rate of average wages for all employees. This hypothesis looked at both larger firms and smaller firms separately and determined whether executive remuneration within such firms grew faster than the remuneration for an average employee within the same firm.

In all cases, the analysis was performed over the ten year period from 2004/5 to 2014/15. Furthermore, the analysis was done for five developing countries (Indonesia, Philippines, India, Poland and South Africa) and five developed countries (UK, Germany, Sweden, Australia and USA).

The following hypotheses were investigated and were tested at a 95% confidence level:

3.1 Hypothesis 1: Growth rates of average wages per employee in large firms versus wages in small firms

H_o: The null hypothesis states that the mean growth rate of average wages per employee for larger firms is less than or equal to the mean growth rate of average wages per employee for smaller firms.

H_A: The alternative hypothesis states that the mean growth rate of average wages per employee for larger firms is greater than the mean growth rate of average wages per employee for smaller firms.

Stated alternatively as:

H_0: $\mu_{GAWL} - \mu_{GAWS} <= 0$

H_A: $\mu_{GAWL} - \mu_{GAWS} > 0$

Where:

GAWL = growth rate of average wages per employee for larger firms;
GAWS = growth rate of average wages per employee for smaller firms;

3.2 Hypothesis 2: Growth rates of average wages per executive in large firms versus small firms

H_o: The null hypothesis states that the mean growth rate of average wages per executive for larger firms is less than or equal to the mean growth rate of average wages per executive for smaller firms.

H_A: The alternative hypothesis states that the mean growth rate of average wages per executive for larger firms is greater than the mean growth rate of average wages per executive for smaller firms.

Stated alternatively as:

H_0: $\mu_{GAWEL} - \mu_{GAWES} <= 0$
H_A: $\mu_{GAWEL} - \mu_{GAWES} > 0$

Where:

GAWEL = growth rate of average wages per executive for larger firms;
GAWES = growth rate of average wages per executive for small firms;

3.3 Hypothesis 3: Within firms, does the growth rate of executive wages exceed that of the rest of the firm?

H_0: The null hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is less than or equal to zero.

H_A: The alternative hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is greater than zero.

Stated alternatively as:

H_0: $\mu_{GAWE - GAW} <= 0$
H_A: $\mu_{GAWE - GAW} > 0$

Where:

GAWE = growth rate of average wages per executive;
GAW = growth rate of average wages per employee.

4. RESEARCH METHODOLOGY

4.1 Research design and methodology

The researcher applied a quantitative study, using a deductive approach to build on existing theories (Saunders, Lewis & Thornhill, 2012) such as the firm size-wage effect and theory established by Mueller et al. (2015) to determine whether or not the proposed hypotheses were true.

The research design for this study used a descriptive quantitative study. This method was best suited to test the hypotheses as these seek to describe the characteristics of data. In addition, the research also followed an explanatory study as the hypotheses would be used to explain the relationship between variables (Saunders et al., 2012). The researcher examined the relationship between the firm size and the growth rate of average wages over a period of ten years.

4.2 Unit of analysis

The unit of analysis is the firm size and the growth rate of average wages over a period of ten years.

4.3 Population of relevance

The population from which the developing and developed countries were selected was based on the IMF and UN categorisation for various countries. The population relevance for the developing and developed countries was based on whether a particular country had a listed stock exchange, accompanied by a quoted stock index from which the researcher could obtain a sample of large and small firms for the analysis.

The population relevance criteria for large and small firms were as follows:

For large firms:

- The firm had to be listed on an exchange and formed part of an index for the entire analysis period.
- The firm's ratio of market capitalisation to GDP had to be in the top 35% of the given population in each year during the analysis period.

For small firms:

- The firm had to be listed on an exchange during the analysis period, and at some point during the analysis period needed to be part of an index.
- The firm had to generate a turnover of less than EUR 50 million, on average, during the analysis period.

This process eliminated companies that were acquired or delisted during the analysis period.

4.4 Sampling

4.4.1 Sampling method

The sampling method that was used to determine the countries and the firms that the researcher tested was based on non-probability sampling. Non-probability sampling is a method whereby the sampling members are not selected randomly (Wegner, 2012). This method was best suited for this research as the sample selection was based on specific criteria as set above and an element of judgment was applied during the selection of the samples.

Availability sampling was used to select five developing countries and five developed countries. In particular, the researcher selected countries with listed stock exchanges that had quoted indices consisting of at least 250 companies over the period of analysis; usually this was the All Share Index of the relevant country. This criteria ensured that sufficient sample observations could be obtained for large and small firms in order to carry out the analysis. The five developing countries that met this criteria were Indonesia, Philippines, India,

Poland and South Africa, while the five developed countries were UK, Germany, Sweden Australia and USA.

4.4.2 Sample size

The targeted sample size for the analysis was chosen to achieve a *power of test* for the hypotheses of approximately 80%. The power of test is the probability of rejecting a false null hypothesis i.e. probability of rejecting H_0 given that H_A is true (Weiers, 2011).

In order to calculate the required sample size to achieve an 80% power, the following assumptions were made:

- The difference, under the alternative hypothesis, between the growth rate of average wages for large and small firms was at least 4% per annum,
- The standard deviation in the growth rates for large and small firms was approximately 5%-6% per annum, and
- The significance level for the hypothesis tests was 95%.

In order to obtain the required sample size, the researcher used an online calculator developed by Snedecor and Cochran (1989) to determine the sample size. In order to achieve an 80% power, a sample size of 17 to 26 was required. However, where possible, the researcher aimed to obtain a larger sample size, which ensured a more robust hypothesis test, particularly where observed standard deviations were higher than the assumption of 5% - 6%. In certain instances the researcher was unable to reach the targeted sample size due data availability, in these cases, a lower sample size reduced the power of tests.

4.5 Data collection process

In collecting data the researcher used secondary data. Secondary data includes data which already exists such as raw data, published data, companies' annual reports and organisations' internal records (Hussey & Hussey, 1997; Saunders et al., 2012). In order to conduct the above research, the researcher obtained

documentary secondary data from Bloomberg and Thomson Reuters, which was text based data that was extracted from both data providers, consisting of data from listed companies' annual financial statements. Where the data was not readily available on these databases, the researcher used manually extracted data directly from the companies' annual financial statements. The data obtained from these sources included the number of employees, the number of executive directors, the total amount paid to employees and the total amount paid to executive directors.

In addition, the researcher obtained GDP, market capitalisation, revenue and index constituent data, from these various database sources.

4.5.1 Selecting the relevant index

Table 2: Sample countries' stock indices

Developing Countries	
Country	**Share Index**
India	Bombay Stock Exchange 500 Index
Poland	Warsaw Stock Exchange WIG Index
South Africa	JSE All Share Index and JSE Alt-x Index
Philippines	Philippines All Share Index
Indonesia	Jakarta Composite Index
Developed Countries	
Country	**Share Index**
Australia	Australian Stock Exchange All Ordinaries Index and S&P/ASX Small Ordinaries Index
United States of America	S&P 500 Index and Russell Microcap Index
Germany	Deutsche Borse Prime All Share Performance Index
Sweden	OMX Stockholm Index
United Kingdom	FTSE All-Share Index and FTSE AIM All Share Index

Please refer to Annexure 1, page 99.

From the selection of five developing and five developed countries, the researcher selected the listed All Share Index equivalent for each of the chosen countries, as detail in Table 1. This was done by observing the number of index constituents for each available share index within each country. The index which consisted of the most number of companies was selected. This provided a pool of companies from which the researcher could obtain a sample of large and small firms in order to conduct the analysis. Once these firms were selected, the researcher obtained employee and executive wage data for each firm within the samples.

4.5.2 Determining the sample of large firms

In applying the criteria for selecting the sample for large firms, as set out in section 4.3, the researcher first determined which companies consistently formed part of the chosen index and then extracted the market capitalisation for each company, for each year, over the analysis period. In particular, market capitalisations were obtained at yearly intervals from 1 January 2005 to 1 January 2015. This data was obtained from Bloomberg.

However, in certain instances there were gaps in the market capitalisation data for certain firms. In these cases, the closest known market capitalisation number was adjusted by the percentage share price move from the known market capitalisation date to the unknown market capitalisation date.

Once the market capitalisation data was obtained, the researcher obtained the GDP data for the relevant countries from Bloomberg. This was used to determine the company's market capitalisation to GDP ratio for each year from 2005 to 2014. Quarterly nominal price GDP data was reported by Bloomberg in local currency terms. This data was aggregated into annual GDP data.

With the GDP and market capitalisations, each company's market capitalisation to GDP ratio was calculated as follows:

$$\frac{(\text{Market capitalisation}_{\textit{beginning of year}} + \text{Market capitalisation}_{\textit{end of year}})/2}{\text{Annual GDP}}$$

Using the market capitalisation to GDP ratios for each company, the researcher calculated the 65th percentile of this ratio for each year, and selected the companies that exceeded this level in every year, over the 10 year analysis period, for its sample of large firms. The 65th percentile was selected as the cut-off point, to ensure the targeted sample size was achieved.

4.5.3 Determining the sample of small firms

In order to assess whether a company met the criteria for a small company as set in section 4.3, the researcher had to extract the revenue data for each company related to each relevant index over the analysis period. The revenue data was based on the reported financial statements for the particular year and was extracted from Bloomberg in Euros. The exchange rate conversion of the revenue number from the reported currency into Euros was done by Bloomberg using an arithmetic average of the relevant exchange rate over the reporting period. Bloomberg used the composite London closing prices when determining the exchange rate. The companies for which the average revenue over the analysis period was less than or equal to EUR 50 million formed the sample of small companies.

In certain instances, the historical Bloomberg revenue data was incomplete. As a result, the research only considered companies for which sufficient data was available.

However, for certain countries the sample size obtained using the relevant country's All Share Index did not produce a sufficient number of small firms. In order to increase the sample of small firms, the researcher used small-cap indices in the relevant, as detailed in Table 2. This was true for the UK, US, Australia and South Africa.

Furthermore, in the case of South Africa, due to a lack of available historical financial reports or employee data for companies sourced from the selected small cap index, the researcher had to reduce the period over which the growth rate of average wages was calculated. More specifically, for these firms, the researcher obtained the average wage for the last reported earnings period together with the average wage for at least 8 years prior to the last reported earnings period, but not exceeding 10 years.

4.5.4 Obtaining average wage per employee

To obtain the average wage per employee for the sample of large and small firms, the researcher extracted the data using Bloomberg. The Bloomberg definition for this data field was as follows:

$$\text{Average wage per employee} = \frac{\text{Personnel expenses}}{\text{Number of employees}}$$

Where:

Personnel expenses included wages and salaries, social security, pension, profit-sharing expenses and other benefits related to personnel. This was quoted in local currency terms.

Number of people employed by the company was based on the number of full-time equivalents. If this was unavailable, then the number of full-time employees was used, excluding part-time employees. In the latter case, this was the number of employees at the end of the firm's financial year, unless an average for the year was available. The number used depended on what was reported by the individual firms.

In some circumstance Bloomberg did not have the average wage per employee data. In these cases, the researcher obtained the personnel expenses and number of employees directly from the firm's financial statements. The approach used when extracting the data was consistent with the methodology used by Bloomberg.

Furthermore, in certain instances the average wage per employee at the beginning of the analysis period was not available. In these cases, the researcher extracted the average wage per employee for 9 years prior to the last reported period in order to calculate the growth rates. The availability of data was highly dependent on the quality of reporting in the relevant country over the analysis period, as well as the quality of data collection by Bloomberg.

4.5.5 Obtaining executive remuneration data

Executive remuneration was not available on either Bloomberg or Thomson Reuters. The researcher extracted the data manually from each company's annual statements for the relevant reporting periods. Historical annual statements were sourced from companies' websites, as well as Bloomberg and Thomson Reuters databases. Where such financial statements were in foreign languages, namely for Indonesia and Poland, the research extracted the data with the aid of Google translate.

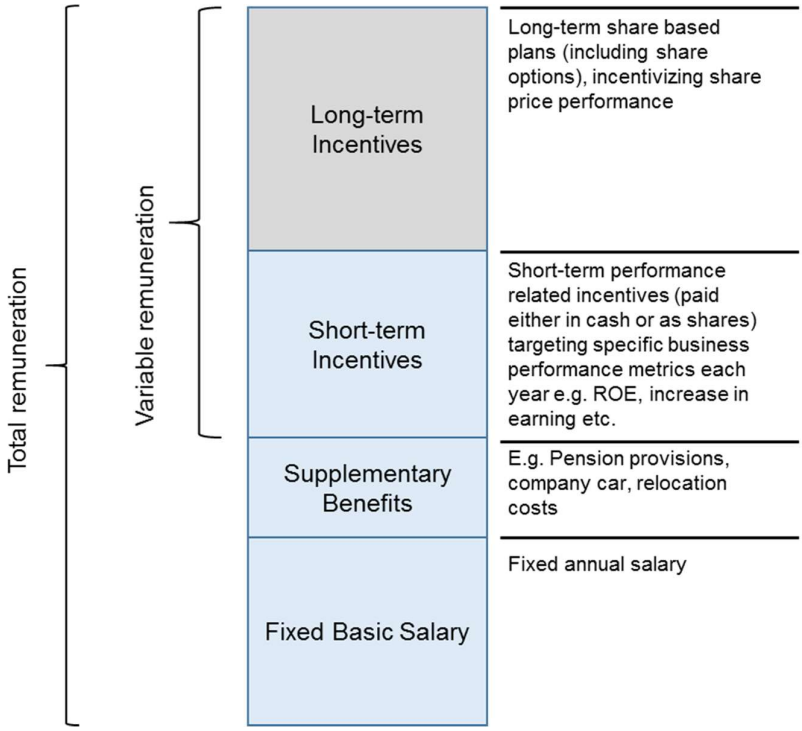
It should be noted that each country had its own rules regarding disclosure of executive remuneration. In general, executive remuneration was made up of two components; fixed remuneration and variable remuneration as illustrated in Figure 3.

For the purpose of the analysis, the fixed salary component, supplementary benefits and short-term incentives plans (STIP), were included. Severance packages were excluded.

Long term incentives plans (LTIP) were excluded from the total remuneration amount. They were excluded because the LTIP were not guaranteed, with vesting periods of 3-10 years. Furthermore, LTIP can be revoked by the board of directors if certain financial targets were not met. In addition, LTIP were highly sensitive to share price fluctuations, which translate into significant volatility in overall remuneration, and were highly affected by the point in time that the

remuneration was measured. This was not conducive to the type of CAGR-analysis (see below) undertaken in this research.

Figure 3: Make up of Executive remuneration



Source: Own construction

4.5.6 Calculating wage growth rates for the sample of large firms and small firms

Once the average wages per employee and the average remuneration per executive director was obtained for the last reported earnings period and the historical earnings period, the average growth rate was calculated as follows:

$$\left(\frac{\text{Average Wage per Employee}_{End\ date}}{\text{Average Wage per Employee}_{Start\ date}}\right)^{\frac{365}{(End\ Date-Start\ Date)}} -1$$

This formula calculated the Compounded Annual Growth Rate (CAGR) for the average wage per employee over the period.

The CAGR is a mathematical formula that provides a "smoothed" rate of return and is a useful measure of growth over multiple time periods (Wayman, n.d.). Furthermore, the measure produced a standardised return, which made it comparable between different firms. The disadvantage was that this method only used two data points and therefore the result of the growth rate was sensitive to the starting and ending wages.

4.6 Data quality and reliability

The quality of data was very important in doing this statistical analysis; the data needed to be reliable and accurate in order for the findings to be valid (Wegner, 2012). In order to ensure the data was relatively clean, the researcher performed the following data checks when collecting data and before running any analyses:

4.6.1 Data checks for Bloomberg and Thomson Reuters data

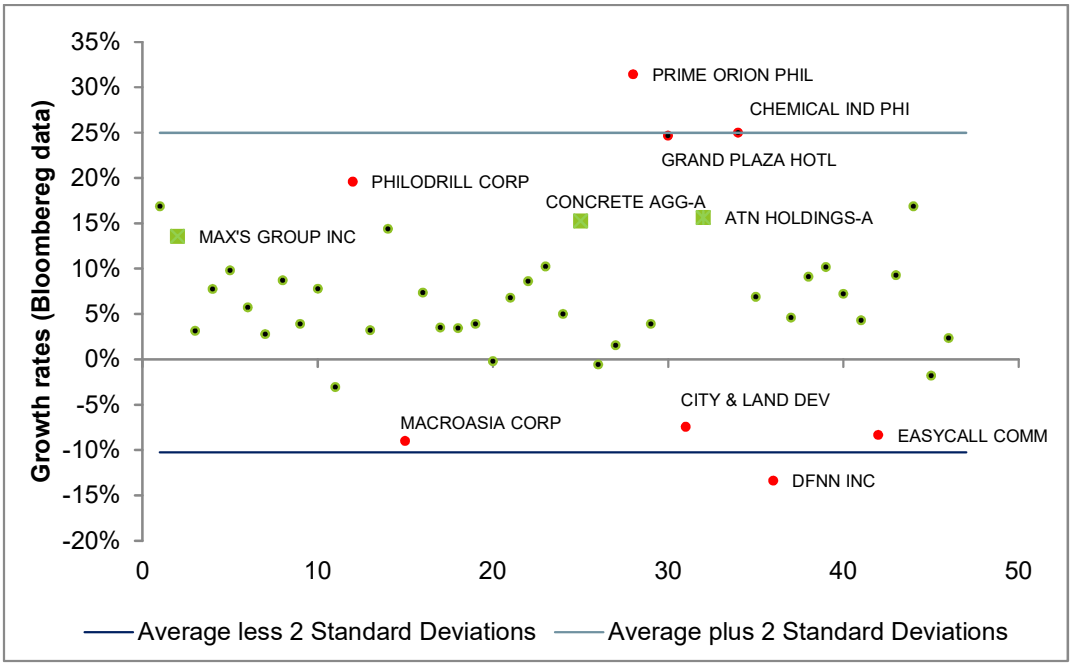
The data obtained from Bloomberg or Thomson Reuters was checked to ensure the data was valid and reliable. The following steps were followed:

The first step plotted the growth rates of average wages for all the firms in each sample, which determined whether the sample observations were roughly two standard deviations higher or lower than the average growth rate. This highlighted the outlier data that need to be investigated.

Random spot checks were done on the data points that showed a sudden change in either the number of employees or the total personnel expenses from one year to the next for a particular firm. The researcher then checked these data points against the annual financial statements to verify the data. The most common error picked up was incorrect employee numbers were recorded by Bloomberg. However, where data discrepancies could not be verified or a satisfactory explanation found for the outlier data, the data point was removed from the sample. Figure 4 illustrates the exercise performed in the case of small firms for

the Philippines. The red dots highlighted data points that looked too high/low and the green dots highlighted the firms which were randomly spot checked. A more detailed example of the checks performed for small firms in Philippines is presented in Annexure 2.

Figure 4: Example of scatter plot for data check



Source: Own construction.

4.6.2 Data adjustments for executive remuneration data collected from annual financial statements

When collecting the executive remuneration data from the annual financial statement, the below adjustments were made to the data.

Executive wages, in certain cases, were displayed in the annual report as a total amount paid to all directors. In addition, some directors only served for part of the financial year, either due to them resigning part way through the year or being appointed part way through the year. In these circumstances, when calculating the average remuneration per executive, the researcher divided the total amount

paid to executives by the partial period served by each executives i.e. if an executives joined midway he/she would be represented by 0.5.

In other cases, executive remuneration was provided for each individual executive. In these cases, if certain executives served only part of the year, then to calculate the average wages per executive, the researcher only included the remuneration of those executives that served the full year. However, where the number of executives was very low or where all executives' only served part of the year, the remuneration was scaled in order to estimate the full year remuneration. For example, if an executive served 8 months, his annual pay was multiplied by 12 and divided by 8 in order to estimate his full year remuneration.

As a data check, the researcher compared the average wage per executive against the remuneration of the highest paid executive to ensure that the average remuneration was not greater than the highest paid executive. This was an important check as the average wages per executive was very sensitive to the number of executives, due to the generally small number of executives within a firm.

As highlighted above, for both developing countries and developed countries, all executive remuneration data was manually collected from annual reports as Bloomberg did not have this data. The only exception was for the large firms in the UK for which Bloomberg did have executive remuneration for 2014/15. However, a lot of the data points needed to be checked due to a large number of outliers as Bloomberg included LTIP remuneration.

4.7 Data analysis approach

The data analysis consisted of capturing data, which was done on Microsoft Excel, as per the data collection method discussed above. Thereafter the researcher used descriptive statics to provide a general overview of the data. Data was presented graphically and in tables to illustrate the characteristics of the distribution, including tests for normality.

When the researcher selected a method to conduct the inferential hypothesis tests, the researcher considered various methodologies such as regression, analysis of variance (ANOVA) test and t-tests.

Regression is a statistical method that aims to quantify the relationship between two variables and measure the strength of the relationship (Wegner, 2012). The purpose of this study was not to find a relationship but consider the inequality of two sample means, and hence regression was considered to be inappropriate.

The second method considered was the ANOVA test. The purpose of ANOVA is to determine whether there is a statistical relationship between factors and the responsible variable (Wegner, 2012) and is used when more than two population means are compared for equality. However, for this research analysis, the effect of only one variable, namely firm size, was being tested. So while an ANOVA test could be used, it was considered to be inappropriate for this study.

T-tests were considered to be more appropriate as the population standard deviations were not known and the sample sizes were generally small (Wegner, 2012). Both factors were true for our data sets.

Furthermore, t-tests shows directionality compared to an ANOVA test, which only tests for equality and did not illustrate directionality (Wegner, 2012) i.e. an ANOVA test only shows that different sample means are either equal or not equal. T-test allowed the researcher to test whether one sample mean was greater or less than another sample mean, which was important for the purpose of this research project. Namely, the researcher could test whether the growth rate of average wages of large firms was greater than the growth rate of average wages of small firms for both executives and the firm as a whole.

For the first two hypotheses tests (being Hypothesis 1 and Hypothesis 2), the researcher conducted a two sample, unknown variance t-tests. The last hypothesis was tested using a matched pair t-test to compare difference between

two populations within the same firm i.e. the mean of the within firm difference between the growth rate of average wages per executive and the growth rate of average wage for all employees.

4.7.1 Hypothesis 1:

The two populations for which the means were tested for differences under this hypothesis were:

- the growth rate of average wages per employee for larger firms;
- the growth rate of average wages per employee for smaller firms.

4.7.2 Hypothesis 2:

The two populations for which the means were tested for differences under this hypothesis were:

- the growth rate of average wages per executive for larger firms;
- the growth rate of average wages per executive for small firms.

4.7.3 Hypothesis 3:

The populations for which the means were tested for differences from zero under this hypothesis were the difference between:

- the growth rate of average wages per executive in a firm;
- the growth rate of average wages per employee for the same firm.

4.8 Ethical considerations

In collecting the data, a large amount of reliance was placed on Bloomberg and Thomson Reuters. The researcher obtained written consent from both parties to use their historical financial and market data where necessary. This was in accordance with the guidelines as set by the Gordon Institute of Business Science.

4.9 Research limitations

The researcher acknowledges the below limitations to this study,

a. The data was confined to only ten countries (Indonesia, Philippines, India, Poland, South Africa, UK, Germany, Sweden, Australia and USA) which may not be representative of all the developing and developed countries around the world.
b. The data was confined to listed data and this study does not take into account unlisted, private companies.
c. The period that was tested was limited to 10 years. A longer period of testing could have resulted in a different outcome.
d. Wages are not the only cause of income inequality in a country, especially since some countries do not rely on wages as the sole purpose of their household income. The researcher has not explored the impact of social grants and any other reactive government intervention or other potential causes on income inequality.
e. The researcher used average per employee / executive data. This may not be representative of the underlying wage distribution, where distributions are highly skewed.
f. The researcher excluded LTIP from executive wages from the analysis. However, LTIP can be a large and significant portion of executive remuneration.

5. RESULTS

Chapter 5 serves to present the results of the statistical analysis based on the data collection and methodology as set out in Chapter 4. Accordingly, this chapter has been divided into subsections that reflect the results for each hypothesis. Each subsection displays the descriptive statistics that were calculated for large and small firms per country. Descriptive statistics are used to describe the basic features of the data in the study and to provide a general overview of the data (Wegner, 2012).

After the initial screening of the descriptive statistics, the researcher used Microsoft Excel to perform the inferential statistical analysis for all the hypotheses that were presented in Chapter 3. This was done using a 95% significance level.

5.1 Descriptive statistics

The descriptive statistics displayed in the tables within this chapter, include the arithmetic average (or mean), the median, the standard deviation and the skewness for the various samples. Furthermore, the minimum and maximum values for each sample are provided.

The arithmetic average and median provides a measure of the central location of the distribution i.e. the value around which the data is concentrated. In the case where the distribution is symmetric, such as a normal distribution, the mean and median are equal. However, to the extent that the distribution is asymmetric, the mean and median will be different (Wegner, 2012).

A measure for the degree of symmetry of a distribution is provided by the skewness of a distribution. Skewness values greater than 1 (positive skewness) and less than -1 (negative skewness) indicates significant asymmetry (Wegner, 2012). A positively skewed distribution implies that there is a bunching up of data below the arithmetic average, and vice versa for a negative skew (Saunders et al., 2012).

Finally, the standard deviation provides a measure of the dispersion, or spread, of the data around the central location. The more dispersion around the arithmetic mean, the greater the standard deviation (Wegner, 2012).

In addition to the above the numerical descriptive statistics, box and whisker plots have been used as a graphical description to understand the data. Box and whisker plots are useful to gauge the range of the data (i.e. the minimum and maximum values); the spread of the data as well as the skewness in the data (Wegner, 2012). The minimum and maximum values are indicated by the lines on either side of the box, while the height of the box indicates the spread of data. Finally, the skewness is indicated by the horizontal line within the box – the closer this line is to the middle of the box, the more symmetric the distribution.

5.2 Testing for normality

In order to use a t-test, there is a requirement that the underlying distribution of data needs to be normally distributed. Therefore, before conducting the inferential statistics, a test for normality of the data was done. Assumptions of normality were initially tested by using histograms as displayed in Annexure 3. This was used to visually check if the distribution looked approximately normal. However, this is a subjective measure and is not ideal when using smaller samples. Therefore, a more quantitative measure, known as the Kolmogorov-Smirnov (K-S) test, was performed to check for normality.

Kolmogorov-Smirnov (K-S) test considers the goodness of fit between a hypothesised distribution function, which in this case is a normal distribution function (Hogg & Tanis, 2001). Tabulated in each of the descriptive statistics sections are the results from the K-S tests that were performed. In each case, the data approximates a normal distribution.

5.3 Hypothesis 1

The first hypothesis is centred on whether the growth rate of average wages per employee in a large firm exceeds the growth rate of average wages per employee in a small- to medium-sized firm

In total 339 companies from five developing countries and 305 companies from five developed countries formed part of the research sample. Section 5.3.1 discusses the descriptive statistics and section 5.3.2 discusses the inferential statistics, which is split between the developing countries and developed countries.

5.3.1 Descriptive statistics

5.3.1.1 Developing countries

Referring to Table 3, when comparing the average growth rates for small and large firms, in each country, they are very similar for each country, with the exception of Poland. Furthermore, for Philippines and South Africa, the average growth rate for large firms is higher than small firms. While, for Poland and India the average growth rate for large firms is less than small firms. For Indonesia the growth rates were very similar.

The means and medians for each sample are not significantly different, indicating a symmetric distributions. This ties up with the observed skewness measures which are all between -1 and 1, with the exception of large firms in Poland. This indicates a negative skewness.

The standard deviations range between 2.93% and 8.54%, which is broadly in the range of the 5%-6% assumption made when determining the sample size in order to achieve a power of 80% for the hypothesis tests. Furthermore, in instances where the standard deviation is higher (Poland small firms), the sample size is larger than the required 17 – 26 sample sizes.

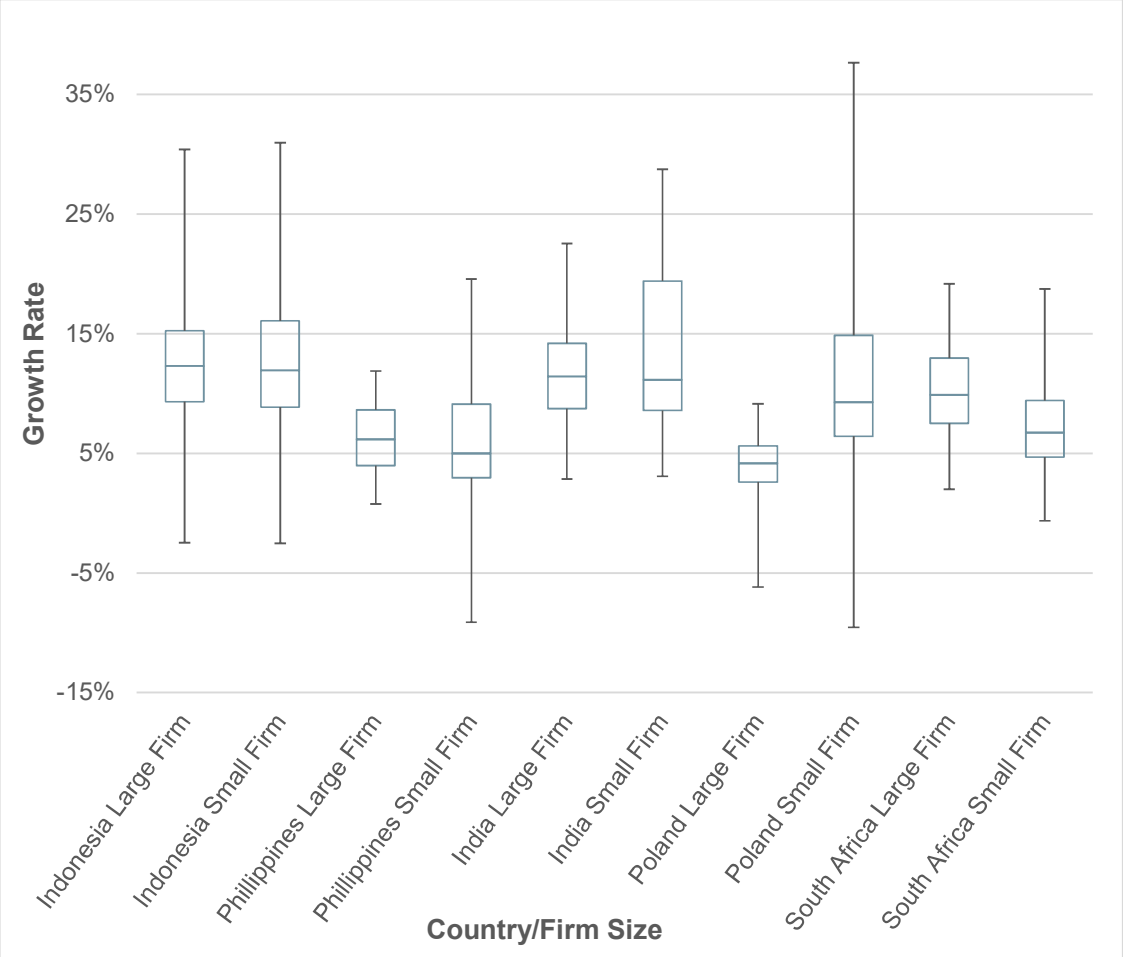
Table 3: Descriptive statistics for growth rates of average wage per employee for developing countries

		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
Indonesia	GAW Large Firms	45	12,27%	12,30%	0,16	-2,47%	30,41%	0,33%	5,71%	0,092	0,061
	GAW Small Firms	90	12,42%	11,93%	0,19	-2,53%	30,95%	0,36%	5,96%	0,203	0,143
Philippines	GAW Large Firms	24	6,06%	6,18%	-0,04	0,77%	11,88%	0,09%	2,93%	0,078	0,089
	GAW Small Firms	41	5,50%	5,00%	-0,20	-9,11%	19,58%	0,40%	6,31%	0,275	0,212
India	GAW Large Firms	27	11,82%	11,42%	0,34	2,85%	22,53%	0,27%	5,19%	0,095	0,150
	GAW Small Firms	21	13,33%	11,15%	0,63	3,09%	28,75%	0,46%	6,79%	0,258	0,289
Poland	GAW Large Firms	17	3,53%	4,16%	-1,12	-6,16%	9,13%	0,14%	3,70%	0,107	0,134
	GAW Small Firms	40	11,37%	9,26%	0,59	-9,55%	37,66%	0,73%	8,54%	0,318	0,215
South Africa	GAW Large Firms	20	9,97%	9,88%	0,09	1,99%	19,16%	0,19%	4,36%	0,074	0,141
	GAW Small Firms	14	7,66%	6,73%	0,63	-0,63%	18,75%	0,27%	5,21%	0,294	0,349

Note that GAW is abbreviated for Growth rate of Average Wages

Referring to the box and whisker plot in Figure 5, it can be noted that for Indonesia and Philippines, the distribution of growth rates for small and large firms have similar statistical outcomes. However, the differences between large and small firms in India and South Africa increases and is more pronounced for Poland.

Figure 5: Box and whisker plot of growth rates of average wages per employee for developing countries



5.3.1.2 Developed countries

Referring to Table 4, like developing countries, the difference in the growth rates between large and small firms, for each country, is small. However, the average growth rates for developed countries are much lower than those observed for developing countries.

The means and medians for each sample are very similar, and together with the skewness measures being close to zero, indicates symmetrical underlying distributions. The only exception is Swedish large firms, which like Polish large firm, exhibits a negative skewness.

The standard deviations range from 2.15% to 4.7% and are lower than those observed for developing countries. Furthermore, these standard deviations are lower than the assumption of 5%-6% used to determine an appropriate sample size. This indicates that the sample sizes are sufficient in order to achieve a power of 80%.

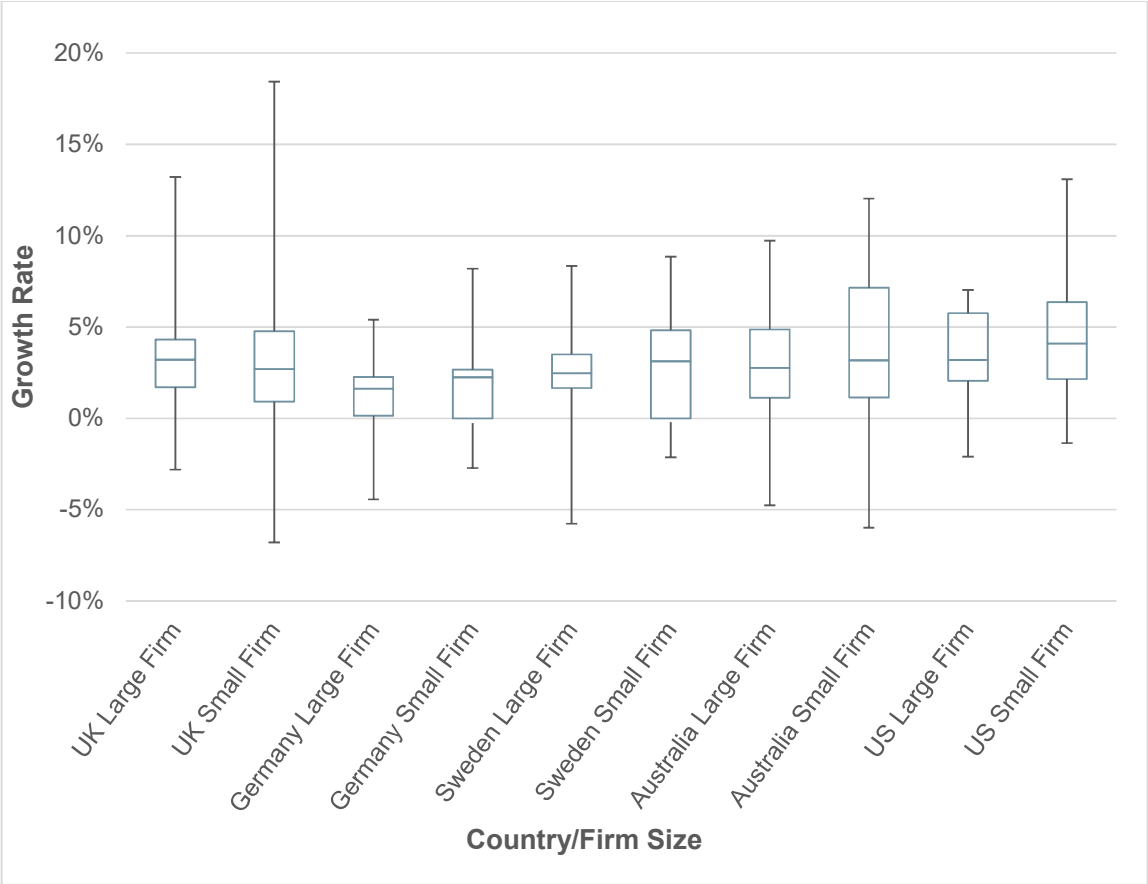
Finally, the box and whisker plots indicate far greater consistency, compared to developing countries, in the distributions of growth rates between small and large firms in the respective countries.

Table 4: Descriptive statistics for growth rates of average wages per employee for developed countries

		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
UK	GAW Large Firms	55	3,51%	3,20%	0,67	-2,81%	13,21%	0,10%	3,08%	0,16	0,18
	GAW Small Firms	47	2,66%	2,69%	0,63	-6,79%	18,44%	0,19%	4,40%	0,10	0,20
Germany	GAW Large Firms	50	1,25%	1,63%	-0,63	-4,43%	5,40%	0,05%	2,15%	0,13	0,19
	GAW Small Firms	21	1,55%	2,00%	0,76	-2,72%	7,95%	0,07%	2,66%	0,18	0,29
Sweden	GAW Large Firms	31	2,18%	2,47%	-0,93	-5,76%	8,34%	0,05%	2,34%	0,17	0,24
	GAW Small Firms	26	2,42%	2,92%	0,22	-2,13%	8,66%	0,08%	2,85%	0,11	0,26
Australia	GAW Large Firms	22	2,8%	2,8%	-0,27	-4,8%	9,7%	0,10%	3,1%	0,120	0,284
	GAW Small Firms	16	3,9%	3,2%	-0,02	-6,0%	12,0%	0,22%	4,7%	0,108	0,328
USA	GAW Large Firms	12	3,5%	3,2%	-0,53	-2,1%	7,0%	0,07%	2,7%	0,115	0,375
	GAW Small Firms	25	4,8%	4,1%	0,67	-1,4%	13,1%	0,15%	3,8%	0,138	0,270

Note that GAW is abbreviated for Growth rate of Average Wages

Figure 6: Box and whisker plot of growth rates of average wages per employee for developed countries



5.3.2 Inferential statistics and hypothesis testing

Inferential statistics makes suggestions about the population using sample data drawn from the population (Wegner, 2012). As described in Chapter 4, a t-test is used to assess whether the two means are statistically different from each other. More specifically, the following hypothesis is tested at the 95% significance level:

H_o: The null hypothesis states that the mean growth rate of average wages per employee for larger firms is less than or equal to the mean growth rate of average wages per employee for smaller firms.

H_A: The alternative hypothesis states that the mean growth rate of average wages per employee for larger firms is greater than the mean growth rate of average wages per employee for smaller firms.

5.3.2.1 Developing countries

The t-test in Table 5 uses a 95% confidence level to test hypothesis one for each country. The test indicates that the mean growth rates of average wages per employee for large firms does not exceed the mean growth rates of average wages per employee for small firms. In fact, for Poland the opposite is statistically significant, whereby the p-value is very close to 1.

Table 5: Inferential statistics and results for hypothesis one – developing countries

	Indonesia	Philippines	India	Poland	South Africa
$\mu_{GAW\ Large\ firms}$ (a)	12,27%	6,06%	11,82%	3,53%	9,97%
$\mu_{GAW\ Small\ firms}$ (b)	12,42%	5,50%	13,33%	11,37%	7,66%
Mean Difference (a-b)	**-0,15%**	**0,56%**	**-1,52%**	**-7,84%**	**2,31%**
Df	92	61	37	55	25
t Stat	-0,145	0,490	-0,850	-4,834	1,361
P(T>=t) one-tail	0,5576	0,313	0,7995	0,9999	0,093
t Critical one-tail	1,662	1,670	1,687	1,673	1,708
P(T<=t) two-tail	0,885	0,626	0,401	0,000	0,186
t Critical two-tail	1,986	2,000	2,026	2,004	2,060
Result t-test	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**

Note: GAW is abbreviated for growth rate of average employee wages.

5.3.2.2 Developed countries

Similarly, when assessing the mean growth rate of average wages per employee for large and small firms in the developed countries, as displayed in Table 6, the null hypothesis was not rejected, indicating that there is no statistically significant evidence that the mean growth rate of average wages per employee for large firms exceeds that of small firms.

Table 6: Inferential statistics and results for hypothesis one - developed countries

	UK	Germany	Sweden	Australia	USA
GAW Large firms (a)	3,51%	1,25%	2,18%	2,83%	3,53%
GAW Small firms (b)	2,66%	1,55%	2,42%	3,94%	4,83%
Mean Difference (a-b)	**0,9%**	**-0,3%**	**-0,2%**	**-1,11%**	**-1,29%**
Df	81	32	48	24	30
t Stat	1,119	-0,471	-0,357	-0,829	-1,191
P(T>=t) one-tail	0,133	0,680	0,639	0,792	0,879
t Critical one-tail	1,664	1,694	1,677	1,711	1,697
P(T<=t) two-tail	0,267	0,641	0,723	0,415	0,243
t Critical two-tail	1,990	2,037	2,011	2,064	2,042
Result t-test	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**

5.4 Hypothesis 2

Hypothesis two assesses whether executives at larger firms have a higher growth rate of average wages than executives at smaller firms, over the analysis period.

294 companies spanning five developing countries and 292 companies over five developed countries form part of the researcher's sample. The sample sizes are lower than hypothesis 1. This is due to executive remuneration not being available for all firms. Section 5.4.1 discusses the descriptive statistics and section 5.4.2 discusses the inferential statistics, relating to developing countries and developed countries.

5.4.1 Descriptive statistics

5.4.1.1 Developing countries

Referring to Table 4, the difference between the average growth rate for large and small firms seems more pronounced, particularly for Philippines, India and

South Africa. For all countries, the mean growth rate for large firms is higher than for small firms.

The mean growth rate is higher than the median for large firms in Poland, large firms in Philippines, large firms in Indonesia and small firms in India. This is further accompanied by relatively high skewness measures, indicating that the data could be less symmetrical. Nevertheless, in all instances, the results from the K-S tests indicate the underlying distributions are roughly normal.

In terms of the standard deviations, the main observation is that they are much higher than the standard deviations observed for the all employee data in hypothesis one. This indicates that executive wages have a far greater inherent variability than the all employee wages. Furthermore, the standard deviations are also higher than the 5%-6% assumption, which is used to determine an appropriate sample size in order to achieve 80% power for the tests. This means that the target sample size of 17 – 26, will adversely affect the power of the test.

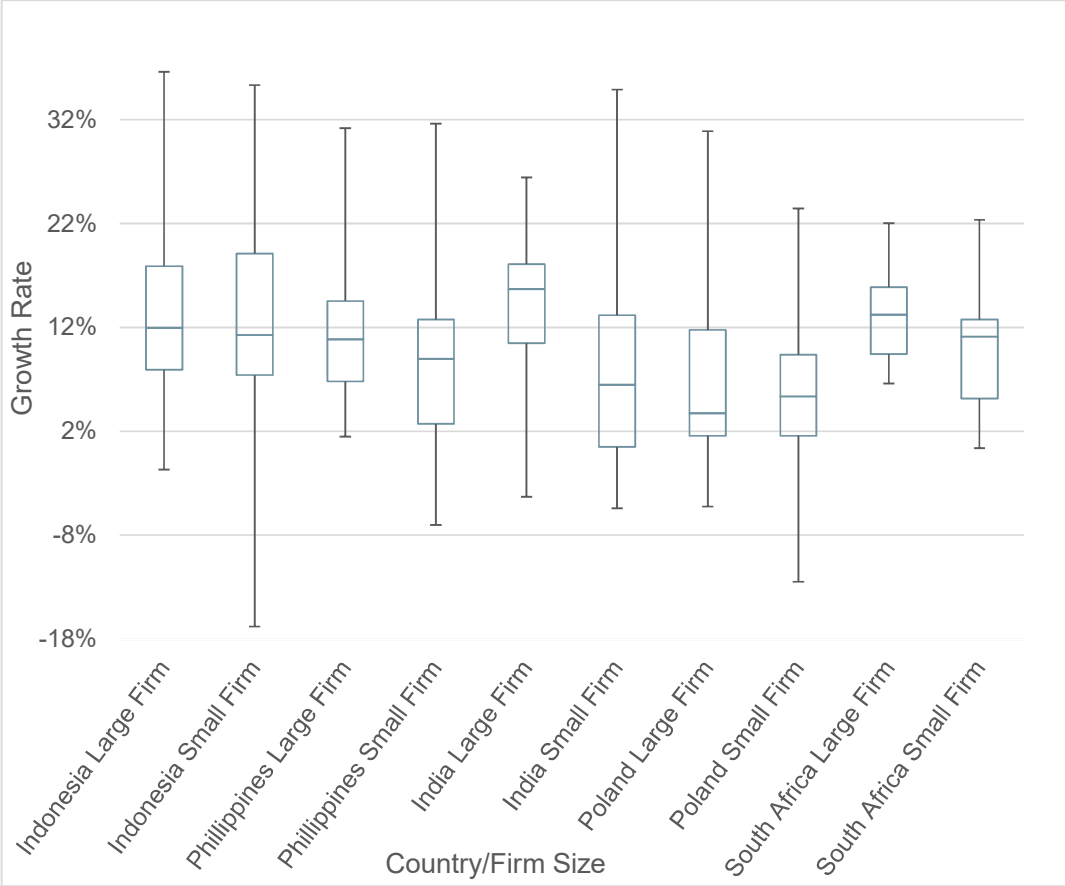
Looking at the box and whisker plots in Figure 7, the statistical outcomes between large and small firms for Indonesia are similar, with more pronounced differences for the Philippines, Poland, South Africa and particularly India.

Table 7: Descriptive statistics for growth rates of average wages per executive for developing countries

		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
Indonesia	GAWE Large Firms	42	14,36%	11,95%	0,89	-1,69%	36,60%	0,88%	9,40%	0,17	0,21
	GAWE Small Firms	59	12,68%	11,27%	0,00	-16,78%	35,35%	1,02%	10,09%	0,07	0,18
Philippines	GAWE Large Firms	23	12,13%	10,85%	1,06	1,47%	31,20%	0,64%	8,03%	0,15	0,28
	GAWE Small Firms	39	8,62%	8,98%	0,76	-7,01%	31,62%	0,69%	8,32%	0,13	0,22
India	GAWE Large Firms	26	14,00%	15,69%	-0,71	-4,30%	26,44%	0,54%	7,36%	0,11	0,26
	GAWE Small Firms	20	8,15%	6,49%	1,08	-5,40%	34,89%	1,16%	10,79%	0,19	0,29
Poland	GAWE Large Firms	16	6,95%	3,75%	1,37	-5,23%	30,91%	0,86%	9,27%	0,24	0,33
	GAWE Small Firms	35	5,50%	5,37%	0,01	-12,48%	23,46%	0,63%	7,92%	0,08	0,23
South Africa	GAWE Large Firms	20	13,24%	13,24%	0,35	6,61%	22,04%	0,22%	4,66%	0,10	0,29
	GAWE Small Firms	14	10,12%	11,11%	0,14	0,39%	22,35%	0,39%	6,21%	0,12	0,35

Note that GAWE is abbreviated for Growth rate of Average Executive Pay

Figure 7: Box and whisker plot of growth rates of average wages per executive for developing countries



5.4.1.2 Developed countries

Referring to Table 8, it can be seen that the average growth rates for both large and small firms, are much lower than those for executives in developing countries. Furthermore, the differences between large and small firms is not always positive, this is true for Swedish firms and USA firms.

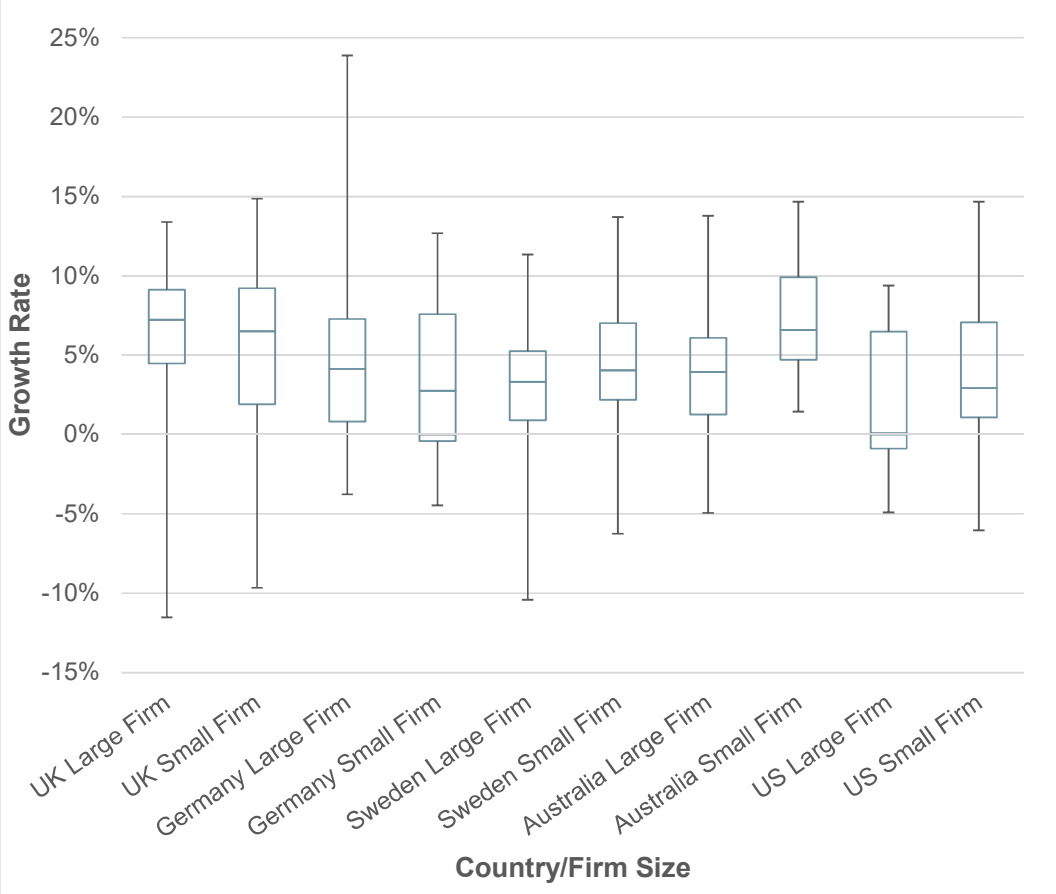
Table 8: Descriptive statistics for growth rates of average wages per executive for developed countries

		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
UK	GAWE Large Firms	53	6,36%	7,22%	-1,73	-11,52%	13,39%	0,18%	4,23%	0,0944	0,1868
	GAWE Small Firms	44	5,61%	6,50%	-0,59	-9,66%	14,86%	0,29%	5,40%	0,0683	0,2050
Germany	GAWE Large Firms	44	4,71%	4,14%	1,22	-3,77%	23,89%	0,31%	5,55%	0,0934	0,2050
	GAWE Small Firms	20	3,30%	2,76%	0,28	-4,47%	12,67%	0,23%	4,77%	0,0918	0,2940
Sweden	GAWE Large Firms	31	2,76%	3,32%	-0,97	-10,42%	11,34%	0,24%	4,90%	0,1147	0,2380
	GAWE Small Firms	25	4,30%	4,04%	-0,33	-6,24%	13,71%	0,18%	4,23%	0,0863	0,2700
Australia	GAWE Large Firms	22	4,40%	3,94%	0,340	-4,95%	13,78%	0,31%	5,56%	0,153	0,284
	GAWE Small Firms	16	7,15%	6,59%	0,332	1,44%	14,67%	0,14%	3,69%	0,117	0,328
USA	GAWE Large Firms	12	2,06%	0,08%	0,259	-4,90%	9,39%	0,24%	4,92%	0,238	0,375
	GAWE Small Firms	25	3,59%	2,92%	0,230	-6,04%	14,67%	0,22%	4,74%	0,127	0,270

Note that GAWE is abbreviated for Growth rate of Average Executive Pay

Looking at the means and the medians, unlike the developing countries, these values are much closer. In addition, the skewness measures are closer to zero, indicating symmetry in the underlying distributions. However, not all the skewness measures are close zero. Large firms in the UK exhibit significant negative skewness, while the large firms in Germany exhibit significant positive skewness. Nevertheless, the K-S test in both instances indicates that the underlying distributions are normal.

Figure 8: Box and whisker plot of growth rates of average wages per executive for developed countries



For executive wages in developed countries, the standard deviations are much lower (ranging from 4.23% to 5.56%) than the standard deviations observed for executive pay in developing countries (ranging from 6.21% to 10.79%). The standard deviation are also similar in value to the all employee data for developed

countries. Furthermore, the observed standard deviation are much closer to the assumption of 5%-6% made to ensure a power for our tests of 80%.

Looking at the box and whisker plot in Figure 8, there is a far tighter range in the distributions of the growth rates for average wages per executive between large and small firms, compared to developing countries. However, the country that seems to stand out is Australia, where the distribution of growth rates for small firms seems to be distinctly higher than for larger firms.

5.4.2 Inferential statistics and hypothesis testing

The second hypothesis is centred on whether the growth rate of average wages per executive in a large firm is greater than the growth rate of average wages per executive in a small firm.

More specifically, the following hypothesis was tested at 95% confidence level:

H_o: The null hypothesis states that the mean growth rate of average wages per executive for larger firms is less than or equal to the mean growth rate of average wages per executive for smaller firms.

H_A: The alternative hypothesis states that the mean growth rate of average wages per executive for larger firms is greater than the mean growth rate of average wages per executive for smaller firms.

5.4.2.1 Developing countries

When reviewing the descriptive statistics for developing countries, it illustrates that in all circumstance, the growth rate of average wages per executive for larger firms exceeds that of smaller firms. However, when referring to the inferential statistics, in all circumstances, the researcher fails to reject the null hypothesis, except in the case of India. This indicates that despite the observed averages being higher for large firms than small firms, there is only statistically significant evidence in the case of India. Having said that, given the low p-values for

Philippines and South Africa, it is worth noting that at a 90% significance level, the null hypothesis is rejected, as well.

Table 9: Inferential statistics and results for hypothesis two - developing countries

	Indonesia	Philippines	India	Poland	South Africa
$\mu_{GAWE\ Large\ firms}$ (a)	14,36%	12,13%	14,00%	6,95%	13,2%
$\mu_{GAWE\ Small\ firms}$ (b)	12,68%	8,62%	8,15%	5,50%	10,1%
Mean Difference (a-b)	**1,68%**	**3,51%**	**5,85%**	**1,45%**	**3,12%**
Df	92	48	32	25	23
t Stat	0,8581	1,6395	2,0809	0,5427	1,5908
P(T>=t) one-tail	0,1965	0,0538	0,0228	0,2961	0,0626
t Critical one-tail	1,6616	1,6772	1,6939	1,7081	1,7139
P(T<=t) two-tail	0,3930	0,1076	0,0455	0,5922	0,1253
t Critical two-tail	1,9861	2,0106	2,0369	2,0595	2,0687
Result t-test	Fail to reject H_o	Fail to reject H_o	Reject H_o	Fail to reject H_o	Fail to reject H_o

5.4.2.2 Developed countries

Table 10: Inferential statistics and results for hypothesis two - developed countries

	UK	Germany	Sweden	Australia	USA
$\mu_{GAWE\ Large\ firms}$ (a)	6,36%	4,71%	2,76%	4,40%	2,06%
$\mu_{GAWE\ Small\ firms}$ (b)	5,61%	3,30%	4,30%	7,15%	3,59%
Mean Difference (a-b)	**0,75%**	**1,41%**	**-1,55%**	**-2,75%**	**-1,52%**
Df	81	42	54	36	21
t Stat	0,754	1,039	-1,266	-1,833	-0,893
P(T>=t) one-tail	0,227	0,152	0,895	0,962	0,809
t Critical one-tail	1,664	1,682	1,674	1,688	1,721
P(T<=t) two-tail	0,453	0,305	0,211	0,075	0,382
t Critical two-tail	1,990	2,018	2,005	2,028	2,080
Result t-test	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o

With respect to developed countries the t-test fails to reject the null hypothesis, once again, indicating that there is no statistically significant evidence that the mean growth rate of average wages per executive is higher for large firms than for small firms in developed countries.

5.5 Hypothesis 3

The third hypothesis is centred on the differences within firms between the growth rates of wages for executives and the growth rate of wages for all employees. However, the question that the hypothesis attempts to answer is whether within firms the growth rate of executive wages is higher than the growth rate of wages for all employees.

A total of 294 companies spanning five developing countries and 292 companies over five developed countries formed part of the researcher's sample. Section 5.5.1 discusses the descriptive statistics and section 5.5.2 discusses the inferential statistics for hypothesis 3.

5.5.1 Descriptive statistics

5.5.1.1 Developing countries

Referring to Table 11, with the exception of small firms in India and small firms in Poland, the average difference for both large and small firms for all the other countries is greater than zero. This indicates that on average the growth rate of average wages per executive increases at a faster pace than rest of the firm for both large and small firms. However, in the case of small firms in India and small firms in Poland, the opposite is true, with average differences being in excess of 4%.

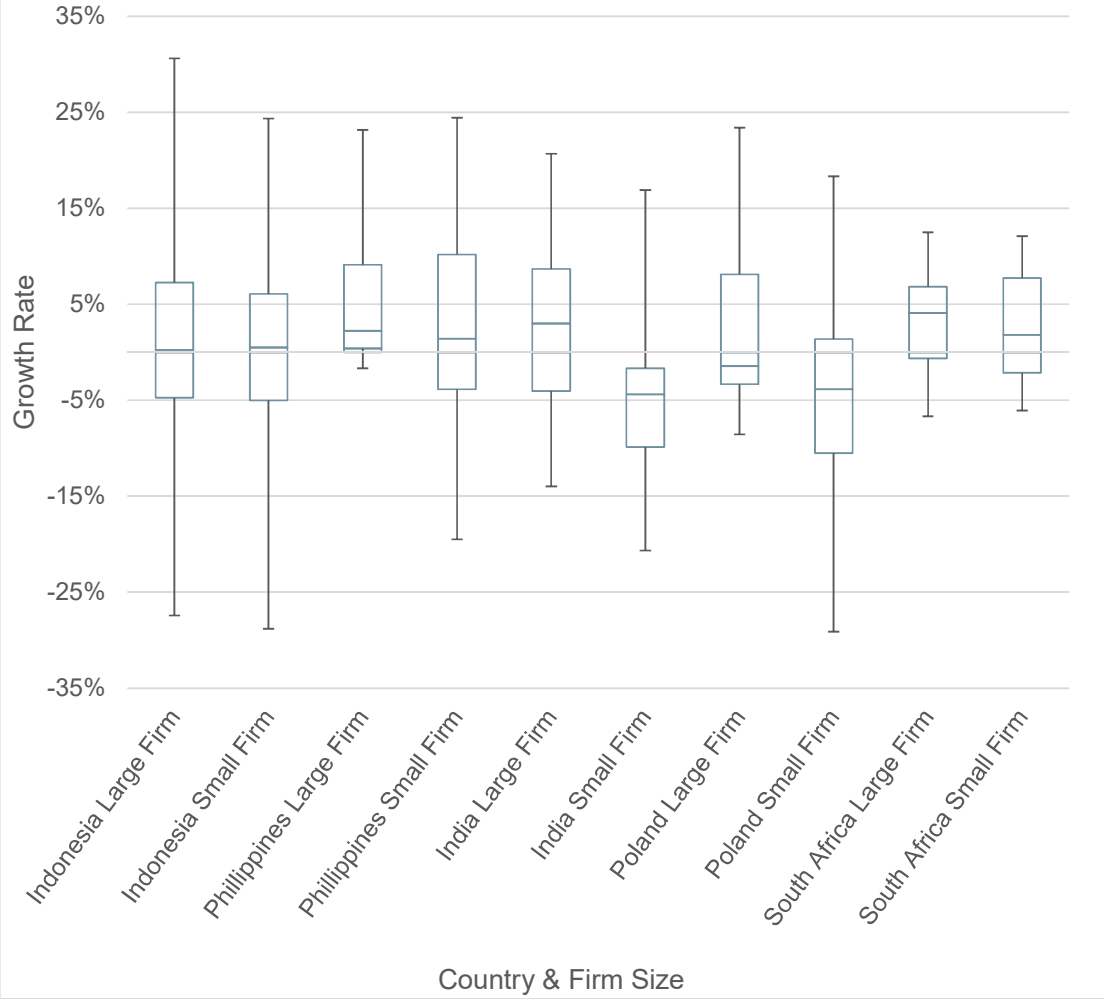
The means and medians are very similar, which together with the skewness measures indicate symmetry in the underlying distributions. The only exception here is large firms in Philippines, where there is a positive skewness.

Table 11: Within firm differences between the growth rates of average wages per executive less the growth rates of average wages per employee for developing countries

Difference between GAWE and GAW		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
Indonesia	Large Firms	42	1,92%	0,25%	0,32	-27,43%	30,61%	1,21%	11,01%	0,15	0,21
	Small Firms	59	0,05%	0,49%	-0,53	-28,82%	24,34%	1,13%	10,64%	0,10	0,18
Philippines	Large Firms	23	5,84%	2,22%	1,23	-1,66%	23,16%	0,54%	7,35%	0,21	0,28
	Small Firms	39	2,58%	1,39%	0,13	-19,49%	24,43%	1,01%	10,05%	0,11	0,22
India	Large Firms	26	2,27%	3,01%	-0.10	-13,99%	20,67%	0,94%	9.71%	0,10	0,26
	Small Firms	20	-4,88%	-4,39%	0.43	-20,67%	16,88%	0.72%	8.51%	0,12	0,29
Poland	Large Firms	16	3,32%	-1,45%	0,82	-8,57%	23,41%	0,97%	9,84%	0,24	0,33
	Small Firms	35	-4,80%	-3,85%	-0,04	-29,14%	18,32%	1,09%	10,43%	0,06	0,23
South Africa	Large Firms	20	3,27%	4,09%	-0,24	-6,68%	12,51%	0,32%	5,62%	0,08	0,29
	Small Firms	14	2,46%	1,83%	0,22	-6,08%	12,11%	0,36%	6,00%	0,12	0,35

The standard deviations are significantly higher than the average of the differences in growth rates. This indicates a large dispersion of the data around the means, and negatively affects the power of the tests (particularly for the smaller samples). It is worth pointing out, that the sample sizes for this test were not specifically targeted with the goal of achieving a certain power. Rather the sample sizes of hypothesis 3 is a consequence of the sample sizes for testing hypothesis 1 and 2, which are both specifically targeted to achieve an 80% power.

Figure 9: Box and whisker plot of the within firm differences of growth rates of average wages per executive less the growth rate of average wages per employee for developing countries



Referring to the box and whisker plot in Figure 9, it can be seen from the wide range over which the underlying data falls, there are large outliers (minimums and maximums) contained in the data. Nevertheless, all data sets seem to be concentrated around zero, except for large firms in the Philippines, small and large firms in South African, small firms in India and small firms in Poland. For Indonesia, Philippines and South Africa, the distributions for large and small firms look similar, however, there exists greater differences between large and small firms in India and firms in Poland.

5.5.1.2 Developed countries

Referring to Table 12, the averages for the within firm differences in growth rates are all greater than zero, except for USA. As with most developing countries, this again indicates that for developed countries, on average, the growth rate of executive wages is increasing at a faster pace than rest of the firm within both large and small firms.

Looking at the means relative to the medians, and the skewness measures, most of the distributions seem to be symmetrical, with the exception of large firms in Germany and Sweden, and both large and small Australian firms. However, all distributions passed the K-S test for being normal.

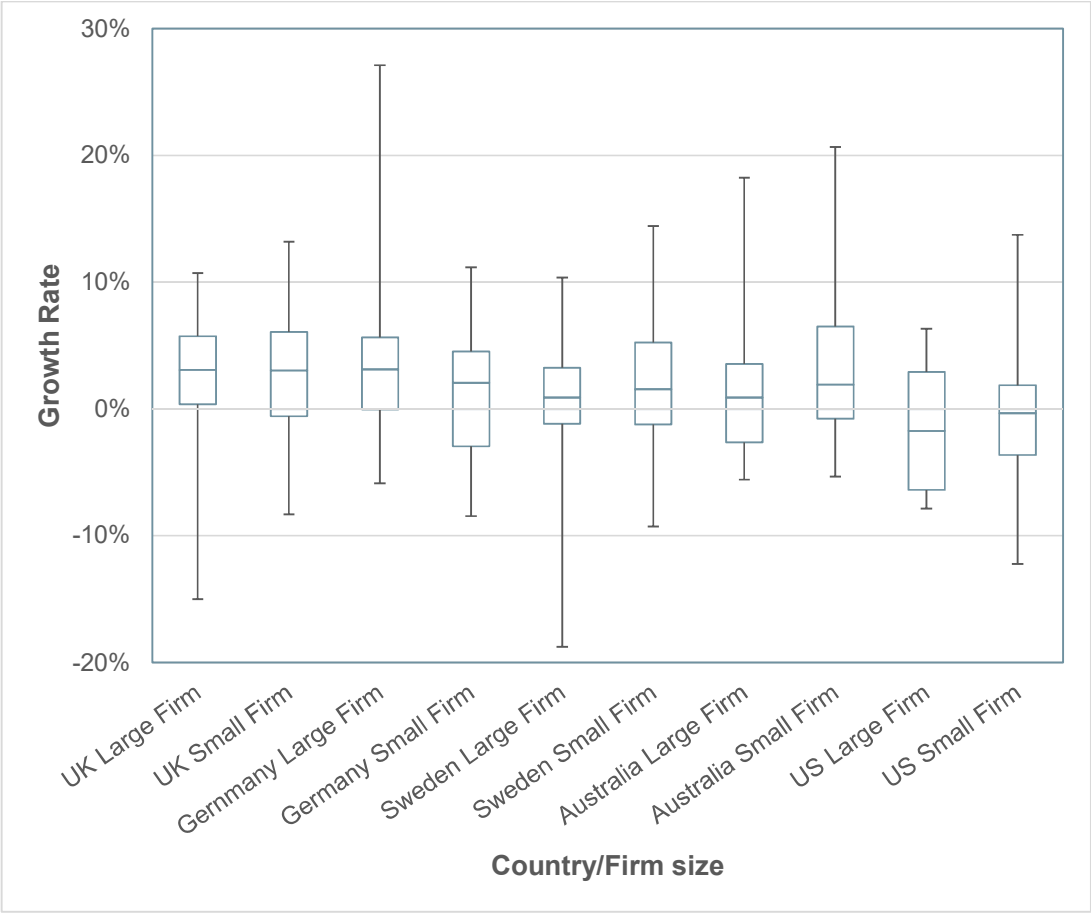
The standard deviations, all seem to be relatively similar with values ranging from 4.74% to 6.15%. Furthermore, they are also a lot lower than the standard deviation for developing countries (ranged from 6% to 11.01%), and should improve the power these tests.

Table 12: Within firm differences between the growth rates of average wages per executive less the growth rates of average wages per employee for developed countries

Difference between GAWE and GAW		Sample size	Average	Median	Skewness	Min	Max	Variance	Standard deviation	K-S test stat	K-S critical value (5%)
UK	Large Firms	53	2,85%	3,08%	-0,7996	-15,00%	12,86%	0,24%	4,91%	0,0491	0,1868
	Small Firms	44	3,02%	3,02%	-0,0662	-8,31%	13,19%	0,27%	5,23%	0,0653	0,2050
Germany	Large Firms	44	3,43%	2,91%	1,905	-5,88%	27,12%	0,37%	6,10%	0,145	0,205
	Small Firms	20	1,74%	2,05%	0,087	-8,46%	11,16%	0,31%	5,59%	0,096	0,294
Sweden	Large Firms	31	0,58%	0,90%	-1,2355	-18,77%	10,36%	0,38%	6,15%	0,1515	0,2380
	Small Firms	25	1,97%	1,56%	-0,2043	-9,28%	14,42%	0,22%	4,74%	0,1099	0,2700
Australia	Large Firms	22	1,57%	0,89%	1,3933	-5,57%	18,25%	0,31%	5,57%	0,1962	0,2844
	Small Firms	16	3,21%	1,91%	1,2860	-5,35%	20,66%	0,40%	6,35%	0,1173	0,3280
USA	Large Firms	12	-1,47%	-1,73%	0,1198	-7,86%	6,33%	0,30%	5,44%	0,1854	0,3750
	Small Firms	25	-1,24%	-0,35%	0,0245	-12,22%	13,73%	0,37%	6,07%	0,0873	0,2700

Looking at the box and whisker plot in Figure 10, for developed countries there are some data sets that contain outliers. Furthermore, looking at where the various distributions are concentrated, large firms in the UK and Germany together with small firms in the UK, Sweden and Australia show distributions that are not quite centred on zero. This indicates possible differences between the growth rates of average wages per executive compared to all employee wages within firms in these countries. Lastly, the distributions between large and small firms for each country look broadly similar.

Figure 10: Box and whisker plot of the within firm differences of the growth rates of average wages per executive less the growth rate of average wages per employee for developed countries



5.5.2 Inferential statistics and hypothesis testing

In testing hypothesis three, the researcher used a matched paired t-tests for independent sample.

The following hypothesis was tested at the 95% confidence level:

H_0: The null hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is less than or equal to zero.

H_A: The alternative hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is greater than zero.

5.5.2.1 Developing countries

When assessing the descriptive statistics for large firms in developing countries, the means of the differences within firms between the growth rates of executives and the rest of the firms were all positive. This observation suggested that within large firms, the growth rate of average wages per executives exceeded the growth rate of average wages for all employee. However, based on the inferential statistics detailed in Table 13, the t-test fails to reject the null hypothesis for all countries except South Africa and the Philippines. This indicates that there is statistically significant evidence that within large firms in these two countries, on average, the growth rate of wages for executives is greater than the growth rate of wages for all employees. However, for the other countries, there is no statistically conclusive evidence of this.

For smaller firms within developing countries, the t-test also rejected the null hypothesis for all countries, suggesting that there is no statistically conclusive evidence that within small firms the growth rate of wages for executives is greater than the growth rate of wages for all employees. In fact, for small firms in India and small firms in Poland, the opposite is true. Namely, there is statistically

significant evidence that within small firms in these countries, the growth rate of average wages for executives is less than the growth rate of average wages for all employees.

Table 13: Inferential statistics and results for hypothesis three - developing countries

Large firms	Indonesia	Philippines	India	Poland	South Africa
$\mu_{GAWE - GAW}$	**1,92%**	**5,84%**	**2,27%**	**3,32%**	**3,27%**
df	41	22	25	15	19
t Stat	1,1278	3,8108	1,1931	1,3516	2,6058
P(T>=t) one-tail	0,1330	0,0005	0,1220	0,0983	0,0087
t Critical one-tail	1,6829	1,7171	1,7081	1,7531	1,7291
P(T<=t) two-tail	0,2660	0,0010	0,2440	0,1965	0,0174
t Critical two-tail	2,0195	2,0739	2,0595	2,1314	2,0930
Result t-test	Fail to reject H_o	Reject H_o	Fail to reject H_o	Fail to reject H_o	Reject H_o
Small firms	**Indonesia**	**Philippines**	**India**	**Poland**	**South Africa**
Difference GAWE - GAW	**0,05%**	**2,58%**	**-4,88%**	**-4,80%**	**2,46%**
df	58	38	19	34	13
t Stat	0,0368	1,6050	-2,5644	-2,7245	1,5370
P(T>=t) one-tail	0,4854	0,0584	0,9905	0,9950	0,0741
t Critical one-tail	1,6716	1,6860	1,7291	1,6909	1,7709
P(T<=t) two-tail	0,9708	0,1168	0,0190	0,0101	0,1483
t Critical two-tail	2,0017	2,0244	2,0930	2,0322	2,1604
Result t-test	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o	Fail to reject H_o

5.5.2.2 Developed countries

When looking at the descriptive statistics for large firms in developed countries, the means of the differences within firms between the growth rates of executives wage and the rest of the firms are positive for all countries except the USA. However, the results in Table 14 show that the null hypothesis was rejected only for large firms in the UK and Germany. This indicates that only for these two countries are there statistically significant evidence that within large firms the

mean growth rate of average wages per executive has been growing at a higher rate than the growth rate of average wages per employee.

For small firms within developed countries, the t-test rejected the null hypothesis for the UK, Sweden and Australia. This implies there is statistically significant evidence that within small firms the growth rate of average wages per executive has been growing at a higher rate than the growth rate of average wages per employee.

Table 14: Inferential statistics and results for hypothesis three - developed countries

Large firms	UK	Germany	Sweden	Australia	USA
Difference GAWE - GAW	**2,85%**	**3,43%**	**0,58%**	**1,57%**	**-1,47%**
df	52	43	30	21	11
t Stat	4,2354	3,8724	0,5275	1,321	-0,9368
P(T>=t) one-tail	0,0000	0,0002	0,3009	0,100	0,1845
t Critical one-tail	1,6747	1,6811	1,6973	1,721	1,7959
P(T<=t) two-tail	0,0001	0,0004	0,6017	0,201	0,3690
t Critical two-tail	2,0066	2,0167	2,0423	2,080	2,2010
Result t-test	**Reject H_o**	**Reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**	**Fail to reject H_o**
Small firms	**UK**	**Germany**	**Sweden**	**Australia**	**USA**
Difference GAWE - GAW	**3,02%**	**1,74%**	**1,97%**	**3,21%**	**-1,24%**
df	43	19	24	15	24
t Stat	3,8260	1,3925	2,0788	2,0239	-1,0217
P(T>=t) one-tail	0,0002	0,0899	0,0242	0,0306	0,1586
t Critical one-tail	1,6811	1,7291	1,7109	1,7531	1,7109
P(T<=t) two-tail	0,0004	0,1799	0,0485	0,0612	0,3171
t Critical two-tail	2,0167	2,0930	2,0639	2,1314	2,0639
Result t-test	**Reject H_o**	**Fail to reject H_o**	**Reject H_o**	**Reject Ho**	**Fail to reject H_o**

5.6 Other findings

As a general observation, when looking at the growth rate of average wages, it can be seen that they are higher for developing countries compared to developed countries. This can be explained by the inflation rates for the respective countries. Table 15 contains the average inflation rate over the analysis period for each country. Comparing these number to the growth rate of average wages, it can be seen that the higher the inflation rate for a country, the higher the growth rate. In other words, the growth rates for wages in different countries is correlated to inflation in those countries.

Table 15: Country inflation rates

Inflation		Bloomberg Index used	Index Dec 2004	Index Dec 2014 (except Indonesia Dec 2013)	Average Inflation rate
Developing	**Indonesia**	IJCOPI Index	76.5	146.8	**7.5%**
	Philippines	PHC2I Index	91.9	140.5	**4.3%**
	India	INFINF Index	100.5	178.7	**5.9%**
	Poland	POCPILB Index	105.2	132.4	**2.3%**
	South Africa	SACPI Index	62.0	111.0	**6.0%**
Developed	**UK**	UKRPI Index	188.9	257.5	**3.1%**
	Germany	GRCP2000 Index	92.1	106.7	**1.5%**
	Sweden	SWCPI Index	279.4	314.5	**1.2%**
	Australia	AUCPI Index	81,5	106,6	**2,7%**
	USA	CPURNSA Index	190,3	234,8	**2,1%**

Source: Bloomberg

6. DISCUSSION OF RESULTS

6.1 Introduction

Chapter 5 presented the results from the statistical analysis of the hypotheses, per Chapter 3. This chapter reviews and discusses the results in detail and connects the finding as outlined in Chapter 5 to the literature in Chapter 2.

The main purpose of this study is to build on the literature around the firm size-wage effect, as well as the topic of wage inequality within firms. In particular, this research first focuses on the growth rate of wages overtime between large and small firms, followed by the growth rate between executives and employees within firms. These factors could have a meaningful impact on income inequality.

6.2 Summary of actions performed

Using secondary data, from data sources such as Bloomberg and Thomson Reuters, along with annual financial statements, this study focuses on five developing and five developed countries, with the aim of assessing the following hypotheses: the first states that the growth rate of average wages per employee for larger firms would be higher than for smaller firms; the second stated the growth rate of average wages per executive would be higher for larger firms than for smaller firms. Finally, the third hypothesis states that within firms the growth rate of average wages per executive would be greater than the growth rate of average wages per employee.

It is also important to note that different scholars used different definitions for firm size in their research. This research is based on a specific definitions for firm size, as set out in section 2.2.2.1 page15.

6.3 Analysis of the hypotheses tests

6.3.1 Discussion of Hypothesis 1

Whether or not the growth rate of average wages per employee for large firms exceeds that of smaller firms.

H_o: The null hypothesis states that the mean growth rate of average wages per employee for larger firms is less than or equal to the mean growth rate of average wages per employee for smaller firms

H_A: The alternative hypothesis states that the mean growth rate of average wages per employee for larger firms is greater than the mean growth rate of average wages per employee for smaller firms.

Hypothesis one centres on the overall firms within a country and whether, irrespective of the job level, the growth rate of average wages for a larger firm is greater than that of smaller firms. If this is true, it implies that on average, if an employee works at a larger firm over time their earnings would grow at a higher rate than that of someone who works at a smaller firm. The purpose of testing this hypothesis is to build on existing firm size-wage effect theory.

6.3.1.1 Contextualising the theory

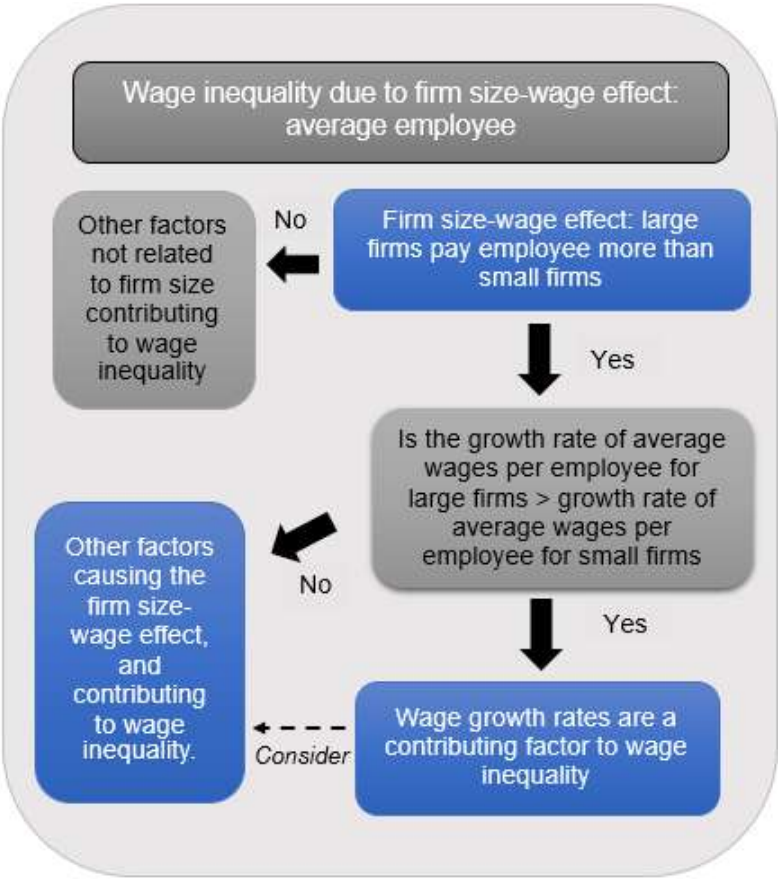
The firm size-wage effect literature indicates that large firms pay their employees higher wages than smaller firms (Brown & Medoff, 1989, Idson & Oi, 1999). Over time, scholars have offered various explanations for the factors that cause this effect to happen.

One factor that explains the firm size-wage relationship is the idea that larger firms, due to their sheer size and resource base, have the ability to pay employees more than the competitive wage, enabling them to seek the best employment that the market will offer (Krishna et al., 2012; Husted et al., 2013; Nell, 2014). Furthermore, Barth & Dale-Olsen (2011) added that larger firms generally pay a premium to retain a larger pool of employees.

These factors seem to refer more to the cause of the firm size-wage effect at the time of employment of new staff into a firm, however, they also seem to imply

something about the growth rate of wages over time. If larger firms have the resources and ability to pay employees more than smaller firms, and they have the ability to retain the best quality labour, then one would expect the growth rate of average wages at larger firms to grow faster than at smaller firms. In addition, research put forward by Mueller et al. (2015) also found evidence that rising inequality in developed countries may be driven by an increase in the size of the largest firms – hence contributing to the firm size-wage effect.

Figure 11: Determining whether firm size influences income inequality - hypothesis one



Source: Own construction

The flow diagram above depicts the process used to determine if larger firms within an economy would be a factor in income inequality.

In this context, the purpose of hypothesis one is to assess if growth rates of average wages at larger firms are higher than at smaller firms and, therefore, contributing to the firm size-wage effect. This is done by testing whether the mean growth rate of wages per employee for larger firms is greater than for smaller firms. Furthermore, while the above research has been conducted mostly in developed countries (more specifically the USA and the UK), this study covers both developing and developed countries.

Figure 11 presents a model that is used to put the research relating to hypothesis one into context.

6.3.1.2 Discussion of results

The results of hypothesis one as presented in Chapter 5, Table 5 and Table 6, shows that for all developed and developing countries, the t-test fails to reject the null hypothesis. This means that while the growth rate of average wages per employee may vary from firm-to-firm for both large and small firms within the countries surveyed, there is no evidence that the mean growth rate of average wages per employee for large firms exceeds that of small firms. In other words, for both the developing and developed countries, over the analysis period, it is not expected that the wage of an employee working at a larger firm will increase at a faster rate than an employee at a small firm.

Given that larger firms pay more than smaller firms, the researcher expected that the growth rate of average wages of larger firms would be higher than smaller firms. However, the overall conclusion from the above results differs to what was initially expected from this study. Therefore based on the above evidence, this research is unable to conclude that the growth rate of wages per employee is influenced by the size of the firm and hence, does not influence income inequality.

As an additional note, while the purpose of this study was not to retest the firm size-wage effect, it is worth pointing out that based on the data available, in this study, the firm size-wage effect can be observed at the start of the analysis period (2004/5). This was done by looking at the observed difference in average wages between large and small firms, and performing a quick t-test to assess if the differences are statistically significance. The results are presented in Annexure 4, page 112.

Based on this data, the average wages per employee at the start of the analysis period (2004/2005) did support the firm size-wage effect for developing countries. In the cases of Indonesia, India and Poland the difference is found to be statistically significant. However, for developed countries, this is less evident. In certain instances, the average wages for small firms exceed that of larger firms. This is true for the UK, Sweden and Australia.

A possible explanation for the lack of the firm size-wage effect in these developed countries may be explained by the definition of employee cost used in this research paper. The definition included in this research is per the annual financial statement as defined by International Accounting Standards. These include all employee costs such as the base wage, social security, pension, profit-sharing expenses and other benefits related to personnel.

In a study conducted by Pedace (2010), he includes benefits such as social security, pension, profit-sharing expenses and fringe benefits to the wage amount. The researcher notes that the firm size-wage premium reduced by 20-50% when benefits and on-the-job training is added to the wage amount. Thus, he believes the established firm size-wage effects are biased in the absence of controls for these factors.

6.3.2 Discussion of Hypothesis 2

Whether or not the growth rate of average wage per executives for large firms exceeds that of small firms.

H_o: The null hypothesis states that the mean growth rate of average wages per executive for larger firms is less than or equal to the mean growth rate of average wages per executive for smaller firms.

H_A: The alternative hypothesis states that the mean growth rate of average wages per executive for larger firms is greater than the mean growth rate of average wages per executive for smaller firms

The first hypothesis looks at the growth rate of average wages across all employees as being a possible contributing factor to the firm size-wage effect. Hypothesis two builds on this concept by looking at a specific job grade, namely executives. Here the researcher tests whether, on average, being an executive at a larger firm would result in a higher wage growth rate than an executive at a smaller firm.

6.3.2.1 Contextualising the theory

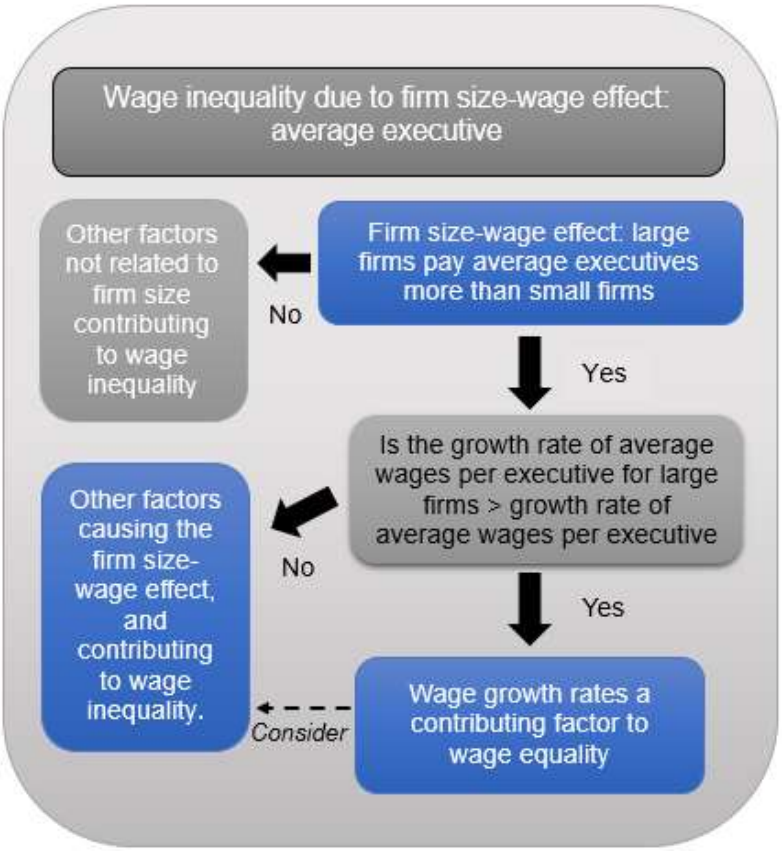
This hypothesis builds on two major theories. The first is a theory by Mueller et al. (2015) who note that the firm size-wage effect is entirely driven by higher-skilled workers. This means that workers who are highly skilled or have higher positions (such as managers or directors) earn more at a larger firm than at a smaller firm. The author also observe that firm size does not affect lower end jobs, such as janitors or blue collar workers. Furthermore, Gabaix et al. (2014), explains that as the value of large firms increases over time, executive compensation also increases by a similar factor, as larger firms have a higher willingness to pay for talent. Given these two studies, the researcher expects that the growth rate of average executive wages of larger firms to be higher than that of smaller firms.

In this context, the purpose of this hypothesis is to assess whether this is the case or not, and in the process also expands the study to include multiple countries, both in developing and developed countries. This was done by testing

whether the mean growth rate of wages per executive for large firms is greater than for small firms.

Figure 12 presents a model that is used to put the research relating to hypothesis two into context.

Figure 12: Determining whether firm size influences income inequality - hypothesis two



Source: Own construction

The flow diagram above shows the process used to determine if larger firm within an economy would be a factor in income inequality

6.3.2.2 Discussion of results

The firm size-wage effect is more evident in the absolute value of average wages per executive (detailed in annexure 4, page 112) compared to hypothesis one.

The data at the start date of the analysis period (which was 2004/2005) shows that the absolute average wages per employee for large firms is higher than that of small firms, for both developed and developing countries. Performing a quick t-test, as detailed in Annexure 4, showed that for all countries the differences are statistically significant. This indicates a strong firm size-wage effect.

However, when looking at the growth rate of average wages per executive, the statistical evidence, presented in chapter 5, shows that the t-test failed to reject the null hypothesis, for all developed and developing countries, with the exception of India. This implies that there is no significant evidence that the growth rate of average wages per executive is higher for larger firms than for smaller firms, except in India.

These results are contrary to what was expected given the strong evidence of the firm size-wage effect. Having said that, the low p-values for Philippines (0.054) and South Africa (0.063) in the analysis, indicates that at a 10% significant level, the t-test rejects the null hypothesis. Based on this observation, in developing countries, there is some evidence of the growth rates being higher for large firms than for small firms. For developed countries, however, the conclusions does not change at a lower significance level.

A possible explanation for these results may be the timing of this study. The analysis fell over the period of the 2008 financial crisis, where on average many large firms saw a decline in value, which over a period of 10 years could average out as muted growth for large firms. Gabaix et al. (2014) relooked at their initial theory, that executive compensation closely tracked the evolution of average firm value, over financial crises and found that from 2007 – 2009, firm values declined by 17% and CEO compensation declined 28%. However, during 2009–11, firm values increased by 19% and CEO pay increased by 22%.

Nevertheless, using Figure 12 as a guide, the implication of the results are that for India, Philippines and South Africa, higher growth rates of average wages per executive at larger firms compared to smaller firms, is likely to be a contributing

factor to the firm size-wage effect and, therefore, wage inequality. However, for all other countries, there are other factors leading to the firm size-wage effect, and therefore, impacting wage inequality.

6.3.3 Discussion of Hypothesis 3

Within firms, is the growth rate of average wages per executive higher than the growth rate of average wages for all employees?

H_0: The null hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is less than or equal to zero.

H_A: The alternative hypothesis states that within a firm, the mean of the difference between the growth rate of average executive wages and the growth rate of average wages for all employees is greater than zero.

The first two hypotheses focuses on the differences between the growth rate of wages for large and small firms, in order to better understand the firm size-wage effect. The final hypothesis considers wage inequality within firms, comparing the growth rates of average wages per executives to the growth rate of average wages per employees.

6.3.3.1 Contextualising the theory

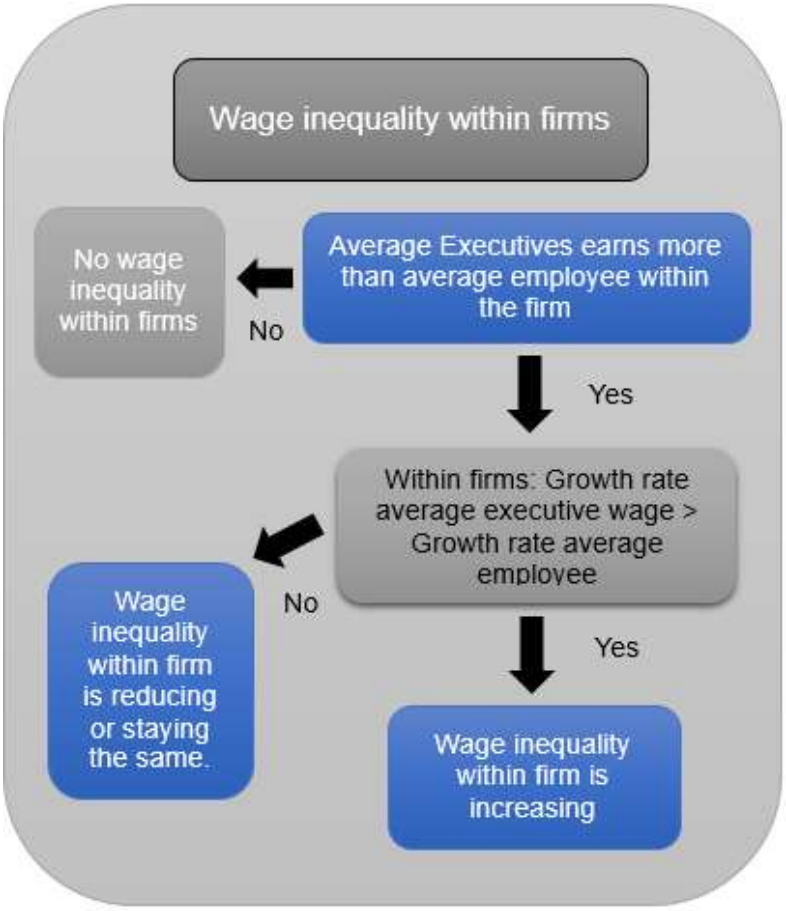
Hypothesis 3 stems from the theory that skilled workers especially executives and the top 1% of an organisation tends to earn more than the rest of the firm (Piketty & Saez, 2003). This has become a driving factor of wage inequality in both developing and developed economies. According to Chang et al. (2013), the increase in wage inequality is driven by the introduction of performance pay bonuses since the 1980s. This is supported by Lemieux et al. (2009) who show that firm wages are less equally distributed when organisations use performance pay instead of a fixed wage. Since higher performance pay is usually awarded to executives and managers rather than the normal rank and file, this helps explain

why executives and managers are being paid more than other employees within the same firm.

It is in this context that hypothesis three is investigated. Namely, this hypothesis aims to test the extent to which wage inequality between executives and the average employee within firms is increasing.

Figure 13 presents a model that is used to put the research conducted in this paper, into context, for hypothesis 3.

Figure 13: Determining whether wage inequality within firms is increasing - hypothesis three



Source: Own construction.

6.3.3.2 Discussion of results

Looking at the average wage data at the beginning of the analysis period, as presented in Annexure 4, page 112, the first observation makes the distinct disparity between the average wages of an executive compared to the average wages of an employee in the same country. This observation strongly supports the research of Piketty & Saez (2003) mentioned above. The numbers in Annexure 4, page 112, show that for large firms in developing countries, the average executive earns between 17 to 32 times the wage of the average employee, and between 11 to 45 times for large firms in developed countries. In the case of small firms, however, this ratio falls to between 4 to 8 times in developing countries and between 2 to 5 times in developed countries. The results of hypothesis three which follows, looks at whether this observed disparity has increased over the analysis period.

Starting with developing countries, Table 13 shows that for large firms, the null hypothesis is rejected for South Africa and the Philippines. However, given the low p-value for Poland (0.098), the null hypothesis also rejects Polish large firms at the 90% significance level. This implies that for these three countries the disparity in remuneration between executives and the average employee continues to increase, with stronger evidence for large firms in South Africa and the Philippines.

For smaller firms in developing countries, Table 13 shows that the null hypothesis is not rejected for all countries. This implies that for small firms in developing countries, there is no statistically significant evidences that the growth rate of average wages per executive is growing at a faster rate than the growth rate of average wages per employee. However, on closer inspection of the p-values for small firms in Philippines (0.058) and small firms in South Africa (0.074) the null hypothesis is also rejected at the 90% significance level. Hence, for small firms in these developing countries there is some evidence of increasing wage inequality within firms.

For developed countries, Table 14 shows that the null hypothesis is rejected for large firms in the UK and Germany. In addition, for large firms in Australia, the null hypothesis is also rejected at the 90% significance level, given its low p-value of 0.1. Based on this, there is high prevalence, in large firms for developed countries, of average wages per executive growing at a faster rate than the average wages per employee. This result is similar to large firms in developing countries.

Finally, for small firms in developed countries, the null hypothesis is rejected for the UK, Sweden and Australia, which is three out of the five countries analysed. Furthermore, if the significance level of the test is reduced to 90%, the null hypothesis is rejected for small firms in Germany. This indicates much stronger evidence of increasing wage inequality within small firms in these countries.

The overall conclusion for this hypothesis is that the results for the different categories of firms analysed, are mixed. Nevertheless, the phenomenon of increasing wage inequality within firms seems quite prevalent, particularly in developed countries where the null hypothesis is rejected seven out ten times.

The reason for the high prevalence of divergence between executive pay relative to the average employee, may be due to the different pay structures applicable for each group. Executive pay structures tend to be far more performance related, while the pay structure for the average employee tends to have a larger fixed component. Moreover, executive performance is usually related to the performance of the firm. As a result, the strong performance of equity markets over time, will have positively influenced executive earnings. This ties up with the study by Gabaix and Landier (2008), explaining that over a 20 year period, the growth rate in executive pay could be fully attributed to the six fold increase in market capitalization of the firms considered.

6.4 Chapter summary

In this chapter, the results displayed in the previous chapter are discussed in relation to the literature review that was conducted in Chapter 2. The research for each hypothesis uses flow diagrams to assist in understanding the results from Chapter 5 in relation to the literature on wage inequality. The evidence in general shows that firm size does not convincingly explain the differing growth rates of average wage between large and small firms. However, there is much stronger evidence that wage inequality within firms is far more prevalent and a potential factor affecting income inequality.

The next chapter presents a summary of the findings that have been discussed in Chapter 6. In addition, Chapter 7 presents the implications for the finding in a worldwide context, suggests future research possibilities and possible limitations to this study.

7. CONCLUSION

Chapter 7 provides the conclusion to this research report. It highlights the major finding of the research presented in Chapter 5 and summarises the discussion from Chapter 6. This chapter also highlights possible studies that could contribute to this field and further delves into the limitations of this study.

7.1 Summary of research objectives

The key challenge facing the world in recent times is the increasing trend in income inequality and it is a reality that the current generation cannot ignore.

It has been long recognised that economies of scale, greater resources and the need to employ talent, allow larger firms to pay higher wages compared to smaller firms for the same labour skill. This phenomena is known as the firm size-wage effect. In addition, there has been a growing disparity in wages over the last three decades between the best paid workers in a firm and the rest of firm.

The purpose of this study is to investigate the roles played by wage growth rates overtime as a potential contributing factor to wage dispersion, and ultimately income inequality. This study explored this concept for five developing countries (Indonesia, Philippines, India, Poland and South Africa) and five developed countries (the UK, Germany, Sweden, Australia and USA).

7.2 Summary of research findings

To explore the cause of income inequality, the researcher focused on wage inequality. In particular, the hypothesis tests focuses on growth rates of average wages over time, and are centred on the impact that wages may have on wage dispersion between and within firms of different sizes.

7.2.1 Summary of findings – growth rate of average wages for all employees of different sized firms

The initial test focuses on whether the growth rate of average wages per employee of larger firms exceeds that of smaller firms. The intention is to test the concept that larger firms provide more opportunity and career progression than smaller firms (Barth & Dale-Olsen, 2011), therefore resulting in larger firms paying their employees more over time than smaller firms (Brown & Medoff, 1989). This in turn will result in wage dispersion between employees of large firms and employees of small firms.

In this instance, however, the results of this research, presented in Chapter 5 and Chapter 6, did not support the view that the growth rate of wages for large firms is greater than that of smaller firms, for both developing and developed countries.

In fact, for Poland this study found the opposite to be true, meaning that the mean growth rate of average wages for small firms exceeds the mean growth rate for large firms. This would indicate that while the absolute average wage for large firms exceeds that of small firms, it is likely that over time the average wage earned by individuals at smaller firms will catch up to the average wage of larger firms.

To conclude, the higher wage growth rates for large firms compared to small firms cannot be argued to be factor that contributes to the dispersion of wages and hence there is no evidence that it contributes income inequality.

7.2.2 Summary of findings – growth rate of average executive pay of different sized firms

The second test was similar to the first test, however, in this case the researcher focused on the executives of a firm and whether the growth rate of average wages per executive for large firms exceeds that of small firms. The purpose of the test was to build on the research of Mueller et al (2015), who notes that at higher job levels, wages at larger firms exceeds that of smaller firms, while at lower job levels, wages are indifferent to firm size. In other words, the second

test assesses whether differing growth rates between large and small firms contributes to a firm size-wage effect at the higher ends of the pay scale.

However, the results of this research did not, in general, support this view, when it comes to growth rates. It is only in the case of India that there is statistically significant evidence that the growth rate of average wages per executive at large firms is greater than small firms. For the rest of the sample, both developed and developing countries, this was found not to be the case. Having said that, if the significance level of the test had been reduced from 95% to 90%, the conclusion for the Philippines and South Africa would have changed in support of the view that the growth rate of average executive wages is higher at larger firms. In conclusion, there is some evidence that the growth rate is higher at larger firms for developing countries, but very little evidence for developed countries.

7.2.3 Summary of findings – growth rates of average wages within firms

The final test compares the wage growth rates of executives and the average employee within firms, looking at whether the growth rate of average executive wages exceeds the growth rate of the average employee. This is motivated by literature that say executives and managers earn far more than an average employee within firms, which has reflected a widening dispersion of labour income (Koske & Wanner, 2013). This research looks at whether differing growth rates within firms is a contributing factor to this disparity overtime.

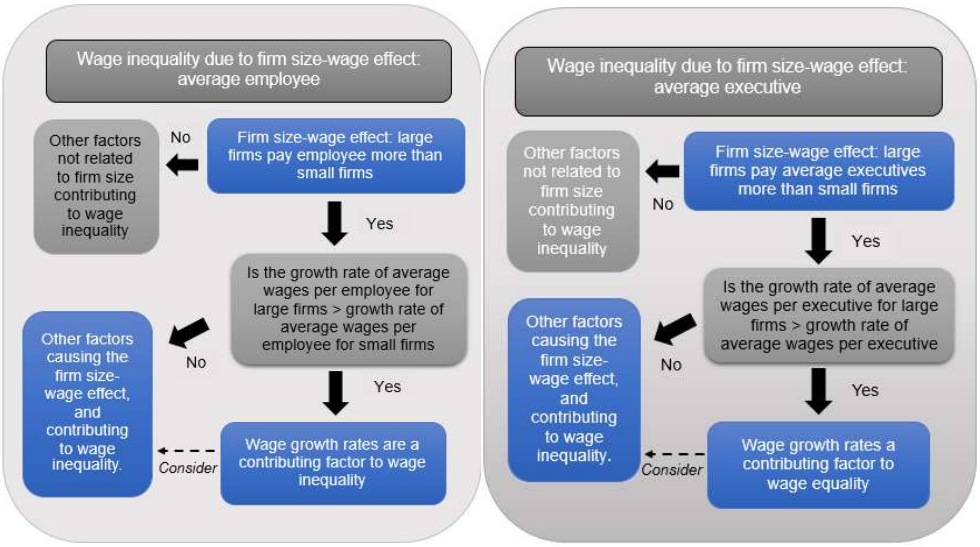
The results in this research for this test are varied, both by firm size and country, with no clear trend. More specifically, for large firms in developing countries the effect is statistically significant for two out of the five countries (South Africa and the Philippines) and for none of the developing countries in the case of small firms. On the other hand, for large firms in developed countries, the effect is statistically significant for two out of the five countries (UK and Germany), but also for three out of the five countries (UK, Sweden and Australia) when it came to small firms. Moreover, the number of countries for which the effect is

statistically significant increases when the significance level of the tests in dropped to 90%.

So while the overall results are mixed, the effect is certainly prevalent, though not clearly influenced by firm size or whether the country is developed or not.

Figure 14: Effect of wage growth rates, between and within firms

The effect of wage growth rates between firm – models from chapter 6



The effect of wager growth rates within firms – model from chapter 6

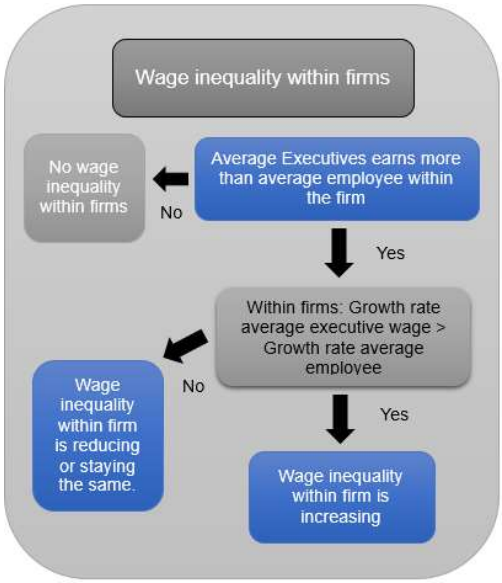


Figure 14, above, are the flow diagrams that were used in chapter 6. It has been present again in chapter 7 to assist in understanding the overall results in relation to the influence of firm size on wage inequality.

7.3 Implications of research findings

7.3.1 Implication of wages for all employees in a firm

Based on the evidence of this study the growth rates of wages per employee is not a factor contributing to the firm-size wage effect at the level of the average employee. The implication of this, based on Figure 14, is that there are other factor causing the phenomena. In particular, factors such skills and the need for larger firms to attract a larger pool of staff, both discussed under the literature review, seems to be playing a far greater roll.

7.3.2 Implication of wages for executives at firms

Based on the results of this study, there is some evidence that in certain developing countries (India, Philippines and South Africa) that being an executive at a large firm is likely to result in a higher growth rate in earnings than being an executive at a smaller firm – hence exacerbating the firm size wage effect, and in turn influencing income inequality.

The implication for these countries could be a small population compounding their wealth as a result of the position they hold as executives and the mere fact that they work for larger firms.

However, for developed countries and the remaining developing countries, there was no evidence that the growth rate of average wages per executive for large firms exceeds small firms. As a result, and based on Figure 14, there are other factors that lead to the wage dispersion at the executive level.

7.3.3 Implication of wages within firms

The last research question pertained to growth rates within firms, and whether the growth rate for executive pay was higher than for the average employee. Studies have shown that executives already earn higher wages than an average employee (Piketty, 2014), however f this disparity continues to increase it will exacerbate wage inequality within firms. In turn this will add to rising income inequality.

Based on the conclusion of this study, the effect of the growth rate of executive earnings being higher than the rest of employee, within the same firm, is prevalent in both developed and developing countries, as well as large and small firms.

Given that executives are already seen to be earning in excess of the perceived value that they bring into an organisation. A higher growth rate of their wages compared to the average worker in a firm could result in discontent amongst workers within the firm, and in turn could lead to demotivational factor in a worker performance.

7.4 Limitations of the research

The following limitations to this research have been noted. Firstly, the sample of firms were all listed companies. As a result, companies such as privately held companies and companies traded in the over-the-counter markets, were not included in this research. Furthermore, using listed firms did not include really small companies, but rather more small-to-medium sized companies.

Secondly, it needs to be pointed out that the definition of firm size used in this study is different to other studies. In this study the researcher defined firm size based on revenue (for small firms) and the market capitalisation to GDP ratio (for large firms), making no reference to the number of employees in the firm. However, firm size can also be defined by the number of employee in a firm like

in the Mueller et al., (2015) defines large firms as firms having more than 250 employee. This may explain differences in the conclusions reached compared to other studies.

Thirdly, it should be noted that in certain instances, due to the small number of listed firms and poor reporting by firms, the sample sizes on which the analysis was based were quite small. This would have adversely influenced the power of some of the tests conducted.

Fourthly, the above study, used the average wage per employee, which may be inappropriate if the wage dispersion within each firm is unequal. This may limit the validity of the analysis.

Finally, the time frame of this research may have played an important role in the result. This study looked at data through the great financial crises of 2008 in which the spill over effects have been fairly large, such that, many firms have resorted to cost cutting measures by reducing wage costs. Wages over this period could have stayed frozen because of the bargaining power of the large firms (Nell, 2014). Factor such as this may have affected the wage data used, making generalisation of this research over other time periods less plausible.

7.5 Suggestions for future research

Data for this study is difficult to obtain and therefore to the extent that a researcher is able to obtain data, the following areas of research would be interesting to explore:

I. Explore the economic motivations for the reason behind the divergence in growth rate of wages.
II. To expand this research to unlisted firms within these economies and expand the time frame.
III. To the extent that information can be obtained for different job grades within different size firms, it would be interesting to see if the growth rate at different job level change with size of firm.

7.6 Concluding note

Income inequality has dominated conversation at policy-maker levels in recent times, with wages constituting the largest single source of income for households in developed and developing countries (International labour organisation, 2015). This became the driving force behind this study. In particular, the researcher analysed whether growth rates of earnings is a factor contributing to wage inequality, which would ultimately be a factor affecting income inequality.

On reviewing the literature and delving deeper into the theories around income inequality, wage inequality and the various proposed contributing factors, the researcher identified the firm size-wage effect, together with wage dispersion within firms, to be an important area to research. The problem of the firm size-wage effect and wage inequality within firms, which was contextualized in Section 6 using the frameworks presented in Figure 14, led to an in depth analysis into the growth rates of earning between large and small firms, in developing and developed countries.

However, income inequality is a nuance and there are very many factors that influence it. This is summarised succinctly by Piketty & Saez (2014, p 842 - 843) who state: “Inequality does not follow a deterministic path. There are powerful forces pushing alternatively in directions of rising or shrinking inequality. Which one dominates depends on the institutions and policies that societies choose to adopt.” This research hopes this study does shed some light on this non-deterministic path to understanding income inequality and whether or not firm size has a role to play in it.

.

8. REFERENCES

Akerman, A., Helpman, E., Itskhoki, O., Muendler, M., & Redding, S. (2013). Sources of wage inequality. *American Economic Review, 103*(3), 214-219. doi:10.1257/aer.103.3.214

Aghion, P., Caroli, E., & García-Penalosa, C. (1999). Inequality and economic growth: The perspective of the new growth theories. *Journal of Economic Literature, 37*(4), 1615-1660. doi:10.1257/jel.37.4.1615

Alvaredo, F., Atkinson, A.B., Piketty, T., & Saez, E. (2013). The top one percent in international and historical perspective. *Journal of Economic Perspectives, 27*(3), 3-20. doi:10.1257/jep.27.3.3

Andrei, A., & Craciun, L. (2015). Inequality and economic growth: Theoretical and operational approach. *Theoretical & Applied Economics, 22*(1), 177-186. Retrieved from: http://0-eds.b.ebscohost.com.innopac.up.ac.za/ehost/detail/detail?vid=3&sid=de2a7c6b-60a4-4797-bfec-244c42006656%40sessionmgr120&hid=126&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl

Andries, P., & Faems, D. (2013). Patenting Activities and Firm Performance: Does Firm Size Matter? *Journal of product innovation management*, *30*(6), 1089-1098. doi:10.1111/jpim.12047

Autor, D. H. (2014). Skills, education, and the rise of earnings inequality among the "other 99 percent". *Science*, *344*(6186), 843–851. doi: 10.1126/science.1251868

Autor, D. H., & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review, 103*(5), 1553-1597. doi:10.1257/aer.103.5.1553

Autor, D.H., Katz, L.F., & Kearney, M.S. (2008). Trends in U.S. wage inequality: Revising the revisionists. *The Review of Economics and Statistics*, *90(2)*, 300-323. doi: 137.215.9.20

Barriers to entry (or exit). (2004). Essential Economics, 29-30.

Barth, E., & Dale-Olsen, H. (2011). Employer size or skill group size effect on wages? *Industrial & Labor Relations Review, 64*(2), 341-355. doi: 10.1177/001979391106400207

Bell, B.D., & Van Reenen, J. (2013). Extreme wage inequality: Pay at the very top. *American Economic Review, 103*(3), 153-157. doi:10.1257/aer.103.3.153

Berg, A., Ostry, J. D., & Zettelmeyer, J. (2012). What makes growth sustained? *Journal of Development Economics, 98*(2), 149-166. doi:10.1016/j.jdeveco.2011.08.002

Bollard, A., Klenow, P.J., & Li, H. (2014). *Entry Cost Rise with Development*. Retreived from http://klenow.com/Bollard_Klenow_Li.pdf. accessed on 27 June 2015.

Bonica, A., McCarty, N., Poole, K. T., & Rosenthal, H. (2013). Why hasn't democracy slowed rising inequality? *Journal of Economic Perspectives, 27*(3), 103-124. doi:10.1257/jep.27.3.103

Boswell, J. (2014). *The rise and decline of small firms. New York, NY:* Routledge.

Botos, K. (2015). Effects of income inequalities: Society and economy. *Public Finance Quarterly*, *60(3)*, 384-395. Retrieved from http://0-eds.b.ebscohost.com.innopac.up.ac.za/ehost/detail/detail?vid=6&sid=c2c3e22f-149a-464a-9e0f-94fe5f8ca33e%40sessionmgr112&hid=126&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=110485105&db=bth

Brown, C., & Medoff, J. (1989). The employer size-wage effect. *Journal of Political Economy, 97*(5), 1027. doi: 10.1086/261642

Byanyima, W. (2015 a). *Rising inequality and climate change: Defining challenges for global leaders in 2015*. Retrieved from: http://oxfam.ca/blogs/rising-inequality-and-climate-change-defining-challenges-global-leaders-2015 accessed on 7 August 2015.

Byanyima, W. (2015 b). *Richest 1% will own more than all the rest by 2016.* Retrieved from: https://www.oxfam.org/en/pressroom/pressreleases/2015-01-19/richest-1-will-own-more-all-rest-2016 accessed on 7 August 2015.

Ceriani, L., & Verme, P. (2012). The origins of the gini index: Extracts from variabilità e mutabilità (1912) by corrado gini. *Journal of Economic Inequality, 10*(3), 421-443. doi:10.1007/s10888-011-9188-x

Chang, J., Liu, C., & Hung, H. (2013). Does performance-based compensation boost economic growth or lead to more income inequality? Does performance-based compensation boost economic growth or lead to more income inequality? *Economic Record, 89*(284), 72-82. doi:10.1111/1475-4932.12020

Cooper, D., McCausland, W. D., & Theodossiou, I. (2013). Income inequality and wellbeing: The plight of the poor and the curse of permanent inequality. *Journal of Economic Issues, 47*(4), 939-958. doi:10.2753/JEI0021-3624470407

Corak, M. (2013). Income inequality, equality of opportunity, and intergenerational mobility. *Journal of Economic Perspectives, 27*(3), 79-102. doi:10.1257/jep.27.3.79

Dabla-Norris, E., Kochhar, K., Suphaphiphat, N., Ricka, F., Tsounta E. (2015). *Causes and consequences of Income Inequality: A Global Perspective.* Retrieved from: https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf accessed on 9 October 2015.

Da Costa, P. N. (2015). *U.S. Pay inequality is growing more between firms than within them, paper says the Wall Street Journal*. Retrieved from: http://blogs.wsj.com/economics/2015/05/27/u-s-pay-inequality-is-growing-more-between-firms-than-within-them-paper-says/ accessed on 7 August 2015.

Deprez, E. E. (2015). *Income Inequality*, Retrieved from http://www.bloombergview.com/quicktake/income-inequality accessed on 7 August 2015.

Gabaix, X., & Landier, A. (2008). Why has CEO pay increased so much? *Quarterly Journal of Economics, 123*(1), 49-100. doi:10.1162/qjec.2008.123.1.49

Gabaix, X., Landier, A., & Sauvagnat, J. (2014). CEO pay and firm size: An update after the crisis. *Economic Journal, 124*(574), 40-59. doi:10.1111/ecoj.12084

Gall, T. (2010). Inequality, incomplete contracts, and the size distribution of business firms. *International Economic Review, 51*(2), 335-364. doi:10.1111/j.1468-2354.2010.00582.x

Gandel, S. (2015). Income inequality: Blame your mediocre company. Retrieved from http://fortune.com/2015/05/27/income-inequality-causes/ accessed on 3 September 2015.

Giovannetti, G., Ricchiuti, G., & Velucchi, M. (2011). Size, innovation and internationalization: a survival analysis of Italian firms. *Applied Economics, 43*(12), 1511-1520. doi:10.1080/00036840802600566

Halter, D., Oechslin, M., & Zweimüller, J. (2014). Inequality and growth: the neglected time dimension. *Journal of Economic Growth, 19(1),* 81-104. doi:10.1007/s10887-013-9099-8

Hodgson, P. (2015). Top CEOs make more than 300 times the average worker. Retrieved from: http://fortune.com/2015/06/22/ceo-vs-worker-pay/ accessed on 4 September 2015.

Hogg, R. V. & Tanis, E. A. (2001). *Probability and statistical inference (6th ed).* New Jersey: Prentice-Hall Inc.

Hussey, J. & Hussey, R. (1997). *Business research: a practical guide for undergraduate and post graduates students*. New York: Palgrave Publishers Ltd.

Husted, B., Henriques, I., & Crane, A. (2013). Income inequality and the firm. Retrieved from http://0-papers.ssrn.com.innopac.up.ac.za/sol3/papers.cfm?abstract_id=2475084 accessed on 27 June 2015.

Idson, T. L., & Oi, W. Y. (1999). Workers Are More Productive in Large Firms. *American Economic Review*, *89(2)*, 104-108. doi 10.1257/aer.89.2.104

International Labour Organisation (2015). *Global Wage Report 2014/15: Wages and income inequality*. Retrieved from http://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_324678.pdf accessed on 13 June 2015.

Investopia. (n.d.). *Income Inequality.* Retrieved from http://www.investopedia.com/terms/i/income-inequality.asp accessed on 13 June 2015.

Jones, C. I. (2015). Pareto and Piketty: The macroeconomics of top income and wealth inequality. *Journal of Economic Perspectives,* *29*(1), 29-46. doi:10.1257/jep.29.1.29

Kaplan, S. N., & Rauh, J. D. (2013). Family, education, and sources of wealth among the richest Americans, 1982-2012. *American Economic Review, 103*(3), 158-162. doi:10.1257/aer.103.3.158

Keeley, B. (2014). Is inequality good or bad for growth? Retrieved from http://oecdinsights.org/2014/12/09/is-inequality-good-or-bad-for-growth/ accessed on 13 September 2015.

Kim, J., & Tebaldi, E. (2013). Trends and sources of income inequality in the United States. *Proceedings of the Northeast Business & Economics Association,* 127-134. Retrieved from http://0-search.proquest.com.innopac.up.ac.za/docview/1624963990/fulltextPDF?accountid=14717

Koske, I., & Wanner, I. (2013). The drivers of labour income inequality – an analysis based on Bayesian model averaging. *Applied Economics Letters, 20*(2), 123-126. doi:10.1080/13504851.2012.683164

Krishna, P., Poole, J. P., & Senses, M. Z. (2012). Trade, labour market frictions, and residual wage inequality across worker groups. *American Economic Review, 102*(3), 417-423. doi:10.1257/aer.102.3.417

Kunnanatt, J. T. (2013). Globalization and developing countries: a global participation model. *Economics, Management & Financial Markets, 8*(4), 42-58. Retrieved from http://0-eds.b.ebscohost.com.innopac.up.ac.za/ehost/detail/detail?sid=832b02d9-8a65-4d40-809b-6c9aeaa9a057%40sessionmgr112&vid=0&hid=126&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=94247826&db=bth

Kuznets, S. S. 1966. Modern Economic Growth. New Haven, CT: Yale University Press.

Lee, E., & Vivarelli, M. (2006). The social impact of globalization in the developing countries. *International Labour Review, 145*(3), 167-184. doi: 10.1111/j.1564-913X.2006.tb00016.x

Lemieux, T., Macleod, W. B., & Parent, D. (2009). Performance pay and wage inequality. *Quarterly Journal of Economics, 124*(1), 1-49. doi:10.1162/qjec.2009.124.1.1

Malul, M., Shapira, D., & Shoham, A. (2013). Practical modified Gini index. *Applied Economics Letters, 20*(4), 324-327. doi:10.1080/13504851.2012.699182

Mankiw, N. G. (2013). Defending the one percent. *Journal of Economic Perspectives, 27*(3), 21-34. doi:10.1257/jep.27.3.21

Meyer, B. D., & Sullivan, J. X. (2013). Consumption and income inequality and the great recession. *American Economic Review, 103*(3), 178-183. doi:10.1257/aer.103.3.178

Milanovic, B. (2010). *The Haves and the Have-Nots*. New York, NY: Basic Books.

Mishel, L., Schmitt, J., & Shierholz, H. (2014). Wage inequality: A story of policy choices. *New Labor Forum, 23*(3), 26-31. doi:10.1177/1095796014544325

Mohammed, A. (2015). *Outlook on the Global Agenda 2015: Deepening income inequality.* Retrieved from http://reports.weforum.org/outlook-global-agenda-2015/top-10-trends-of-2015/1-deepening-income-inequality/ accessed on 5 August 2015.

Mueller, H.M., Ouimet, P.P., Simintzi E. (2015). *Wage inequality and firm growth*. (Working paper no.20876). Massachusetts: National Bureau of Economic research.

Muller, P., Gagliardi, D., Caliandro C., Bohn N.U., Klitou, D. (2014). *Annual report on European SMEs 2013/2014: A partial and fragile recovery.* European commision.

Munshi, F. (2012). Does openness reduce wage inequality in developing countries? Panel data evidence from Bangladesh. *Singapore Economic Review, 57*(2), 1250011-1250012. doi: 10.1142/S0217590812500129

Nau, M. (2013). Economic elites, investments, and income inequality. *Social Forces, 92*(2), 437-461. doi: 10.1093/sf/sot102

Nell, E. J. (2014). On the causes of growing inequality. *International Journal of Political Economy, 43*(3), 26-34. doi:10.1080/08911916.2014.1001702

Nielsen, L. (2013). How to classify countries based on their level of development. *Social Indicators Research, 114*(3), 1087-1107. doi:10.1007/s11205-012-0191-9

OECD. (n.d.). *Inequality.* Retrieved from https://data.oecd.org/inequality/income-inequality.htm accessed on 13 July 2015.

Ostry, J.D., Berg, A. & Tsangarides, C.G. (2014). *Redistribution, Inequality and growth*. International Monetary Fund. Retreived from http://www.imf.org/external/pubs/ft/sdn/2014/sdn1402.pdf accessed on 12 June 2015.

Parkin, M. (2014). *Microeconomics* (11th ed.). Essex: Pearson Education Limited.

Pedace, R. (2010). Firm size-wage premiums: Using employer data to unravel the mystery. *Journal of Economic Issues, 44*(1), 163-181. doi: 10.2753/JEI0021-3624440108

Petit, P. (2010). The systemic nature of the rise in inequality in developed economies. *International Review of Applied Economics, 24*(3), 251-267. doi:10.1080/02692171003701396

Piketty, T. (2015). Putting distribution back at the centre of economics: Reflections on capital in the twenty-first century. *Journal of Economic Perspectives, 29*(1), 67-88. doi:10.1257/jep.29.1.67

Piketty, T., & Saez, E. (2003). Income inequality in the United States, 1913-1998. *Quarterly Journal of Economics, 118*(1), 1-39. doi: 10.1162/00335530360535135

Piketty, T & Saez, E. (2014) Inequality in the long run. *Science, 344 (6168).* doi: 10.1126/science.1251936

Rajan, P. (2010). *The Fault Lines*. New York: Princeton University Press.

Saunders, M., & Lewis, P. & Thornhill A. (2012). *Doing research in business and management* (6th ed.). Essex: Pearson Education Limited.

Slonimczyk, F. (2013). Earnings inequality and skill mismatch in the U.S.: 1973-2002. *Journal of Economic Inequality, 11*(2), 163-194. doi:10.1007/s10888-011-9212-1

Snedecor, G.W. & Cochran, W.G. (n.d.). *Upaired t-test.* Retrieved from http://biomath.info/power/ttest.htm accessed on 26 October 2015.

Stiglitz, J. E. (2013). *The price of inequality*. New York: W. W. Norton & Company.

The bigger, the less fair. (2015, March). The Economist. Retreived from http://www.economist.com/news/finance-and-economics/21646266-growing-size-firms-may-help-explain-rising-inequality-bigger accessed on 6 June 2015.

United Nations Development Programme (2013). *Humanity Divided: Confronting Inequality in Developing Countries*. New York: United Nations Development Programme Bureau for Development Policy

Van Reenen, J. (2011). Wage inequality, technology and trade: 21st century evidence. *Labour Economics, 18*(6), 730-741. doi: 10.1016/j.labeco.2011.05.006

Wayman, R. (n.d). *Compound annual growth rates: What you should know. Investopedia.* Retrieved from http://www.investopedia.com/articles/analyst/041502.asp accessed on 18 October 2015.

Wegner, T. (2012). *Applied Business Statistics Method and Excel-based Applications* (3rd ed.). Cape Town: Juta & Company Ltd.

Weier, R.M. (2011). *Introduction to Business Statistics* (7th ed.). Southern-western Cengage Learning.

Weiss, M., & Garloff, A. (2011). Skill-biased technological change and endogenous benefits: the dynamics of unemployment and wage inequality. *Applied Economics, 43*(7), 811-821. doi:10.1080/00036840802599933

World Bank. (n.d.) *GINI index (World Bank estimate).* Retrieved from http://data.worldbank.org/indicator/SI.POV.GINI accessed on 27 June 2015.

9. ANNEXURES

Annexure 1 – Bloomberg description of indices

S&P BSE 500 index: is a free-float weighted index that represents nearly 93% of the total market capitalization on BSE India exchange. This index represents all 20 major industries of the economy. 1998-99 is chosen as the base year, and within this, the date 1 February 1999 is selected as the base date for its proximity to the current period. The base value was fixed at 1000 points.

Warsaw Stock Exchange WIG INDEX is a total return index which includes dividends and pre-emptive rights (subscription rights). Index includes all companies listed on the main market, excluding foreign companies and investment funds. The index base value is 1000.00 as of 16 April 1991.

The Philippine Stock Exchange All Share Index is a market capitalization weight index composed of all the stocks listed at the Philippine Stock Exchange.

The Jakarta Stock Price Index is a modified capitalization-weighted index of all stocks listed on the regular board of the Indonesia Stock Exchange. The index was developed with a base index value of 100 as of 10 August 1982.

The FTSE/JSE Africa All Shares Index is a market capitalization-weighted index. Companies included in this index make up the top 99% of the total pre free-float market capitalization of all Warsaw Stock Exchange WIG Indexlisted companies on the Johannesburg Stock Exchange.

The FTSE/JSE AltX Index has been created to provide a market measurement for those companies listed on the Alternative Market Exchange at the Johannesburg Stock Exchange.

The FTSE All-Share Index is a capitalization-weighted index comprising of the FTSE 350 and the FTSE Small Cap Indices. The index was developed with a base value of 100.00 as of 10 April 1962.

FTSE AIM All Share Index - The Financial Times-Stock Exchange AIM (Alternative Investment Market) All Share Index is a capitalization-weighted index of small and emerging companies traded on the London Stock Exchange. This index has a base date of 30 December 1994 and a base value of 2000.

The Deutsche Borse Prime All Share Performance Index is a total return index that has been conceived to measure the overall performance of all Prime Standard issues. The index was developed with a base value of 1000 as of 21 March 2003.

The OMX Stockholm All-Share Index includes all the shares listed on OMX Nordic Exchange Stockholm. The aim of the index is to reflect the current status and changes in the market. The base date for the OMX Stockholm All-Share Index is 31 December 1995, with a base value of 100.

Australian Stock Exchange All Ordinaries Index- the Australian All Ordinaries Index is a capitalization weighted index. The index is made up of the largest 500 companies as measured by market cap that are listed on the ASX. The index was developed with a base value of 500 as of 1979 and is calculated by ASX/S&P. The groups of this index were discontinued on 5 July 2002.

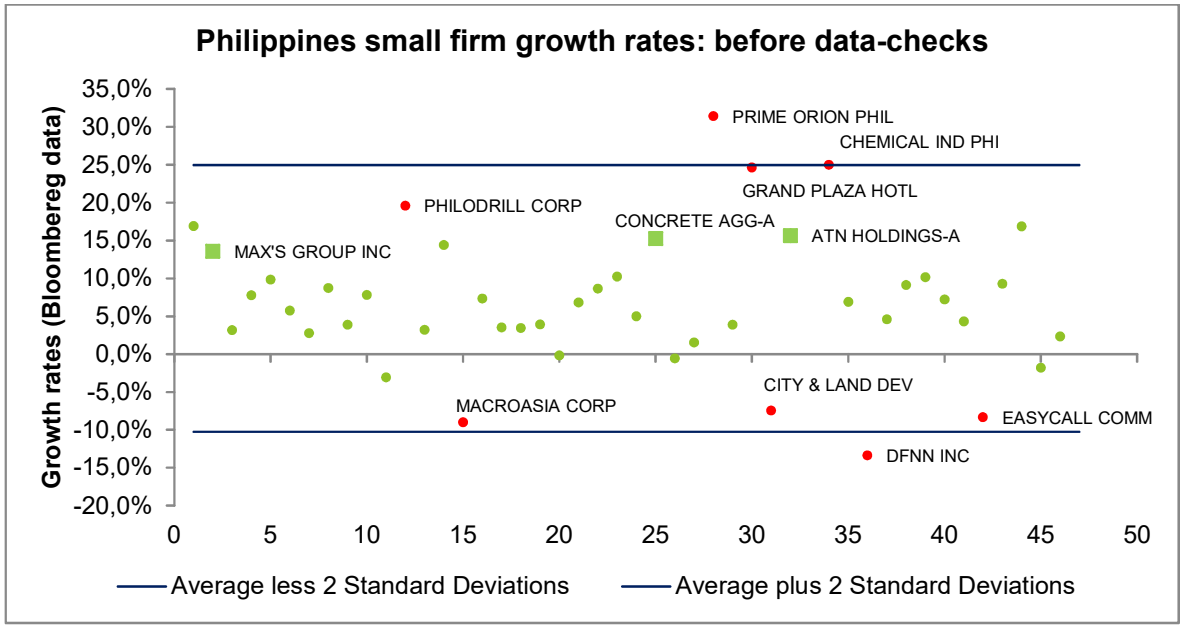
S&P/ASX Small Ordinaries Index- the Australian Small cap Ordinaries Index is a capitalization-weighted index of all small cap stocks listed on the Australian Stock Exchange. The index was developed with a base value of 500 as of 31 December 1979

S&P 500 Index –Standard and Poor's 500 Index is a capitalization-weighted index of 500 stocks. The index is designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries. The index was developed with a base level of 10 for the 1941-43 base period.

Russell Microcap Index – The Russell Microcap Index measures the performance of the microcap segment of the U.S. equity market. It makes up less than 3% of the U.S. equity market. It includes 1000 of the smallest securities in the small-cap Russell 2000® Index based on a combination of their market cap and current index membership and it includes the next 1,000 securities.

Annexure 2 – Data checks example

The graph below illustrates the exercise that was conducted in section 4.6.1 for small firms Philippines. The red dots highlight data point that look too high/low and the green dots highlight the firm which were randomly spot checked:



Source: own construction

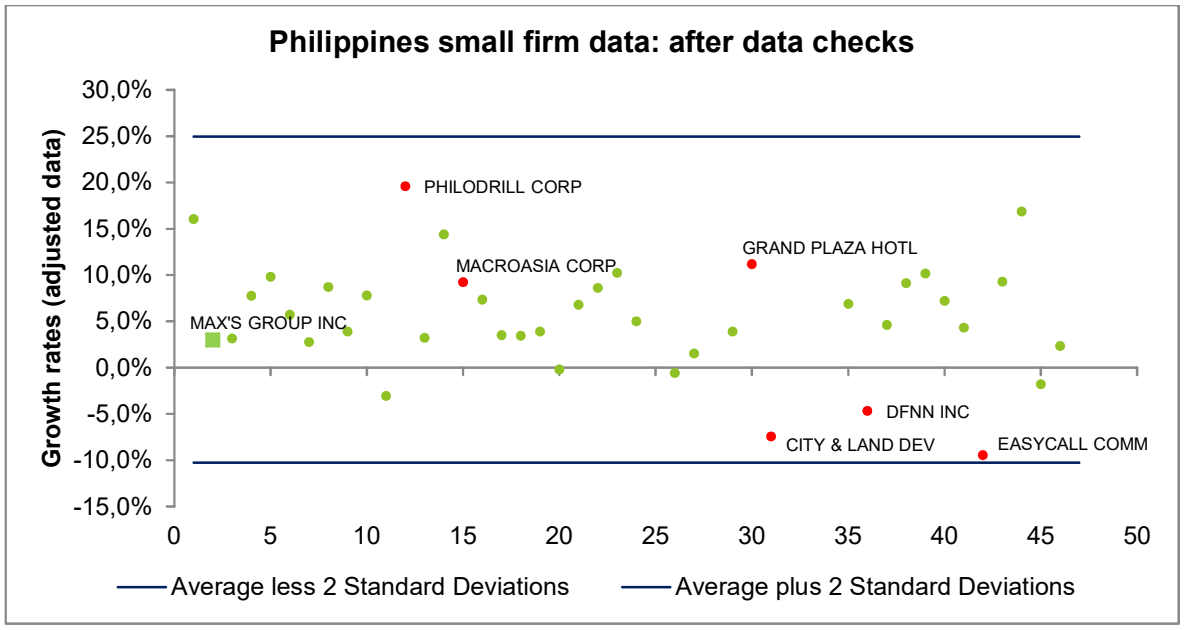
The Bloomberg data for these firms were checked against what was actually reported in the annual statements for the firms. For the above example, the following adjustments were required:

1. **City& Land Dev**: Bloomberg data agreed to the annual reports.
2. **Easycall Comm**: Bloomberg data agreed to the annual reports.
3. **Philodrill Corp**: Bloomberg data agreed to the annual reports.
4. **Grand Plaza Hotel**: Bloomberg had the incorrect number of employees for the financial year (FY) 2005 i.e. correct number was 550 employees instead of 1727 employees as stated by Bloomberg. The total for personnel expenses was correct.
5. **Macroasia Corp:** Bloomberg had the incorrect number of employees for the FY 2004. This could be seen by the sudden change in the number of employees reported by Bloomberg over the analysis period. Namely the number of

employees changed from 425 in FY 2007 to 3580 in FY 2008. The total for personnel expenses was correct.

6. **DFNN INC**: Bloomberg had the incorrect number of employees for FY 2014. However, despite this, the growth rate remained negative.
7. **Prime Orion Phil:** The number of employees reported on Bloomberg dropped from 539 in FY2004 to only 46 in FY 2014. The FY 2014 number looked correct as the number of employees increased gradually from 22 employees in FY 2007. This therefore indicated a potential error with the FY 2004 number. The annual statement for FY 2004 did not contain the number of employees for the firm. As a result, this data point was excluded.
8. **Chemical Ind Phi:** The number of employees reported by Bloomberg dropped from 256 in FY 2004 to only 6 in FY 2014. While both these numbers were correct in terms of what was reported in the annual statements, a sufficient explanation for the drop could not be obtained. Due to the material impact on the average wage per employee for FY 2014 (₱ 5 041 459 per employee) compared to the FY 2013 number (₱ 872 902 per employee), this data point was excluded.

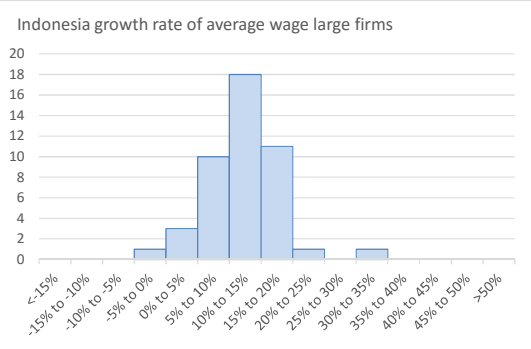
After adjusting for above data point, the resulting data set looked as followed:

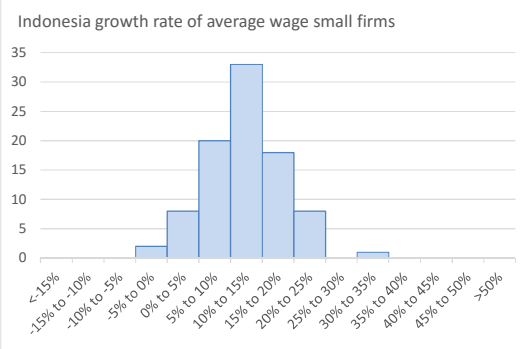


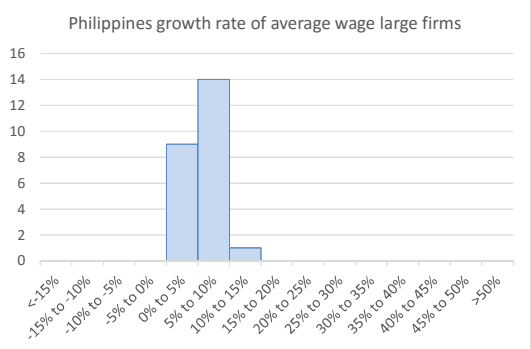
Source: own construction

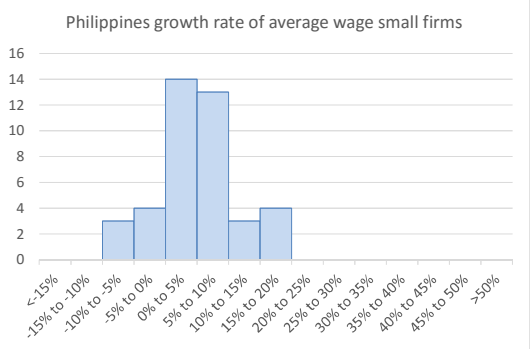
Annexure 3 – Histograms of data

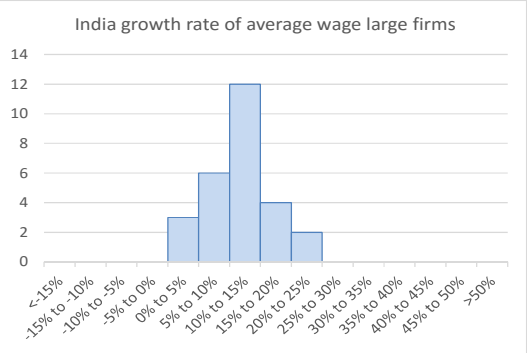
Histograms for growth rates of average employee wages for developing countries:

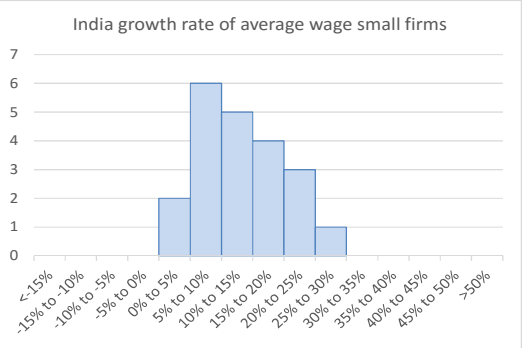


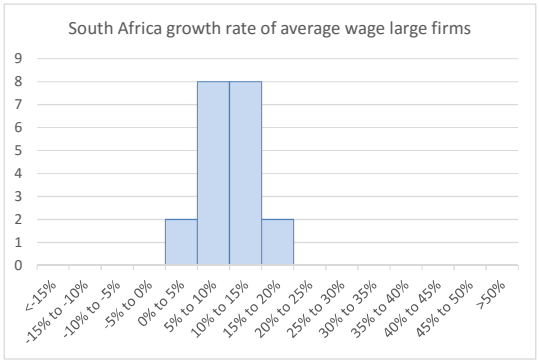


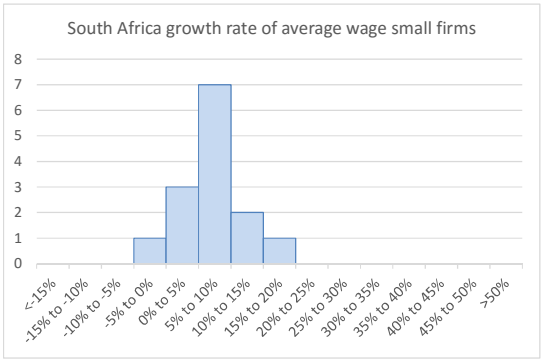




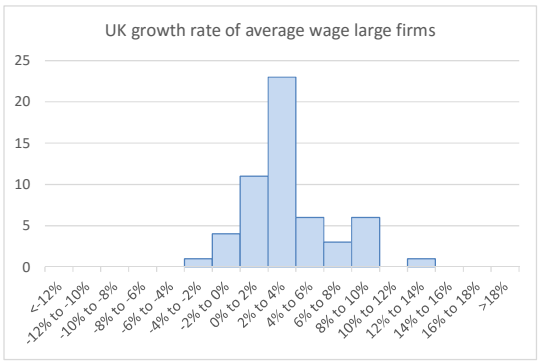


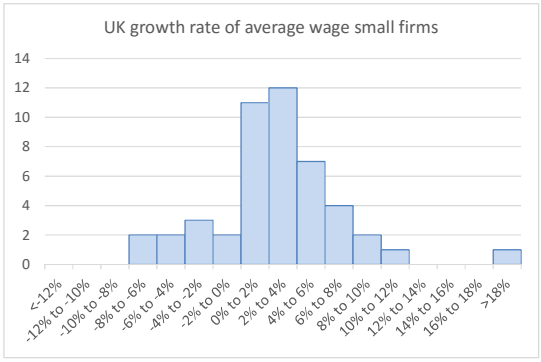


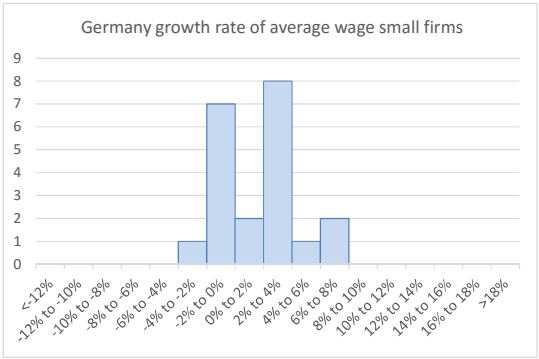


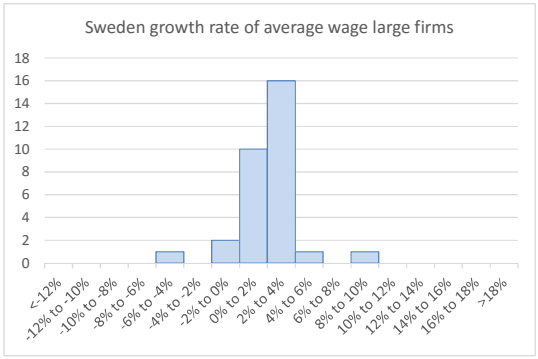


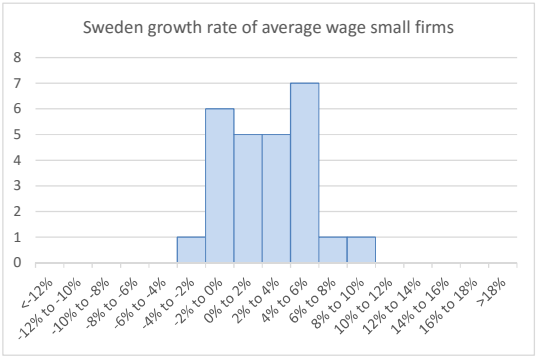
Histograms for growth rates of average employee wages for developed countries:

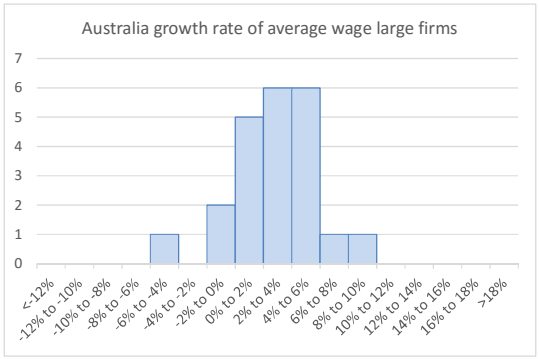


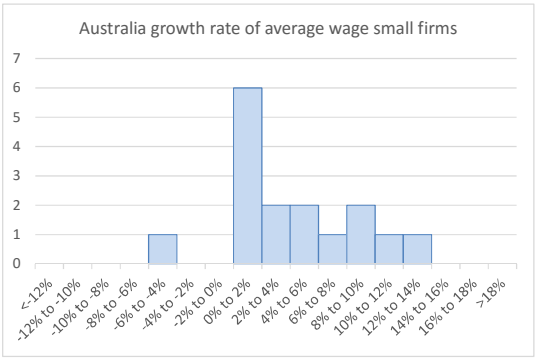


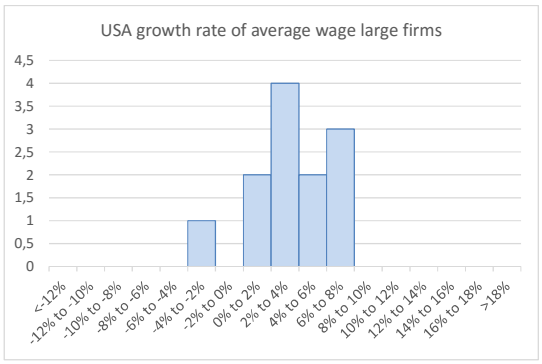


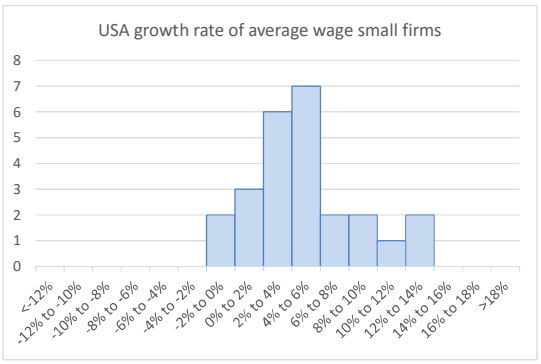




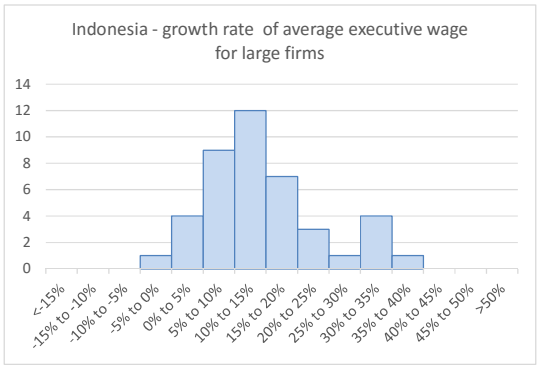


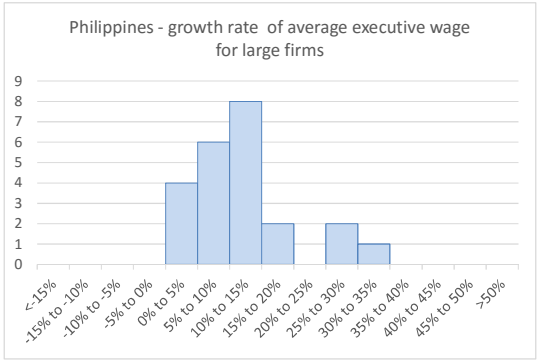


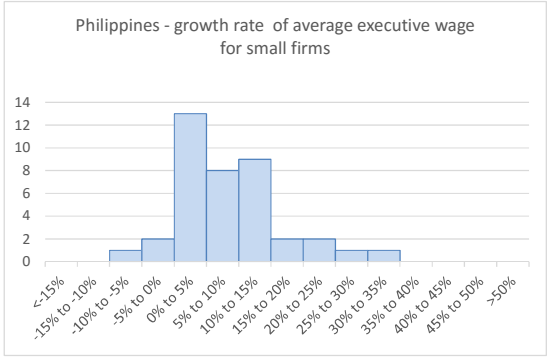


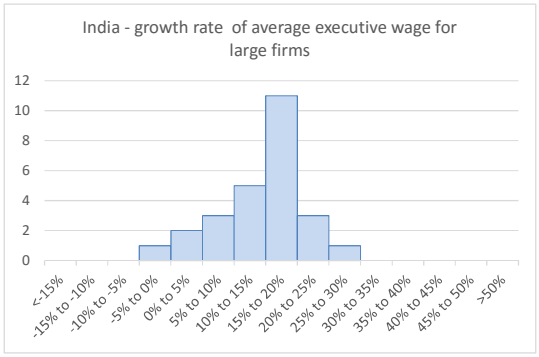


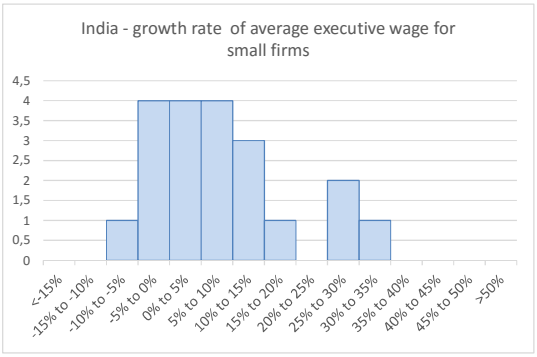
Histograms for growth rates of average wage per executive for developing countries:

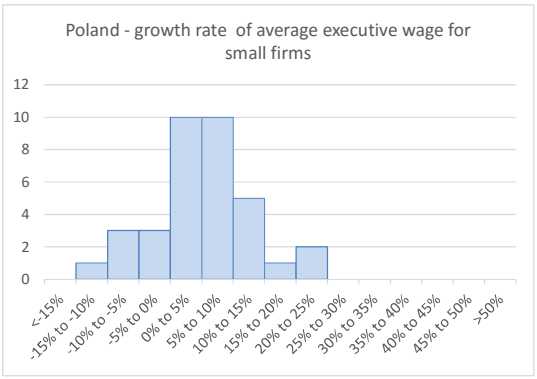


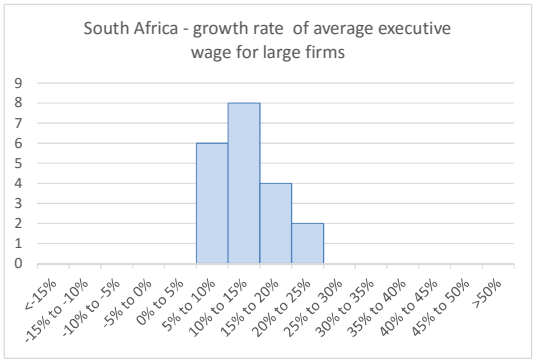


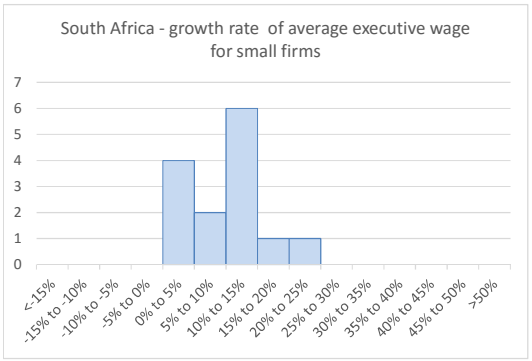




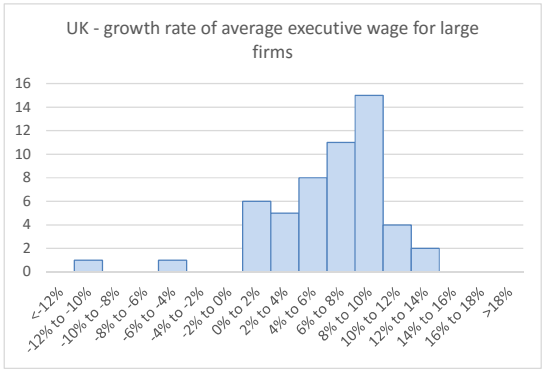


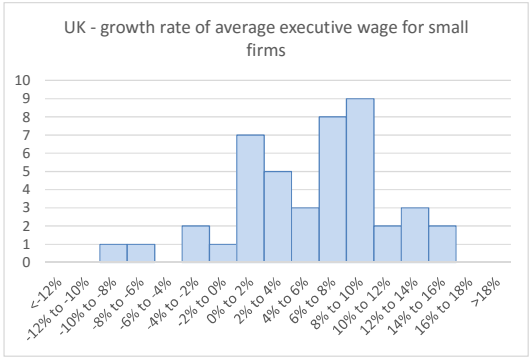


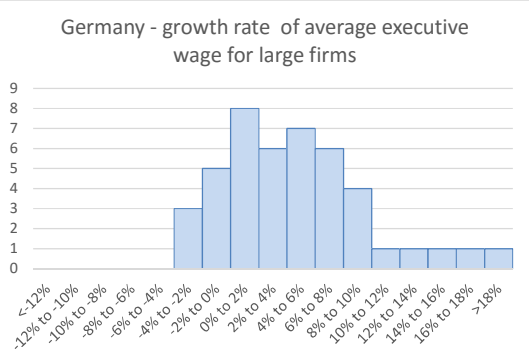


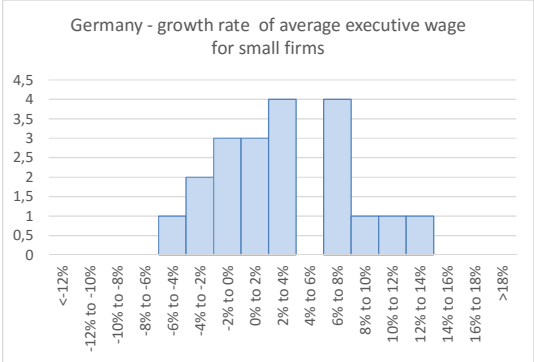


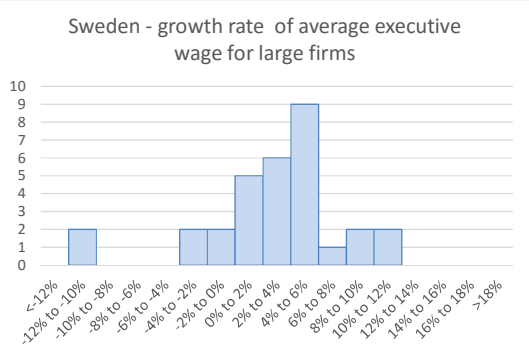
Histograms for growth rates of average wage per executive for developed countries:

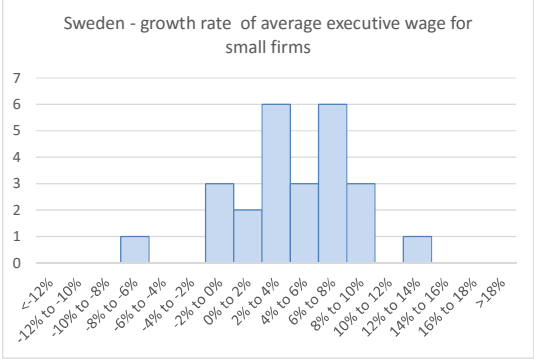


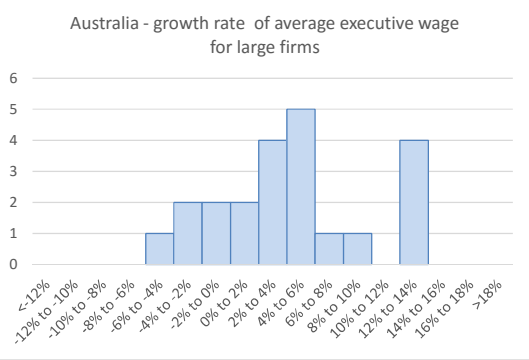


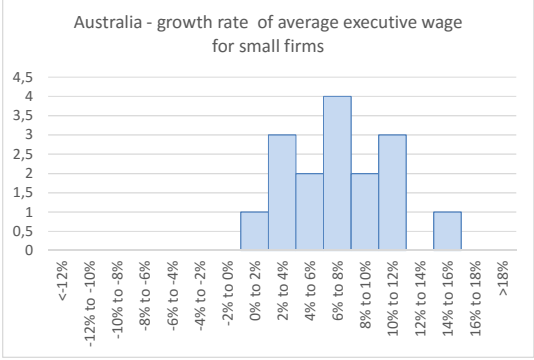


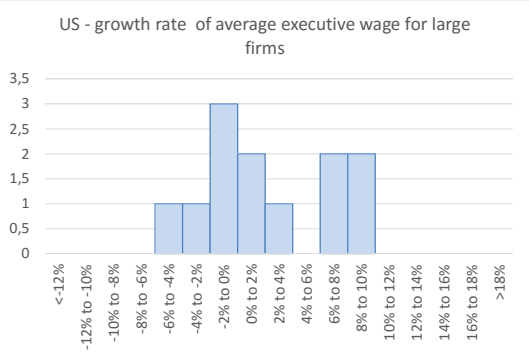


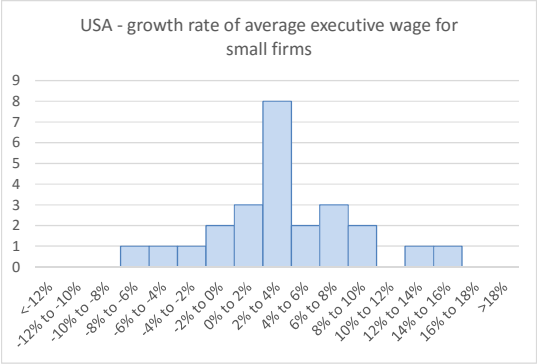




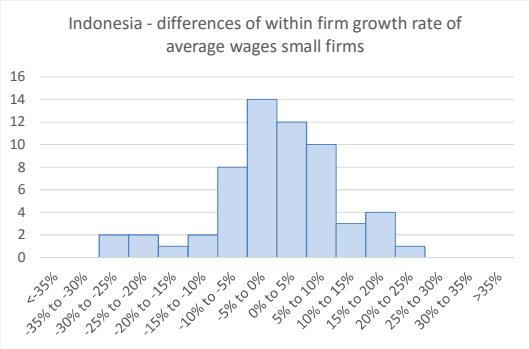


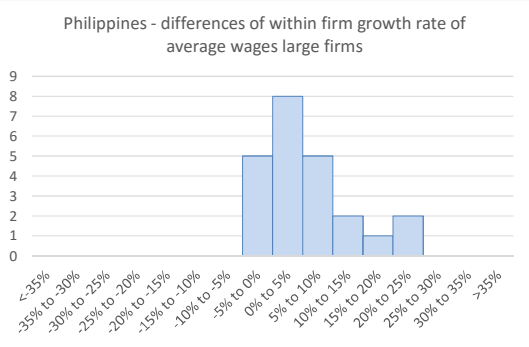


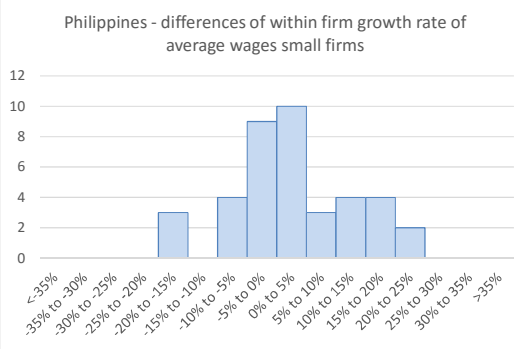


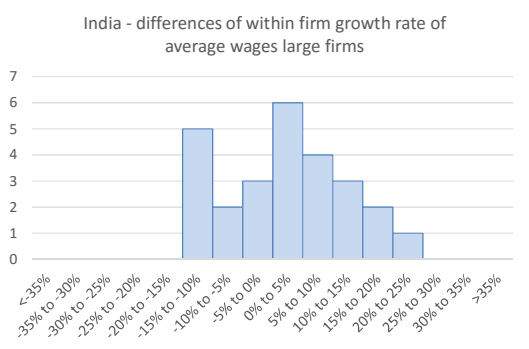


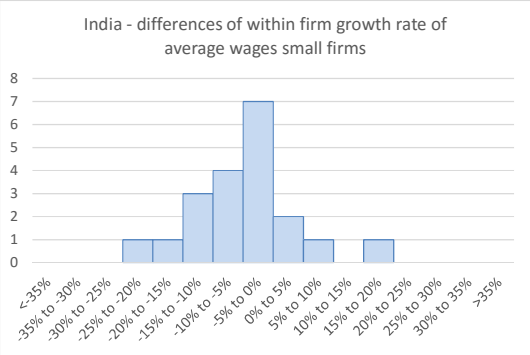
Histograms for difference in growth rates of average wage per executive and the rest of the firm for developing countries:

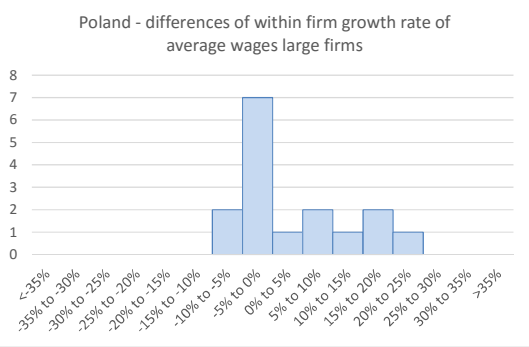


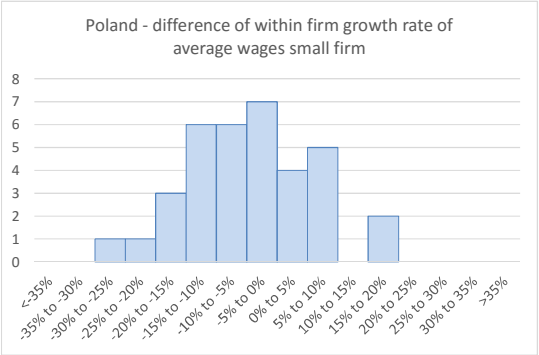


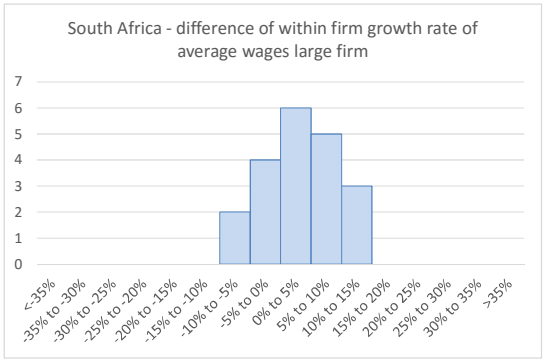


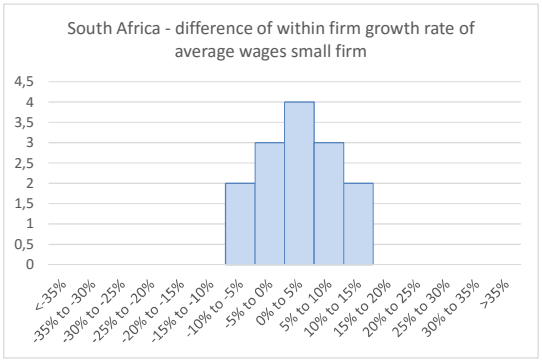




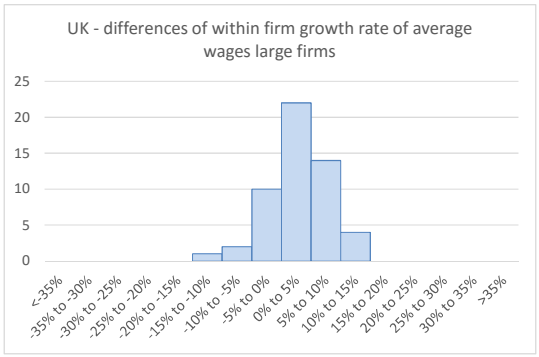


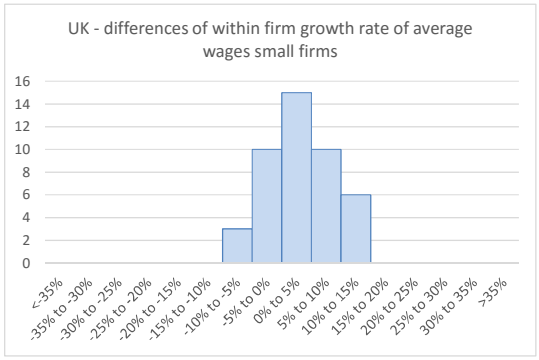


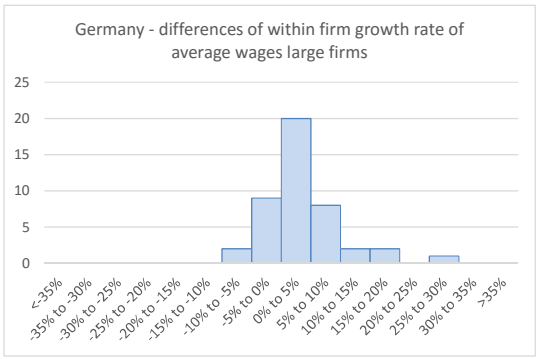


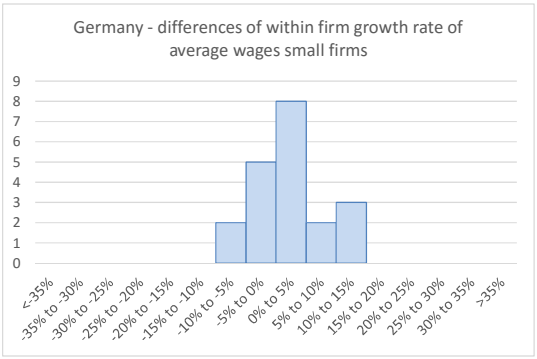


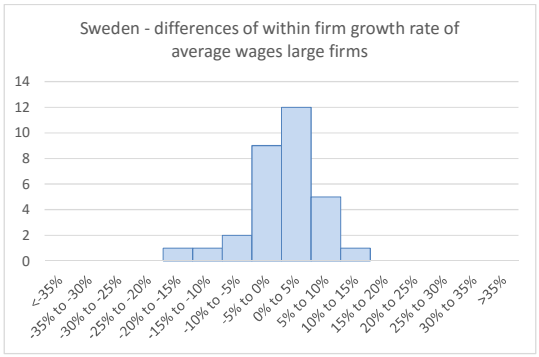
Histograms for difference in growth rates of average wage per executive and the rest of the firm for developed countries:

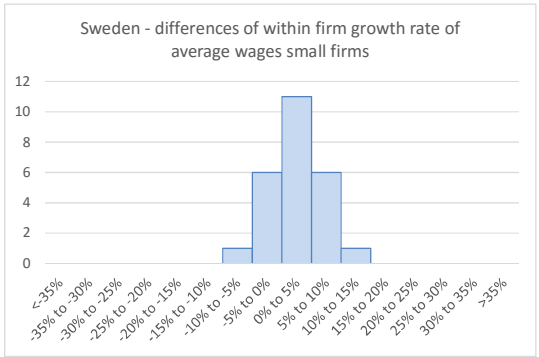


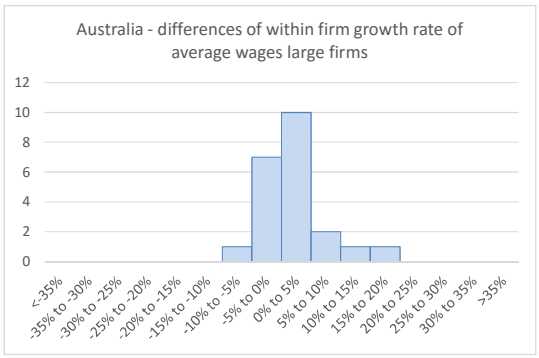


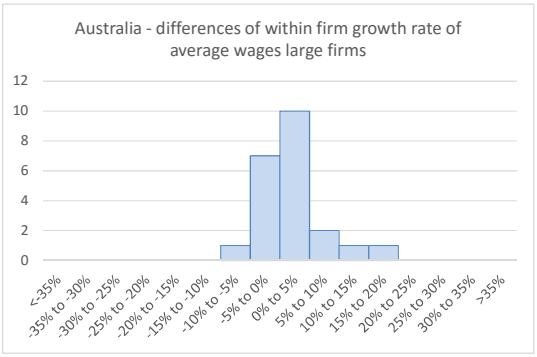


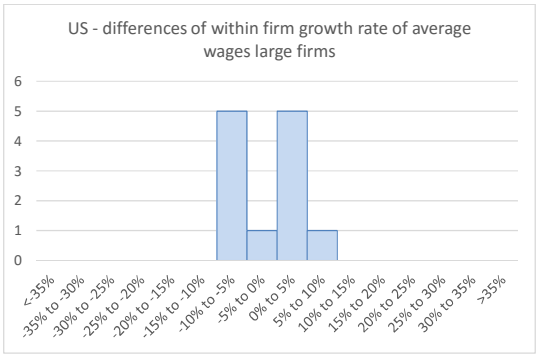


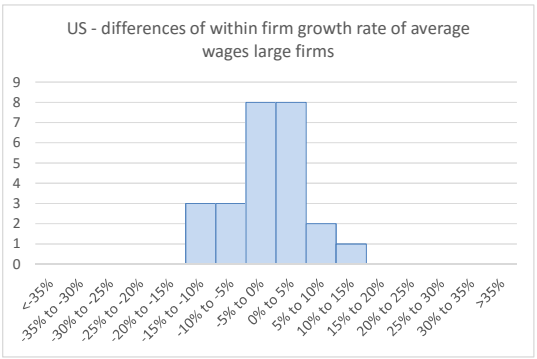












Annexure 4 – Absolute values of average earnings at the beginning of the analysis

Tabulated below is the average wage per employee per country in 2004/2005

All employees					
Developing Countries	*Average Wage per Employee Large Firms*	*Average Wage per Employee Small Firms*	*Difference*	*p-value*	*Result t-test*
Indonesia	Rp68,952,335.64	Rp42,295,064.66	Rp26,657,270.98	0,2%	Reject Ho
Philippines	₱560,923.20	₱440,887.23	₱120,035.97	11,6%	Fail to reject Ho
India	₹ 555,309.48	₹ 335,996.20	₹ 219,313.28	1,6%	Reject Ho
Poland	79,334.57 zł	35,591.99 zł	43,742.59 zł	0,0%	Reject Ho
South Africa	R215,126.21	R198,609.89	R16,516.32	40,2%	Fail to reject Ho
Developed Countries	*Average Wage per employee Large Firms*	*Average Wage per employee Small Firms*	*Difference*	*p-value*	*Result t-test*
UK	£37,303.93	£42,999.35	-£5,695.42	13,0%	Fail to reject Ho
Germany	€55,542.45	€53,848.39	€1,694.06	36,2%	Fail to reject Ho
Sweden	kr. 488,089.86	kr. 661,299.07	-kr. 173,209.21	100,0%	Fail to reject Ho
Australia	AUD 82 886,52	AUD 136 742,98	-AUD 53 856,46	95,7%	Fail to reject Ho
USA	$107 174,23	$84 503,06	$22 671,18	27,6%	Fail to reject Ho

Source: Own construction

Tabulated below is the average earnings per executive per country in 2004/2005

Executive earnings					
Developing Countries	*Average wage per executive - large firms*	*Average wage per executive - small firms*	*Difference*	*p-value*	*Result t-test*
Indonesia	Rp1,500,213,190.60	Rp346,156,772.36	Rp1,154,056,418.23	0,0%	Reject Ho
Philippines	₱9,787,257.57	₱1,629,888.96	₱8,157,368.61	0,0%	Reject Ho
India	₹ 14,689,190.46	₹ 4,740,558.10	₹ 9,948,632.36	0,3%	Reject Ho
Poland	1,357,991.67 zł	211,858.82 zł	1,146,132.84 zł	0,0%	Reject Ho
South Africa	R6,932,019.42	R980,871.54	R5,951,147.88	0,0%	Reject Ho
Developed Countries	*Average wage per executive - large firms*	*Average wage per executive - small firms*	*Difference*	*p-value*	*Result t-test*
UK	£1,093,127.80	£124,229.33	£968,898.47	0,0%	Reject Ho
Germany	€1,371,553.62	€265,968.95	€1,105,584.67	0,0%	Reject Ho
Sweden	kr. 5,355,417.86	kr. 1,262,738.41	kr. 4,092,679.45	0,0%	Reject Ho
Australia	AUD 1 532 995,56	AUD 221 611,82	AUD 1 311 383,73	0,0%	Reject Ho
USA	$4 879 341,91	$310 699,71	$4 568 642,20	0,0%	Reject Ho

Source: Own construction

Tabulated below are the ratios of average wage per executive to average wage per employee by country and firm size.

Average executive to average employee wage ratio		
Developing Countries	*Large Firms*	*Small Firms*
Indonesia	22 x	8 x
Philippines	18 x	4 x
India	27 x	14 x
Poland	17 x	6 x
South Africa	32 x	5x
Developed Countries	*Large Firms*	*Small Firms*
UK	29 x	3 x
Germany	25 x	5 x
Sweden	11 x	2 x
Australia	19 x	2 x
USA	45 x	4 x

Source: Own construction

ETHICS APPROVAL LETTER

Gordon Institute of Business Science
University of Pretoria

Dear Moushmi Vallabhbhai

Protocol Number: **Temp2015-01981**

Title: **The influence of firm size on income inequality.**

Please be advised that your application for Ethical Clearance has been APPROVED.

You are therefore allowed to continue collecting your data.

We wish you everything of the best for the rest of the project.

Kind Regards,

Adele Bekker