



# Is the attractiveness trait influencing our economy?

**The correlation between the attractiveness of  
senior managers in firms on the Fortune 1000  
list and their firm's rankings on the list.**

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## Abstract

Attractiveness is a powerful trait. It changes how we see someone's personality and how we treat them. It has a relationship with who they are and has correlations to personality and behavioural traits. Attractiveness has mostly been looked at in individuals and individual interactions. This paper looks at the bigger picture, investigating if attractiveness influences the ranking of a firm on the Fortune 1000. Can an attractive person change a large firm influencing the economy? Two data samples were collected to measure attractiveness. The first was an unbiased estimate using an online program, Anaface. The second was an online survey answered by 247 people. The Anaface results show that managers from the top 100 firms on the Fortune 1000 list were 0.75 points out of 10 more attractive than managers from the bottom 100 firms on the list. The survey results showed that there is not a clear relationship between the respondent's preferences for attractiveness and the ranking of the firm that the manager is from. The means that attractiveness may have an influence on the firm's ranking using an unbiased estimator, but people do not show preferences this way. This would mean that how attractive a manager is probably will not affect the ranking of the firm on the Fortune 1000. These results shed light on the size of the effects of attractiveness and question some of the findings of research in the same field. Results based on the facial analysis program do not reflect the preferences of people, which may mean there are more factors to attractiveness than facial geometry that influence preference. Attractiveness is powerful on an individual level, but perhaps not on a large scale. It could be that attractiveness is not as big an influence in our lives as some research may suggest.

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## *Introduction*

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We trust our sensory experiences. Marketing already uses our senses (Kirshna, 2010) when promoting goods and services, but could also use this to promote our opinion of people and their business. What if we trusted people on appearance so much so that it influenced our opinion and decisions? The Milgram Experiment is a famous example of how appearances already influence our lives. It was reasoned that many Nazi soldiers followed the generals and leaders in the Nazi regime purely because they were figure heads. In the experiment people gave their victims a fatal electric shock when ordered to by someone who appeared to be in authority by simply wearing a white coat. In a recreation of the Milgram experiment, in 2009, the doctor giving the instructions was actually an actor, but the people followed the instructions without seeking further knowledge as he appeared to be in charge. Appearance of authority lead people to act against their better judgement even if the person giving the orders was not as qualified as their dress suggested. (Milgram, 1974) Therefore it can be said that appearance has a mighty affect in our lives. This leads to further questions about our behaviour. How much does a person's looks affect our judgement? This paper will look into one aspect where appearance possibly plays a role in our economy.

The research currently shows that attractiveness positively affects individual income (Pfeifer, 2012), peer recognition (Kennedy, 1990), elections results (Berggren, Jordahl & Poutvaara, 2010), personal lending (Duarte, Siegel & Young, 2012), and many more advantageous factors in an individual's life. There is a lot of focus on individual benefits of attractiveness, but not so much on the group welfare (Halford & Hsu, 2014). There should be more research into the greater affects that attractiveness may have on our economy. There is advancement towards this study field already. More attractive CEOs are associated with better stock returns around their job announcements. This means that if a company were to announce a more attractive CEO there is a possibility that this trait would increase their stock returns. There is much to still be gained in this broader way of thinking. Managers represent a company. They should have the consumers' and employees' best interests at heart. Attractiveness has such an impact on individual lives and these individuals are very important for the well-being of the company that perhaps their attractiveness will have an impact on the company itself.

The focus of this paper is to look for a correlation between the attractiveness in the top managers in the top firms and how well the firms are doing. There are many reasons for such a relationship to possibly exist. Perhaps the appearance of the senior management in firms can lead us to think differently about the firm itself. Perhaps the attractiveness of the people has influenced their careers leading them to work in top firms. Perhaps there are other factors involved. The first step is to see if there is a relationship between these factors.

This paper will measure if attractiveness in management will have a correlation with the ranking or revenue of a business. This leads to the thesis statement or hypothesis:

**There is a correlation between the attractiveness of senior managers in firms on the Fortune 1000 list and their firm's rankings on that list.**

The Fortune 1000 list measures the top 1000 U.S. firms ranked on recent revenue figures and includes both public and private companies based and operating in the U.S. This list is an unbiased and reliable measure of ranking of companies. (DeCarlo, 2015) The hypothesis will be tested using different firms from the fortune 1000 list based in the United States. The focus will be on firms in the top 100 and the lowest 100 of the list. The paper will try to show if there is a correlation between the ranking of a firm and the attractiveness of the senior managers in that firm. The difference between the firm's rankings should be great enough that if there is a correlation, between the ranking of the firm and attractiveness of its managers, it will show through.

Attractiveness will be defined on physical appearance in this paper and judged through photographs of managers. It should be noted that throughout the paper the managers referenced are the people in the senior management team. There is an old proverb "beauty is in the eye of the beholder" (Martin, n.d.), which leads us to believe that beauty is very subjective. This might be comforting to those of us who may rank lower on the attractive attributes scale. Unfortunately it is not completely true. Research into beauty has shown that attractive people will generally be found to be attractive to most people. Much of our rating of attractiveness lies in the symmetry of the face. Factors such as race, culture or weight, except for the morbidly obese, are not leading factors in people's perception of attractiveness. (Hamermesh, 2011) In this paper the face will be used for the best measure of attractiveness. There is a combination of symmetry (Rikowski & Grammer, 1999), facial averageness (Langlois & Roggman, 1990),

different measurements and ratios, including the golden ratio (Schmid, Marx & Samal, 2008), which can be used to determine attractiveness objectively (Atalay, 2004). This paper will use an online program that scores a person's face according to attractiveness based on facial geometry and ratios via the site Anaface.com (hereby referred to as Anaface). People have an innate ability to determine attractiveness in people. From infants, we can judge people to be attractive or non-attractive. (Langlois, Roggman, Casey, Ritter & et al, 1987) Therefore this paper will also use people's judgement of attractiveness to determine if the hypothesis posed is indeed true or not. 247 people have judged 25 different pairs of managers to determine if the managers of higher ranking firms are actually more attractive.

If this hypothesis is true it would mean that it would be beneficial for a company to include attractiveness of the staff as a factor when looking to promote staff to senior manager positions. The implications of this study would be that the attractiveness trait would have another aspect in our lives that it influences. Attractiveness already influences us on an individual interaction scale as our judgment and treatment of people in our day to day lives is affected by the trait. There are few studies into the large scale effects and this would look even broader as the effects it has on the revenue of large firms. If this is the case it could mean that being attractive can add value to a giant firm which is a rather large influence for a pretty face.

This research is new because it looks at such a large scale in the field of attractiveness and because it takes people's opinions and preferences into account as well as using a computer software analysis so the results will be unbiased. It also compares the two data sets for a more robust result meaning that the conclusions are using both objective and subjective measures of attractiveness. This means that the conclusions have depth.

The rest of this paper will be organized as follows. First I will address all the previous studies on attractiveness and their implications to this research in the theoretical framework, followed by the breakdown of the hypotheses. Next, in the methodology, I will show how the data for the Anaface analysis and the online survey was collected and analysed. The results will show all the statistical analysis, followed by the conclusion, which is drawn from all the previous sections. Lastly I will list the limitations to the research and the references and appendices.

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## *Theoretical framework*

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The literature review will be a review on all the previous articles and theories that apply to this field of research. First attractiveness and its ability to be measured are described. Logically this paper will develop from the immediate personal effects attractiveness has on a person to the global influences attractive people have. The implicit personality theory and the horns effect is explained at the basis of this study. It follows to detail the impact that attractiveness has on the impression and treatment of an attractive person. The research of attractiveness also goes into the correlated personality and behavioural traits. Then I review the large scale influences that attractiveness has, looking at how attractiveness may change opinions in a crowd of people. Finally the disadvantages of attractiveness are reviewed. In the hypothesis development there is a step by step development of the hypotheses and relevant research to provide evidence for these theories. The conclusion of this section touches on the theoretical outcomes for this paper and the impact of these conclusions based on available knowledge.

### *Literature review*

In order to have attractiveness we must find some people better looking than others. Attractiveness, like many of our features such as height, is an objective quantifiable trait. We are born with the innate ability to tell who is attractive and who is not. We can see across cultures, races and age. (Hamermesh, 2011) It is something in the face of a person that determines if they are beautiful or not. Even new-borns not over a week old pay more attention to those deemed more attractive than those not. (Langlois, Roggman, Casey, Ritter & et al, 1987) Objective evaluations of the face have been used since ancient Greeks used measures like facial symmetry and the golden ratio to assess attractiveness (Atalay, 2004). Studies have improved since then showing that attractiveness is associated with geometry-based facial features, facial symmetry (Rikowski & Grammer, 1999), averageness (Langlois & Roggman, 1990) and the golden ratio (Schmid, Marx & Samal, 2008). Attractiveness is identifiable, but this trait is so much more powerful than simply being measurable.

Throughout many different psychology, sociology and economics studies people have looked into the effects of the attractiveness trait. The studies so far have concentrated on two main branches when looking at the attractiveness trait. The first study is how others perceive and

treat those who are attractive and the second is if attractive people exhibit, with a higher probability, other physical, behavioural or personality traits (Berger, Cohen & Zelditch, 1972).

The foundation of this first study is the implicit personality theory (Schneider, 1973). This theory describes the assumptions that are made automatically about unfamiliar people when there is little information available. That first impression or inner gut feeling that people have when they first meet someone is this theory. The idea of associating traits with other traits happens subconsciously from the beginning of an interaction (Carlston & Skowronski, 1994). Each individual constructs their own unique impressions about people based on different situations and their own personality. Sometimes, across groups of people, the same assumptions are formed. There are trends and patterns in the way the assumptions are formed allowing us to study the way people form the impressions. This study branches off into many different fields all looking at how the individual creates an impression of someone based off of certain traits and information available. For example the self-based heuristic where people fill in the gaps in the information they are given about someone to create an impression using information that reflects their own personality (Beer & Watson, 2008).

The studies show that people make an impression of someone else from traits that they have seen and then they infer other traits. Further studying into the bias and assumptions that people have brings us to the halo effect (or horns effect), which is a cognitive bias where people see a good (or bad) impression or trait in a person and thereafter have a good (or bad) disposition, inferences and expectations towards that person. For example you may relate a characteristic such as hard worker to someone who is always punctual though the person may not have actually given any indication of the hard working trait on its own. There are many aspects not actually seen in a person that are linked to people without any evidence from the observer because of another aspect observed. (Thorndike, 1920) The perceptions of the characteristics in attractive people is a specific type of halo effect.

Many studies have looked into the assumptions we make about attractive people. The physical attractiveness stereotype (Aronson & Aronson, 2008) is the tendency to associate other socially desirable traits with attractiveness. If someone is attractive then people perceive them to have better social skills (Goldman & Lewis, 1977), higher intelligence (Jackson, Hunter & Hodge, 1995) and a healthier mentality. In many studies, over different cultures and countries, traits have been associated with attractive people simply because they are attractive. They are seen

in various studies to be associated with more loyalty, integrity, self-assertion, dominance (Dion, Berscheid & Walster, 1972), trustworthiness (Wilson & Eckel, 2006), and concern for others (Wheeler & Kim, 1997). All of these positive traits are related to a person for simply being pretty. This seems like this attractiveness trait already is a mighty trait to possess, but its influence is not limited to characteristic associations alone. People treat attractive people better.

Attractive people receive more peer recognition (Kennedy, 1990), better treatment (Hamermesh, 2011) and have greater social influence (Hamermesh, 2011). People listen more to attractive people (Dion, Berscheid & Walster, 1972) and are more open and honest towards them (Brundage, Derlega & Cash, 1976). The attractive have better employment or social opportunities, are more likely to be employed and there is a positive correlation between attractiveness and income (Pfeifer, 2012). Physically attractive people are perceived to be happier (Dion, Berscheid & Walster, 1972). We expect more from attractive people. Even from childhood we have raised expectations, as teachers see attractive children as more academic and more likely to succeed. (Hunsberger & Cavanagh, 1988) They will spend more time on these children as they think they have more talent which in turn actually gives these children the advantage. This may even bias their grading. (Byrnes, 1988) This advantageous trait can even benefit in crime. Physically attractive people have even been found less guilty when charged with the same crime than less attractive people. (Efran, 1974) Attractive people will also have more lenient sentencing when found guilty (De Santis & Kayson, 1997).

Attractiveness does not just affect our perceptions of people. Attractiveness is so influential that it can even play a role in who we spend our lives with. Physically attractive people of the similarity in attractiveness level have a better chance at staying together in a relationship (White, 1980). Attractiveness plays a role in staying power in our love lives.

The cognitive bias that people have means that attractive people are perceived better and treated better. The second main branch of the study of attractiveness researches if attractive people display different characteristics compared to their not so attractive counterparts. The research looks into the physical, behavioural or personality traits that attractive people actually exhibit. Attractive people receive a greater surplus in negotiating games (Rosenblatt, 2008) and more fundraising success (Price, 2008). They appear to have better negotiating skills and are better communicators (Chaiken, 1986). They show more socially desirable personality traits (Langlois et al., 2000), are happier and more confident people (Hammeresh & Abrevaya, 2013,



Mobius & Rosenblatt, 2006) and they are more resistant to peer pressure (Adams, 1977). There is even evidence, though controversial, that attractive people may be more intelligent than unattractive people (Kanazana, 2011, Hamermesh, 2011).

Attractive people are not only perceived and treated positively, but show many positive characteristics. The attractiveness trait has been looked at from many different angles already to see its effect on individuals and the people who deal directly with them. A large field in the study of the attractiveness has been for the most part overlooked. The research into the greater effect of attractive people on the population or general public and the economy has barely begun. Perhaps a factor in an entrepreneur's success, an actor's following by fans or a CEO's business flourishing is actually their attractiveness. Perhaps the attractiveness trait does not only change the immediate surroundings of a person, but can affect many more people, most of which they will not even meet. This paper will use the reasoning of the first research branch and broaden it to look at the effect of the population's perceptions of attractive people.

The research into this concept has already shown some incredible results. Studies have shown that the attractiveness trait impacts the decisions of leadership for countries. Research has shown that more attractive people are more likely to be elected. People could judge in one second on side by side photos of candidates who would win and that judgement was decent predictors for the US congressional election results. (Verhulst, Lodge & Lavine, 2010) The unpopular party also tends to have an unattractive person in power, in the Canadian federal elections (Efrain & Patterson, 1974). A study on Finnish election results showed that there was a positive relationship between the attractiveness score of candidates and their number of votes (Berggren, Jordahl & Poutvaara, 2010). Despite people knowing more factual knowledge about candidates, the candidates, who were rated as more attractive, were still found to also be more knowledgeable (Palmer & Peterson, 2012). Attractiveness can impact the politicians in power.

Joseph T. Halford and Hung-Chia Hsu have shown that there is a correlation between a higher attractiveness score of a new CEO and an increase of their company's share prices at their job announcement (Halford & Hsu, 2014). This means that if a company elects a better looking CEO they can expect the attractiveness trait of the CEO to have a positive effect on the share price. They found that attractiveness matters for shareholder value. This means that a person's face affects a company value and since the companies studied were large firms this conclusion can represent the relationship in our economy fairly. They used companies from the S&P 500

companies list, which lists 500 large companies having stock on the NYSE or NASDAQ, which shows that attractiveness can impact big firms in our economy.

It is not all a bed of roses for the attractive people though. There are disadvantages to being attractive. Attractive people often have issues with identifying why people may like them. They often will question if people are attracted to their looks and not their personality. There is a possible negative correlation between attractiveness and care for others and honesty. (Jackson, Hunter & Hodge, 1995) Attractive people are more likely to rely on their looks than other attributes. People also associate negative traits like vanity and egocentric traits with attractive people and often believe them to be shallow and manipulative. (Gallucci & Meyer, 1984) People of the same sex may also refuse attractive people because of jealousy. (Mazur, Hatfield & Sprecher, 1987)

### *Hypothesis development*

The theoretical framework outlines studies that look at the effects of attractiveness on a large scale. The attractiveness has an effect on a large number of voters or shareholders to the point of the trait actually influencing a result. This paper uses this outlook further regarding the effects that the attractiveness of managers in a firm. The managers of a firm represent the interests of the firm itself in a similar way that the board of directors represent the shareholders' interests. (Fama, 1980) The managers represent the employees' and the customers' interests. (Waldman, Ramirez, House & Puranam, 2001) Since the managers represent the firm, people would look to them for the traits they want to see in the firm. The attractiveness trait should then hypothetically have an impact on the result of the firm.

#### **Main hypothesis:**

**There is a correlation between the attractiveness of senior managers in firms on the Fortune 1000 list and their firm's rankings on that list.**

In order to address this hypothesis I will need to develop several steps to draw a strong foundation for any possible conclusions. The first question that comes to mind is why managers should have any effect on the ranking in the Fortune 1000, a list based on revenue, at all. Firstly many of the managers are in the firm for a long time. Some of which have been promoted to the position internally. For example Satya Nadella, the current CEO of Microsoft, joined the

business in 1992 and was promoted to CEO in 2014 (Microsoft News Center, 2014). These are the people who watch the business grow through their work. The managers represent the people in the business fairly. The board of directors are often chosen for an annual basis and mainly have the interests of the stockholders in mind, aiming to reduce agency costs, so would have little true representation of the business. Managers can inspire the employees to work more productively (Dosier, Case & Keys, 1988). Increased productivity would lead to higher revenues. They can create customer and employee loyalty (Sirdeshmukh, Singh & Sabol, 2002, Eskildsen & Nussler, 2000). If customers trust the firm more, then they are likely to purchase more or be more loyal (Anderson, Fornell & Lehmann, 1994), which in turn increases revenues or profit. The managers are often the ones to announce the direction of a company and launch new products. For example Satya Nadella gave the keynote speech to open Microsoft Ignite, a convention for IT professionals, in May 2015. He was the first face and first speaker that people interested in the Microsoft technology saw. ([ignite.microsoft.com](http://ignite.microsoft.com), n.d.) Since attractive people are better communicators (Chaiken, 1986), attractive managers would communicate for the firm better. They are the face for the relationship people will have with a firm.

First step is to look at the managers' attractiveness rating from an objective perspective. Using the geometry and facial symmetry the photos of managers can be measured for attractiveness and given a rating from one to ten. If there is a correlation between the ranking on the Fortune 1000 or firm's revenue and the attractiveness of the managers then the rating of the managers in the top ranking firms should be higher than the rating of the managers in the lower ranking firms. This will be tested using a facial analysis program, Anaface. More formally:

Hypothesis 1:

The rating of the managers in the top ranking firms of the Fortune 1000 is higher than the ratings of the managers in the lower ranking firms, measured with an objective attractiveness analysis program, Anaface.

Once there is a clear understanding of the attractiveness in the groups of managers from high and low ranking firms this research can further investigate the factors that influence attractiveness such as the gender of the managers. In many firms there are far more men than women in the senior managers position. Only 14.6% of the executive officer positions in the firms on the Fortune 500 list were held by women in 2013. As little as 4.8% of the CEOs of the firms in the Fortune 500 were women. (Catalyst, 2014) In this research the management

teams used all consisted of more than half male members. Males are still seen in many professional fields as better than women in leadership roles. The stereotype for this bias is referred to as the “women take care, men take charge” stereotype (Catalyst, 2005), where females are not seen as being equally capable of the senior manager role based only on their gender. The stereotype is built on other biases such as the belief that women are poor problem solvers (Catalyst, 2005). One of the factors that lead to this judgement of management quality could be attractiveness. The attractiveness trait has different pay offs for the males and females. Attractiveness in females increases the probability of having a highly educated husband with high income and decreases the probability of remaining unmarried. They have no own income benefits. The attractiveness trait helps males with the achievement of status. (Udry & Eckland, 1984)

In the job selection process a study by Bradley Ruffle and Ze’ev Shtudiner showed that CVs with pictures of attractive males received more positive responses than CVs with normal pictures or no pictures whereas the opposite is true for females. The CVs with photos of attractive females received less responses than CVs with normal photos or no photos. The main reason for this was because of the high number of women in human resources and they did not wish to hire what they viewed as competition in the firm. (Ruffle & Shtudiner, 2014) It seems that women tend to hinder the growth of the careers of attractive women. Perhaps in business attractive males benefit more from the attractiveness trait than females do. In this case then attractive men would more likely end up in the managerial positions than attractive women, which would mean that the men in the management teams would be more attractive than average and the women would be less attractive. This can be tested using the attractiveness scores of the managers from the Anaface program. This leads to the hypothesis:

Hypothesis 2:

Men in managerial positions are more attractive than the women in managerial positions, using objective measures.

The implications of this hypothesis would be that this paper’s conclusions would apply best to males. The gender factor would also have to be considered then when looking at the correlation of managers in the firm with the ranking of that firm on the Fortune 1000. If the hypothesis is untrue then the attractiveness trait would affect both genders equally. This would mean that the attractive females or attractive males both have the same effect of the attractiveness trait.

This measure using technology, like Anaface, is not the only way to measure attractiveness. Since people are the ones to judge whether someone is attractive or not it is logical that the next step in this research is to ask people about the attractiveness of the managers. Independently of the computer analysis, an experiment will be conducted, in the form of an online survey, to record an objective measurement of the two groups of managers (belonging to high or low ranking firms). Conclusions about the groups of managers can be made, by having a group of participants to judge who is the more attractive manager, one belonging to the high or low ranking firms. Respondents to the survey will be asked to judge pairs of pictures where each pair has one manager from a high ranking firm and one from a low ranking firm. The hypothesis is:

Hypothesis 3:

When asked to choose based on attractiveness, people choose the picture of the manager from the high ranking firm more often than the manager from the low ranking firm.

It is important in all research that the conclusions are useful and reflect the population that the sample has been taken from. Attractiveness is recognisable across cultures and races (Hamermesh, 2011). This implication is that the benefits of attractiveness would be possible in many different countries. Some research has found that slightly different personal traits are assigned to attractive people in different countries, often differing in degree of positive correlations, but across all cultures an attractive person is assigned positive traits to their personality (Schneider, 1973). Anaface is an online program and uses an unbiased assignment of attractiveness so the results of this analysis can be extended to general attractiveness values across culture. The online experiment was conducted in the Netherlands and the majority of the respondents are Dutch. This means that their view of attractiveness could be slightly different from outside of that group and thus the results would not be able to reflect a general correlation. Since groups of people in Europe, but outside of the Netherlands and outside Europe were also asked it is possible to compare these groups to see if their answers differ to that of the Dutch respondents. If the groups of people from different nationalities are similar in responses then the conclusions that are made based on their responses would be reflective of the population that they represent. People would find the same people attractive no matter where they are from. Thus the hypothesis is:

#### Hypothesis 4

Respondents to the survey from the Netherlands, Europe (excluding the Netherlands) and outside of Europe will have similar choices for attractiveness.

The final step in this paper is to check that the analysis program and the survey conducted have the same conclusions. Each of these studies are a solid reflection of the measurement of attractiveness alone and can be used to check the correlation between the trait and the ranking of the firm on the Fortune 1000 individually. The first test uses a mathematical formula, while the second relies on people's preferences. Together they provide a robust result. The conclusions drawn should be strong and effective in most situations. If both tests reflect the correlation between rankings in the Fortune 1000 and the attractiveness of managers then the conclusions will be very reliable and powerful. Thus:

#### Hypothesis 5:

The analysis program, Anaface, and the survey results will reflect the same conclusions regarding the effect of attractiveness of managers on ranking in the Fortune 1000.

Once there is solid evidence for these hypotheses it is possible to conclude on the main hypothesis. The conclusion will reflect the greater population, using different methods of measurement and will be across managers of different genders. If the main hypothesis is true and there would be a correlation there would be many reasons for such a relationship, as shown through the beneficial links that attractiveness has for individuals throughout the theoretical framework. It is not a test for a causal relationship though as it is possible that there is a moderating variable or a mediating variable. This means a variable might influence the relationship that is not recorded like a personality trait, which is linked to attractiveness, which would be the true reason for managerial success rather than attractiveness itself. Perhaps a variable that has nothing to do with attractiveness is the true cause of success. The time order is also not known. Perhaps their attractiveness gave them the opportunity to work at a better firm and their work is not the biggest influencer of the revenue of the firm. Since many of the managers work for a long time at the firm it would be logical to conclude that they have shown their value to the firm in more than simply looks or the firm might have looked for a better worker. Perhaps they were attracted to work at the top firm more than the top firm was interested in hiring attractive people. It could also be a spurious relationship, which can only be tested through multiple trials and different experiments. The relationship could also be

because top companies know the worth of appearances and take extra care to publish more professional pictures of their staff, which makes them appear to be more attractive than they are, which would mean that the photographer is the factor influencing revenues.

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### *Experiment methodology*

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In this section I will first cover the raw data collection. Then the methodology for the Anaface computer analysis, description of the variables, and the statistical analysis of the data is explained. Following that the process for the survey creation, distribution and collection of results is described. Problems and limitations of the survey are briefly addressed. The variables collected and the statistical analysis thereof are covered. Finally this section will look at the method of statistically comparing data sets in order to test the robustness of results.

The first step in testing the main hypothesis is to determine which firms will be used. The firms were picked from the 2015 Fortune 1000 list. The fortune 1000 list measures the top 1000 USA firms ranked on recent revenue figures. The list is compiled annually by the Fortune magazine and has been used to roughly gauge the well-being of the U.S. economy. The Fortune 1000 list is simply an extension of the more familiar list, the Fortune 500. This list is an unbiased and reliable measure of ranking of companies. It accounts for all companies with publicly available revenues and includes both public and private companies based and operating in the U.S. (DeCarlo, 2015). The companies are all based in the U.S. meaning that the managers will be seen by a similar mix of Americans and international people that large companies deal with. Their attractiveness and differences in culture or race will affect all firms with the same bias as the same type of people would judge them all. It would not be as fair to use Dutch people to compare a company based in China with a company based in America as their own bias may affect the results.

In order for attractiveness trait to play a role in the business people will have to see the managers. The research by Joseph Halford and Hung-Chia Hsu (2014) showed that visibility is a factor in the correlation between CEOs attractiveness and the shareholder's value of the firm. Attractive CEOs have a greater effect positive effect on stock prices when their picture appears in the news item. This means that only firms that have their managers visible online will be used. If it were necessary to request pictures of the managers then the general population

would not see them. There is no proof that the employees of such large corporations would be sure to easily have seen the senior managers. This would mean that their attractiveness would not have an effect on them and if there was a correlation between attractiveness and ranking on the Fortune 1000 it would be more likely spurious. This will be controlled for by only using firms with available information and pictures of the managers. The exact effects of visibility on this correlation is beyond the scope of this research.

Six firms were chosen for the analysis. Three firms from the top 100 (ranks 1 to 100) and three firms from the bottom 100 (ranks 901 to 1000) of the Fortune 1000 list. The firms were chosen from the top and the bottom of the list so that difference between them in ranking would be great enough that if there is a correlation, even if small, between revenue and ranking and their managers it would be more likely that it can be seen as the difference in ranking is so great. The Fortune 1000 list does include the top and best firms in America so even though we use the biggest difference in ranking on the list it is still possible that the effect of attractiveness in managers on the revenue, and thus ranking, is better analysed using an even larger difference in firm revenues. This paper uses ranking to test for a correlation and not the revenue of the firms. It is only important that one firm is larger than another. The exact size of this difference, in terms of revenue, is not important as there are many factors leading to a firm's revenue and if attractiveness of managers is one factor it is not possible with the information at hand to determine the size of the effect. Since I am not testing for causation knowing the revenue will not give further insight into the nature of the relationship between the managers' attractiveness and a firm's ranking on the list. The firms were chosen in pairs according to industry. This was done to control for the possibility that one industry might have more attractive people than another.

The industries were chosen at random from the selection of industries that the Fortune 1000 list offers (for example "Advertising, Marketing", "Beverages", etc.). The only requirement was that, in the industry, there was a firm in the top and bottom 100 of the list and the firms had online information about their current board of managers available, including pictures.

The industries chosen were computer software, motor parts and pharmaceuticals. The firms were chosen in the following pairs: Microsoft (ranked 31), Synopsys (ranked 995), Johnson Controls (ranked 66), Allison Transmission Holdings (ranked 974), Johnson & Johnson (ranked 37) and Alexion Pharmaceuticals (ranked 941) respectively in industry. The firms all



have a mixture of business to business and business to consumer sales. They are in different production fields offering products, services or both. This means the results of this paper would be representative of an interesting mix of firms.

The focus of the paper is to see if the higher ranking firms have more attractive people than the lower ranking firms. In this case the managers will not be divided by industry in the analysis, but rather by two groups, the top 100 firms and the bottom 100 firms. There are too few industries and firms chosen to conclude anything about each industry or specific ranking on the Fortune 1000. The specific effect of attractiveness on ranking in that an increase in attractiveness could increase ranking by a constant amount is for further investigation. This paper will look for evidence of a correlation as a foundation to this type of research. Thus the comparison will be made based on if the group of managers from the top 100 firms is indeed more attractive than the other group.

Pictures of the senior managers from each firm were collected. By using pictures it is possible to focus on the effects of attractiveness without factors like personality, mannerisms, charisma or sound of their voice playing a role. The pictures had to be front facing showing as much of their face as possible, be clear and identifiable for analysis and be a high enough quality that it is possible to identify facial features. There were additional restrictions for Anaface and the experiment which were also considered, which are explained in detail later. The pictures were collected first from the firm's website and then from Google images, for possible images that may fit the criteria better. As many senior managers as possible from each firm were found. This ranged from 10 to 20 managers per firm. This was because there was no certainty about the number of available pictures there would be when we started collected data and it is more convenient to have too many pictures than too few from each firm.

In order to address hypothesis 3 there needs to be a collection of both female and male managers. Most of the firms had very few females in senior positions. There were only two female managers in Allison Transmission Holdings. This uneven distribution of gender will have to be accounted for in the interpretation of the analysis and comparison of the attractiveness of the genders.

Ten pictures from each firm were randomly selected by having an external helper call out numbers at random and deleting those pictures until there were ten left. For example if there

were 15 managers then the helper would have called 5 numbers out of 15 and those ones would have been deleted so that 10 would remain. This makes a total of 30 managers from the top 100 firms, Microsoft, Johnson Controls and Johnson & Johnson, and there were 30 managers from the bottom 100 firms, Synopsys, Allison Transmission Holdings and Alexion Pharmaceuticals. These 60 managers were used for the objective analysis using Anaface.

This paper rests on the idea that attractiveness is a quantifiable variable. Two methods of measuring attractiveness were applied. Each method will be analysed individually first, then analysed to see if the two samples are correlated to each other for reliability. If the samples show individually and together evidence for or against the hypothesis then there is a more firm basis to draw conclusions. The first method uses Anaface, the online facial analyse program, to rate each picture giving a Facial Analysis Score (FAS) out of 10. This will provide an objective measurement of attractiveness. The second method uses a survey, which asks respondents to choose who is more attractive out of pairs of managers, each pair including one person from the top 100 firms and one from the bottom 100. This is a representative of the preferences of people.

### *Anaface analysis*

Anaface was launched in May 2009. According to the Google application download service Anaface uses their own special algorithm based on neoclassical beauty, facial symmetry, facial structure and the golden ratio to analyse attractiveness. The site requires a photograph with a clear view of the facial features and minimal rotation. The person should be facing forward with a more neutral expression, no exaggerated expressions. The user uploads the photo through an image hosting site or directly through their personal files and places 17 markers on the important facial features, such as the tip of the ears, the edges of the eyes and the corners of the mouth. The site then runs the algorithm and gives their FAS. It also includes some of the factors which contributed to the score such as the horizontal symmetry or the ratio of the eye width compared to the inner ocular distance. An example of Anaface is provided (Figure 1) using a picture of myself for the analysis.

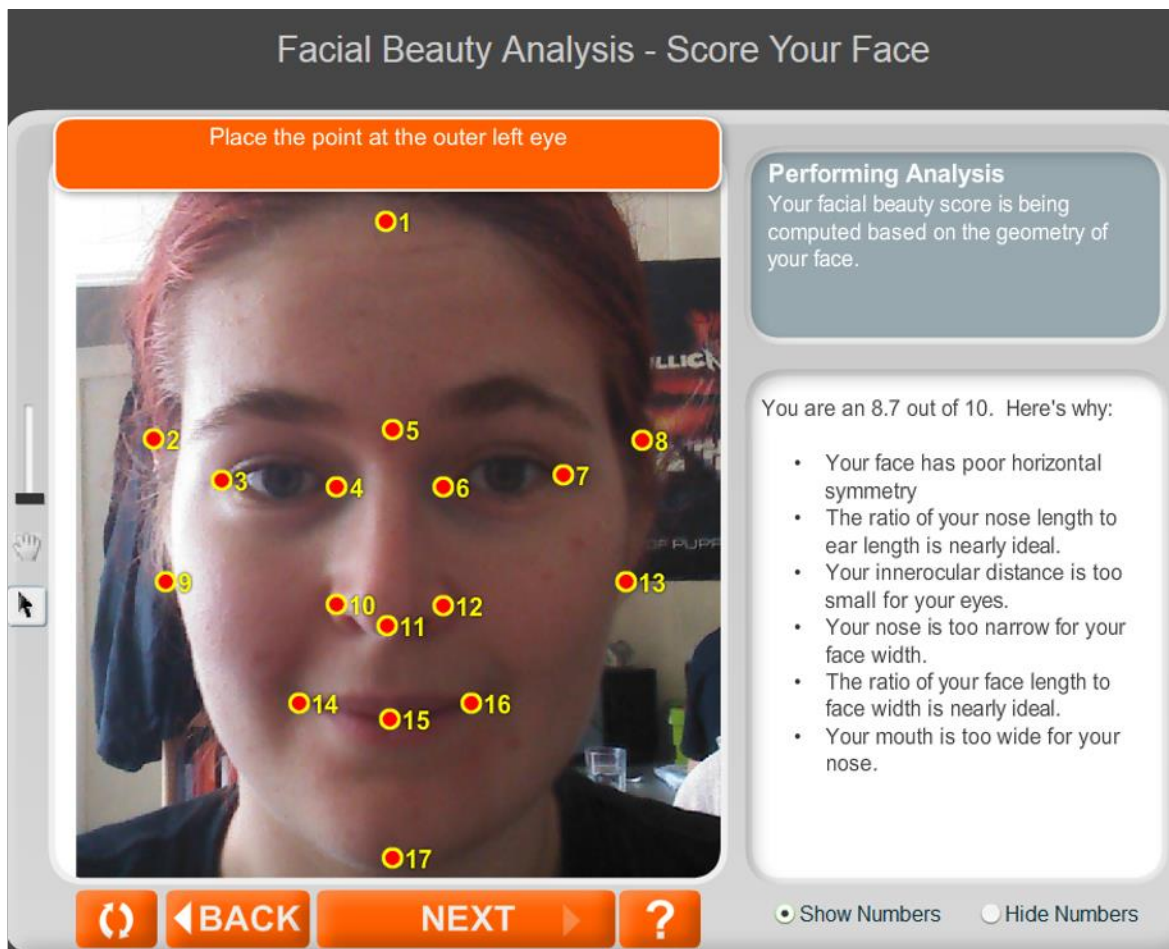


Figure 1: Anaface analysis of myself using a recent picture.

Each of the 60 managers were checked for the requirements Anaface has when collected and rotated slightly if necessary. The pictures were uploaded to the image hosting site Imgur.com (Imgur, n.d.). Anaface sometimes has trouble loading pictures directly from a file, which is why the image hosting site is used. Due to some recent updates of certain internet browsers it is advisable to use Firefox to run Anaface. Each of the 60 managers were run through Anaface twice, plotting the 17 markers on each face, and the ratings were recorded. This gives a continuous ordinal variable as one person can be more attractive than another in a measurable way. The pictures were run through the program in a random order to reduce the possible bias I could have on the results. The sample was collected twice to make sure the results are reliable. By using multi-sampling it is possible to check that the scores are not statistically different from each other and we can use the average for the hypothesis testing for a more true representation of the FAS.

Anaface uses gender for a part of the algorithm so the gender of each picture was also recorded

as a dichotomous variable. Anaface does not control for the facial traits and photo characteristics that could play a role in attractiveness. There may be an effect of wearing glasses, having a moustache, age, having hair, race, looking directly forward, picture lighting, or professionalism of the photo. This is why the results will also be compared with a survey. If the two data sets agree on someone being more attractive than another it is very likely that they are actually more attractive. Even if these traits do play a role in the attractiveness score, in the end the traits a manager may have, such as age, are part of the attractiveness that people will see and the picture characteristics, such as lighting, are part of the image the firm gives to the public through these pictures being on display. This means that even if they do play a role they should be included in the rating of attractiveness. It would be difficult to control for these factors as many of them, such as age or lighting, are dependent on our judgement of the picture. The role these factors may play would definitely be an interesting future research though and could add to what we know about attractiveness, but are beyond the scope of this paper.

The recorded results of the managers were first checked for their differences. The two results were compared to see if they were significantly different from each other. The average of the two results was used for the Facial Analysis Score. The more times that each manager is run through Anaface the more reliable the average will be. For further investigation into this subject it is advisable, if the resources are available, to collect each manager's FAS more times for more reliability. If the manager was in the top 100 firms then they were assigned to group 1, or zero otherwise creating a dichotomous variable. The firm they belonged to was also recorded as a nominal variable. The results were analysed in IBM SPSS statistics program and elaborated in the results section of this paper. Mostly t-tests were used to determine if the groups are statistically different from each other.

### *The online experiment*

An experiment was conducted in the form of a survey sent out to mostly Dutch students. A total of 247 respondents replied to the survey. 120 males and 127 females answered the questions. The survey was created by choosing 25 pairs from the 60 managers collected. The respondent was asked to choose who is more attractive out of these 25 pairs creating 25 questions, which are enough questions to draw conclusions on while still being few enough to not bore the respondent. One person from the top 100 firms and one from the bottom was matched roughly based on gender, an estimate of age, facial expression and prominent features

such as weight, skin colour, or the use of glasses. They were also paired roughly based on culture to further control for any possible influence that may have on respondents' rating of attractiveness. The photos were matched according to the quality, lighting, background and professionalism of the pictures as best as possible. Where this was not possible the quality of one of the pictures was adjusted to match the other. This matching was done to control for external factors affecting the participant's preferences. Personal preferences in facial features or the professionalism of the photo could play a role in the choices, by matching up the photos and controlling the quality we control for these factors. There were 8 pairs of women and 17 pairs of men. The people and pairs were ordered randomly. A coin was flipped to see if the person from the top 100 firms would be labelled as person A or B. The order of the pairs were also randomly selected through an external helper. The random selection controls for the possibility that conclusions could be drawn on preferences that were chosen systematically, for example choosing all A's or all B's. (See appendix A for an example of the survey questions)

The online survey was created using Google forms. This program allows the user to create questions in a simple manor where each question is on a new page so that respondents staring at the previous question will not change their answer to the next question. All questions were compulsory so that there were no non-responses from respondents in the analysis. Basic demographics of the respondent were also included in the questions. Questions were asked to check the age, gender, student status and cultural spread of respondents. When we make conclusions we should have a clear understanding about the group that we are basing this conclusion on. It is an ecological fallacy to conclude something about a population if the group is not representative of the population. The respondents were asked if they have studied in this line of research before. It is possible that having studied in marketing or behavioural economics recently could affect their answers, since many of these courses cover the effects of attractiveness on behaviour. They were also asked which device they answered the online survey on. It is possible that the smaller screen of a cell phone could impede their judgement slightly. These two factors will be taken into account in the results by checking if the respondent's answers are significantly different from the others. Gender of the respondents can also be used to see if this had an effect on the results. Studies have shown that females and males should be able to judge people on attractiveness equally well. (Tovée, M. J. and Cornelissen, P. L. 2001) The female group of respondents will be compared with the male group to investigate the role of gender in choices. It is expected that gender will not play a role in the choices of attractiveness.

The survey was shared through pages on Facebook.com. The pages were diverse to find people who did not personally know the author or the research. Friends of mine and I shared the survey through Facebook pages such as the “Commodity Market Rotterdam”, groups about master programs (other than marketing programs), such as Strategic Entrepreneurship at RSM Erasmus, pages of TU Delft study rooms, student building pages and a few others. The survey was also passed on individually by unknown people who found the survey on these pages and wished to share it. Through this method of sharing the possibility of bias, because the respondents are all people who know the author personally, is eliminated. The fact that this research was done online means that the respondents could be living in other countries as well as the Netherlands. The pages the survey was initially shared on were chosen to try to have more respondents living in the Netherlands to make the conclusions more pertinent to the Netherlands, but it is also still possible that the conclusions will apply to other cultures and countries because many of the respondents are not Dutch, so represent the greater population, and, as I have mentioned in the theoretical framework, attractiveness is not bound by country or culture.

A few respondents remarked that the survey was long so it is important to note when conducting this type of research to not add too many questions so that the responses are honest and not simply done to make the survey end. The final questions shortly collected basic demographics, as seen in Appendix A. It may be possible to use less than 25 pairs if the length of the survey becomes a concern in future research.

In each of the 25 comparison questions, the responses were coded that the choice was 1 if the respondent chose the manager from the top 100 firms and 0 otherwise. This is a nominal or specifically a dichotomous variable. The gender of the respondent was coded 1 for female and 0 for male, also a dichotomous variable. The respondent’s age was recorded, as a continuous ratio variable. Also recorded was the respondent’s student status (as a current student or not), nationality (as Dutch, European excluding Dutch and Non-European), and marketing or behavioural economic specialisations (if any) all as nominal variables. The groups created in the demographic questions, like studied or not, will be compared to see if they answer the questions similarly or if their differences are a factor in the identification of attractiveness. The 25 pairs were tested separately using t-tests to see if more people chose the managers from the top 100 firms or not. They were compared for an overall trend as well. The results were

analysed in IBM SPSS statistics program and elaborated in the results section of this paper.

Finally the two data sets are compared. The FAS from Anaface of each person in the 25 questions is matched up. The difference of the FAS of the manager from the top 100 firms and the manager from the bottom 100 in the pair is compared with the difference in the number of people who rated the manager of the top 100 firms as more attractive and the number of people who rated the manager of the bottom 100. These differences are tested for a correlation using the Pearson Correlation test. If there is a correlation then that means that the difference in attractiveness rating from Anaface compares with the difference in respondent's choices for attractiveness. This shows that these measures rate attractiveness in similar ways.

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## *Results*

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This section will cover all the statistical analysis of the data collected. This explanation will show what the figures mean in terms of this research and look at the data that will determine if there is truth to the hypotheses. This is the preparation for the final conclusion.

First step in checking the first hypothesis is checking that the Anaface FAS are accurate. Each manager was tested through Anaface twice. The difference of the two tests were tested to see if they were statistically close to zero. If the absolute difference is zero then the two results are close enough together that the Anaface would give the same face the same score each time it is run. It is necessary to use the absolute difference because it is not a test to see if the overall trend of increasing or decreasing scores is close to zero, but a test to see if, despite the direction of the change, the change is not a big one.

Unfortunately this test shows a significance that is less than 0.05 (0.000), which means that the null hypothesis, that the mean is zero, is false. This means that there is a significant difference between the two results. This shows that perhaps Anaface is not a reliable measure of attractiveness. The mean difference between the two results is 0.321, which means that on average there was a difference in Anaface score of 0.321 points between the results for the same picture of the same manager when it was tested through the program twice. This means that conclusions made based on this data might not be accurate as Anaface does not measure precisely. To make the FAS more reliable the average of the results will be used as this might

be closer to the true FAS of the managers, but since the results differ from each other each time the test on Anaface is conducted there is not surety that the results are true representations of attractiveness.

The averages of managers of the top 100 firms and the bottom 100 firms were compared using an independent sample t-test. The Levene's test for equality of variance had a significance of 0.37 which is greater than 0.05. This means that the assumption of equal variances is not rejected and the normal independent samples t-test can be used. The significance of the t-test was 0.005 which is less than 0.05, which means that I can reject the null hypothesis that the averages are equal. The two averages were significantly different from each other. This means that on average the two groups have the different attractiveness. The difference in attractiveness between the group of managers from the top 100 firms and the managers from the bottom 100 firms is 0.75, which means on average managers from the top firms are 0.75 points more attractive than managers from the bottom firms.

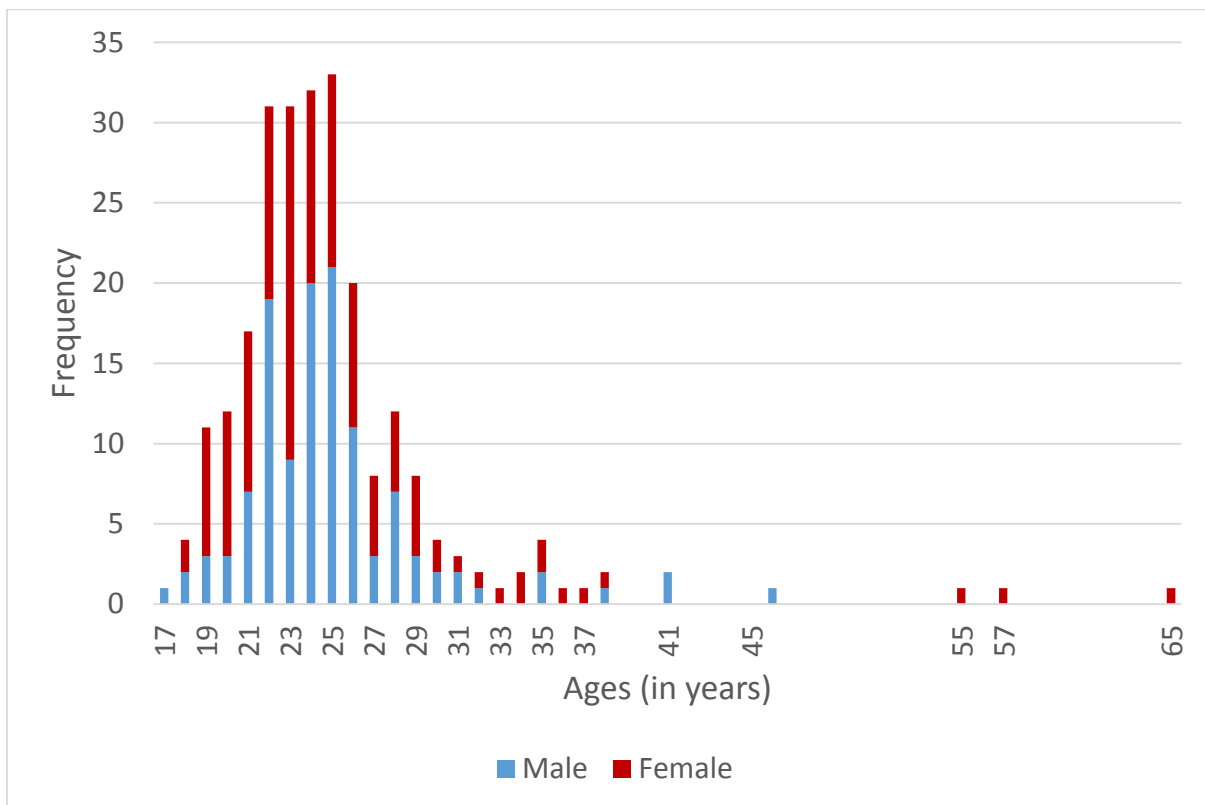
The mean attractiveness of the managers from the higher ranked firms is 7.00 and the mean of the managers in the lowest ranking firms is 6.24 out of 10. This means that the managers from the top 100 firms are more attractive than the managers from the bottom 100 firms which proves it is not possible to reject hypothesis 1. This uses the averages of the groups and does not account for the individual, but as groups this shows that the first hypothesis is correct and there is a difference in attractiveness in the two groups.

Next I tested hypothesis 2 checking for a difference in attractiveness between the genders of the managers. Using an independent sample t-test, I compared the genders to see which would be more attractive. The average attractiveness for men was 6.60 and for women it was 6.63. Once again the Levene's test for equality of variance, with a significance of 0.68, had insufficient evidence to conclude that the variances were not equal. The independent sample t-test had a significance of 0.943, which is higher than 0.05, which means I do not reject the null hypothesis that there is a difference in the groups. This means that male managers are equally attractive to female managers. This means that hypothesis 2 is rejected as the managers are comparably attractive.

The online survey should reveal personal preferences of the sample, which should reflect a greater population. The survey was filled out by 247 people. There are no missing values as



each question was mandatory. There were 120 males and 127 females. They ranged from 17 years old to 65 years old with a mean of 25 years and a standard deviation of 6 years. This means that most of the respondents were between 19 and 31 years old. Graph 1 below shows the distribution of age and gender of the respondents. This graph shows that the respondents represent a fair spread of ages and evenly represent genders of the respondents. This would mean that the sample is representative of the greater spread of the population, not only young students. The respondents were mostly Dutch (143 Dutch respondents), but there were also 66 European (non Dutch) respondents and 38 non-Europeans respondents. Most of the respondents were students. 164 respondents currently studying and 17 graduated in the last 3 months so will still count in the students category. The last 66 were not students. 200 people did not study in the marketing or behavioural economics field, while 47 did.



Graph 1: The distribution of the respondents according to their age and gender.

The respondents were asked a few questions at the end of the survey to control for some factors that may influence their responses. If they are currently students or not, if they have studied in their field of research before or if they are answering the questions on a smaller screen like a cell phone could have had an influence on their answers. These factors have been tested using independent sample t-tests separately to see if they changed the preferences of the respondent. Firstly I compared those that are currently students or have just graduated against those who

are not students and found that for 24 of the 25 questions they did not have different preferences. Only in one of the questions did the group choose differently. (See Appendix B for the Levene's test and t-test results.) This means that being a student or not will not change their preferences for attractiveness. The next test was done to see if studying in marketing or behavioural economics, the fields of this research, would influence the results. Similarly the groups differed in their preference for only 2 questions. In the other 23 questions the people who have studied in this field had the same preference as those who have not. (See Appendix C for the Levene's test and t-test results). This means that studying in this field of research would not change their preferences. Lastly the means of answering this survey was compared. 174 respondents answered on a laptop, while 73 used a cell phone. It was found that in 20 questions the preference of people who answered on a laptop did not differ to those who answered on a cell phone, while in 5 questions the preferences did change. (See Appendix D for the Levene's test and t-test results) This shows that what the respondent answered the survey on is not likely to have an influence on their choices.

The respondents cover a variety of different groups and having seen the breakdown of the respondents it is possible to conclude on the preferences of this diverse group though the conclusions will still pertain mostly to the Netherlands population. It is possible to test the third hypothesis with this sample as it is representative.

Each question in the survey is run through a one sample t-test to test if the respondents chose the manager from the top 100 firms more than half of the time ( $H_0: \mu=0.5$ ). If this is the case then it is possible that the manager from the top 100 firms is more attractive than the manager from the bottom 100. The results of the t-tests are shown in table 1 including if the majority of the respondents choose for the manager from the top 100 firms or the manager from the bottom 100 firms.

	Mean of the respondents' choices**	Preference made for the manager from the top firm or bottom firm or neither	T-test Significance
Question 1	0,78	Top firm	0,000*
Question 2	0,61	Top firm	0,000*
Question 3	0,26	Bottom firm	0,000*
Question 4	0,55	Neither	0,144
Question 5	0,45	Neither	0,144
Question 6	0,48	Neither	0,568
Question 7	0,30	Bottom firm	0,000*
Question 8	0,74	Top firm	0,000*
Question 9	0,73	Top firm	0,000*
Question 10	0,85	Top firm	0,000*
Question 11	0,36	Bottom firm	0,000*
Question 12	0,46	Neither	0,227
Question 13	0,53	Neither	0,409
Question 14	0,58	Top firm	0,009*
Question 15	0,21	Bottom firm	0,000*
Question 16	0,66	Top firm	0,000*
Question 17	0,34	Bottom firm	0,000*
Question 18	0,96	Top firm	0,000*
Question 19	0,48	Neither	0,568
Question 20	0,54	Neither	0,227
Question 21	0,85	Top firm	0,000*
Question 22	0,98	Top firm	0,000*
Question 23	0,36	Bottom firm	0,000*
Question 24	0,52	Neither	0,485
Question 25	0,55	Neither	0,144

Table 1: The t-test results for each of the survey questions

\*signify statistical significantly different from the mean of 0.5 when  $p < 0.05$ . Also note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.

In the table 1 above it shows that out of the 25 questions respondents only chose the manager from the top 100 firms 10 times (with a significant difference) as more attractive person. They actually chose the manager from the bottom 100 firms 6 times (with a significant result). 9 results were insignificant which means that the respondents could choose either way. This shows that there is not a very strong relationship between the respondents choice and the firm the manager comes from.

It is possible that there are influences of the respondent such as their gender or nationality, which would influence their responses to the questions. There are many questions that do not seem to have a strong popular choice for either manager as the most attractive in the pair so I will first test to see if gender plays a role in this decision. Independent sample t-tests were used to see if there is a significant difference between the preferences of managers according to males and females. The Levene's test was also used to check the assumption of equal variances for the t-test. In the cases that this assumption was not met the Welch t-test was used instead of the independent sample t-tests. Thus the significance recorded in the table below pertains to the t-test applicable according to the results of the Levene's test. The results of the effects of gender on the choices of attractiveness is shown in the table 2.

	Mean of the male respondents' choices**	Mean of the female respondents' choices**	Levene's test for equality of variance	Significance for if there is a difference between male and female respondents
Question 1	0.68	0.87	0.000*	0.000*
Question 2	0.56	0.66	0.003*	0.098
Question 3	0.27	0.25	0.600	0.793
Question 4	0.60	0.50	0.023*	0.102
Question 5	0.42	0.49	0.067	0.261
Question 6	0.50	0.46	0.439	0.579
Question 7	0.33	0.28	0.160	0.480
Question 8	0.73	0.75	0.600	0.793
Question 9	0.78	0.69	0.002*	0.112
Question 10	0.83	0.88	0.011*	0.209
Question 11	0.28	0.43	0.000*	0.009*
Question 12	0.45	0.47	0.496	0.725
Question 13	0.53	0.53	0.936	0.968
Question 14	0.45	.071	0.000*	0.000*
Question 15	0.18	0.25	0.003*	0.140
Question 16	0.70	0.62	0.011*	0.197
Question 17	0.32	0.35	0.213	0.533
Question 18	0.94	0.98	0.000*	0.080
Question 19	0.53	0.44	0.326	0.188
Question 20	0.43	0.64	0.032*	0.001*
Question 21	0.78	0.92	0.000*	0.002*
Question 22	0.98	0.98	0.889	0.944
Question 23	0.37	0.35	0.511	0.742
Question 24	0.60	0.45	0.137	0.017*
Question 25	0.53	0.56	0.439	0.686

Table 2: The difference in choices between female and male respondents.

\*signify statistical significance at  $p < 0.05$ . Note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.

Table 2 shows that respondents choice differently based on their gender for only 6 questions (question 1, 11, 14, 20, 21 and 24). This is by far less than half the questions so gender is not a big factor in the choices as expected. The respondent's gender will not determine their choices for 19 of the questions, which leads to the conclusions that the gender of the respondent is not the significant factor in their choices of attractiveness.

In order to understand if the nationality of the respondent plays a significant role in their choices I will test the groups against each other to see if they answer any questions differently. This is to test hypothesis 4 and to see if the conclusions made on this predominately Dutch sample can be extended to include other nationalities as well. First I will conduct a Levene's test for homogeneity of variances. If the question has homogeneity of variance then I will conduct a one way ANOVA using the three groups, Dutch, Europeans (excluding Dutch) and Non-Europeans to compare the mean answers to each question to see if their nationality will affect their preferences for attractiveness in the managers. If the assumption of equal variances is violated then I will conduct a Welch test to compare the means of the three groups. These three categories are independent of each other. The dependent variable in this case is the percentage of people in the group who picked the manager from the top 100 firms. This is a ratio variable. The significance reported relates to the test that was applicable according to the results of the Levene's test. The results are shown in the table 3.

	Mean of the Dutch respondents' choices**	Mean of the European respondents' choices (excluding Dutch)**	Mean of the Non-European respondents' choices**	Levene's test for equality of variance	Significance for if there is a difference between respondents
Question 1	0.78	0.83	0.66	0.001*	0.161
Question 2	0.63	0.58	0.61	0.403	0.761
Question 3	0.22	0.30	0.32	0.016*	0.350
Question 4	0.53	0.52	0.66	0.000*	0.305
Question 5	0.42	0.47	0.55	0.501	0.329
Question 6	0.49	0.47	0.47	0.855	0.960
Question 7	0.33	0.21	0.37	0.000*	0.127
Question 8	0.67	0.86	0.79	0.000*	0.005*
Question 9	0.78	0.59	0.76	0.000*	0.026*
Question 10	0.87	0.85	0.82	0.293	0.722
Question 11	0.27	0.45	0.53	0.000*	0.003*
Question 12	0.46	0.48	0.42	0.374	0.823
Question 13	0.52	0.52	0.55	0.660	0.933
Question 14	0.59	0.52	0.66	0.034*	0.341
Question 15	0.22	0.21	0.21	0.980	0.995
Question 16	0.66	0.68	0.61	0.366	0.722
Question 17	0.27	0.45	0.37	0.000*	0.042*
Question 18	0.97	0.97	0.95	0.495	0.836
Question 19	0.46	0.52	0.50	0.791	0.751
Question 20	0.52	0.55	0.61	0.055	0.625
Question 21	0.81	0.94	0.87	0.000*	0.018*
Question 22	0.97	1.00	0.97	0.008*	N.A.
Question 23	0.34	0.38	0.39	0.309	0.723
Question 24	0.47	0.56	0.66	0.001*	0.087
Question 25	0.55	0.50	0.61	0.154	0.573

Table 3: The differences in preferences from respondents from different nationalities.

\*signify statistical significance at  $p < 0.05$ . Note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.

N.A. – Not applicable because at least one group has a variance of 0 so the robust tests of equality of means cannot be performed.

Respondents to the survey from the Netherlands, Europe (excluding the Netherlands) and outside of Europe will have similar choices for attractiveness. The groups chose who is

attractive differently in only 5 of the questions (in questions 8, 9, 11, 17 and 21). This shows that for the most part nationality does not play a role in the choices for who is more attractive, which is expected. Hypothesis 4 is correct.

Finally I tested if there was a correlation in the two data sets. I compared the difference in the Anaface FAS of the managers with the percentage of respondents who chose for the manager from the top 100 firms minus the percentage who chose for the manager from the bottom 100 for a correlation.

According to the Pearson Correlation test there is not a correlation in the two data sets. The choice of the most attractive manager does not correlate with the Anaface FAS. The statistic for the test was -0.097, but it was not significant. The significance is 0.643 which is larger than 0.05, which means the null hypothesis of no correlation is not rejected. This means that hypothesis 5 is rejected and the two data sets are not comparable and do not draw the same conclusions about the attractiveness of the managers.

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## *Conclusions and Discussions*

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Attractiveness is a powerful trait for personal interactions. An attractive individual will have positive trait associations and better treatment because of their attractiveness. They may also have positive personality and behavioural traits. There are some negative associations with being attractive and it will cast doubt for some of the attractive on the depth of their relationships with people around them. Overall it seems pretty positive to be attractive. This paper looked into the possibility that attractiveness has effects on a larger scale. This has not been studied by many before. The theory of the effect of attractiveness is the basis of this paper. Following that the hypotheses were developed in a logical manager to be addressed in turn in the results and conclusion.

The methodology was elaborated on to describe the process of data collection and analysis for the two data sets used. Attractiveness is measurable and in this paper two measures of attractiveness were used. One was the unbiased estimation of attractiveness using Anaface and the other was the online survey using 247 respondents. This data was tested using various statistical analyses to address the hypotheses posed.



The first hypothesis is the rating of the managers in the top ranking firms of the Fortune 1000 is higher than the ratings of the managers in the lower ranking firms, measured with an objective attractiveness analysis program, Anaface. Looking at the Anaface results it is apparently that Anaface is not a reliable measure of attractiveness in that the results from the two times each manager was run through the program were not significantly close together. The scores for the same face were on average 0.32 points apart. All conclusions based on this data should be taken with this in mind as they are possibly based on unreliable results. Using the t-test comparing the average FAS of the two Anaface scores for the groups of managers it seems that they do differ in attractiveness. Managers from the higher ranking firms are on average 0.75 out of 10 points more attractive than managers from lower ranking firms. This is not a large difference between averages and since the Anaface results were not very precise it is not enough evidence to conclude that attractiveness in managers is definitely correlated to the firm's Fortune 1000 ranking, but it is possible.

Using the Anaface FAS I tested hypothesis 2 and found that the hypothesis is false. The hypothesis said that men in managerial positions are more attractive than the women in managerial positions, using objective measures. This is not the case as they are similar in attractiveness. The two groups had the same mean attractiveness. The males and females in senior management positions do not differ in attractiveness. If there is an effect of attractiveness on the managerial position gender will not influence that effect.

Anaface is not enough to address the main hypothesis. Attractiveness influences people and will be judged in the end by people. The survey results covered a wide demographic including a variety of ages, genders and nationalities. The survey included students and people who were not students. The sample reflects the greater population because of this variety. I found that factors like if they are students or not, if they had studied this field before or not, their gender or the device they used for filling out the survey all did not have a significant effect on their overall preferences. Hypothesis 3 stated: When asked to choose based on attractiveness, people choose the picture of the manager from the high ranking firm more often than the manager from the low ranking firm. There was not sufficient evidence to accept this hypothesis. It seems according to the sample that beauty is indeed in the eye of the beholder. There were slight trends as in more questions people chose the manager from the top ranking firms than questions where they chose the manager from the bottom ranking firms, but there was not a gross

difference in these. In 9 of the questions out of the 25 the respondents did not even have a preference. Hypothesis 3, therefore, cannot be accepted and I can conclude that the choice of who is attractive greatly differs from person to person.

The respondents did choose in a similar way when divided based on nationality, showing that they did not make their choice based on their nationality. This follows the theory that attractiveness is universal and is not divided by culture or country. For the majority of the questions the same percentage of the respondents chose the same person as more attractive regardless of being Dutch, European (non-Dutch) or Non-European. This means hypothesis 4 is correct and people do not make their choices of attractiveness based on nationality.

The final analysis looked at the correlation in the data sets and found that there was not a correlation between them. Hypothesis 5 stated that the analysis program, Anaface, and the survey results will reflect the same conclusions regarding the effect of attractiveness of managers on ranking in the Fortune 1000. This is incorrect and the attractiveness rating from the online program is not the same as who people find more attractive when given a choice of two managers. It is possible to see that without the correlation test as Anaface had small results in favour of a relationship between attractiveness and rankings in a firm and the survey showed no real evidence for a relationship. This could be because the data from the Anaface program is not a good representation of what is attractive. It could also be because the sample is not representative in some unknown way of actual behaviour. Perhaps the true measure of attractiveness is unconscious and would not show when asked directly for an opinion. It could also be that unbiased attractiveness, while measurable, is not actually an influence in personal choice and each individual measures attractiveness differently meaning that there cannot be a certain trend in the choices. Many studies showed that factors isolated measured attractiveness, but perhaps when they are all used together to judge attractiveness their power is lost.

Finally I draw conclusions on the he main hypothesis, which is:

**There is a correlation between the attractiveness of senior managers in firms on the Fortune 1000 list and their firm's rankings on that list.**

It is possible to conclude that the hypothesis might be true for the Anaface results, though the relationship is not very large and the FAS is unreliable as the results from the program might differ when repeated. There seems to be a correlation between the Anaface score and the firm that the manager belongs to as the managers from the top firms have a higher FAS than the

managers from the lower firms. It is impossible to claim causality though as there is no proof of time order or control for all moderating or mediating factors. This requires further study.

The survey showed that the main hypothesis is not true. People choose for attractiveness based on their own preferences and there was no correlation between their choices and the ranking of the firms. This means that if there is a factor of attractiveness, which would influence the ranking of the firm, it would have to either be unconscious or have other factors involved in order to take effect. There are many limitations of this study and of this field of study, which will be covered in the limitations section of the paper.

It seems that this field shows potential if there were a better measure of objective attractiveness than Anaface for reliable results. It is possible that there is a correlation between attractiveness and the ranking of a firm on the Fortune 1000, but there are too many uncontrolled factors to be certain. It might be comforting to know that people will still choose their preferences for attractiveness based on their own ideals and not on the measurements of Anaface and that this choice will not mean that it is not possible for an unattractive person to end up a manager of a firm on the Fortune 1000. Attractiveness has many positive benefits for an individual, but it seems that there is not certainty that running a company on the Fortune 1000 is one of those benefits.

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### *Limitations*

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There are many limitations to this paper and to the field of research. Firstly Anaface is not a reliable measure of attractiveness. The two tests that were conducted on each manager resulted in different scores. It might be possible to have a better average score if the manager is run through the analysis many more times, but it will still be an estimation of attractiveness and it is based on how a person places the markers on the pictures so will always have a human error factor. In the paper by Halford, J. T., & Hsu, S. H. (2014) they used Anaface 6 times on each picture and took the average of the results, but they never tested if that was an accurate measure. This may be a running problem through papers that use facial analysis software.

The pictures themselves might also be causing measurement errors. There were limited senior managers in each firm and thus very few pictures for analysis. It might be smarter to widen the

search by including more firms so that the pool of pictures is bigger. Anaface relies on the pictures being front facing and showing all the necessary features, which is not possible with the limited available resources. This could have caused the measurements to be an incorrect representation of the attractiveness of the person all together. There are many factors, such as light, facial traits like moustaches, hair or glasses, professionalism, which might play a role in the choices made on the survey. It was attempted to control for these when matching the pairs, but there may be unknown influences of these factors that are not able to be controlled for. For example perhaps a certain type of glasses improves a manager's attractiveness. There is also my bias in the survey as the pairs were based on who I thought matched based under the criteria. There could perhaps have been a more random pairing or a more equal matching which would have resulted in the survey showing a correlation after all. Unless all the managers were photographed by the same photographer under the same conditions with the same facial expression I think there will always be some influence that will be difficult to account for in this line of research. Other papers have tried to account for these differences like the paper by Halford, J. T., & Hsu, S. H. (2014), but there are always factors that could be controlled for that are missed.

The survey also did not account for a scale of attractiveness. Perhaps there would have been more correlation between the Anaface analysis and the survey choices if it was known how much more attractive the respondent found one person is over the other. Some respondents commented after the survey that they were choosing who they found least unattractive rather than who they found attractive.

This research also does not take into account a timeline of events. Perhaps the strongest link to revenue and thus to the position of the firm on the Fortune 1000 and the attractiveness of the manager is when the manager is announced and the six months that follow. It is suggested that in further research the timeline of changes should be accounted for. Perhaps attractiveness has a smaller effect on ranking, but there is a bump each time an attractive manager is given the senior position.

Since we are testing pictures of managers the external factors like personality or leadership do not factor in our analysis. It may be that the correlation between ranking on the Fortune 1000 and the attractiveness of the managers is attributed to better leadership or personality. These factors have already been mentioned (in the theoretical framework) to be positively correlated

with attractiveness in people's impressions of others. It might be likely that increases in attractiveness causes the managers to appear to be better leaders or they may simply be better leaders. This is a limitation of this paper as it is not possible with the resources available to test for the external factors that may play a role in the correlation.

The many limitations mean that there is much improvement to be made on this field of research before any conclusions are certain. There is a probability that there may be a relationship between attractive managers and the ranking of a firm on the Fortune 1000 if all the factors are controlled for, but this research with the limited resources could not account for all the possibilities.

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## Appendix A – Survey questions

The online survey design for the data collection showing the introduction to the survey, the first question of 25 similar questions and the demographics questions.

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### Survey

Honestly how attractive are they?

Thank you so much for taking the time to answer a few short questions for my master thesis.

In order to complete this project I need your honest opinion.

There are no right or wrong answers. I just want to know what you think.

For these next few questions simply choose which person you think is more attractive. Being attractive is subjective so go with your gut as to who you like more.

Some of the pictures have low quality. Please take this into account and try to focus on judging the faces and not the picture quality.

If it is possible please answer this survey on a laptop or computer.

Please take your time for each question. Your answers are so valuable to me so thank you for helping.

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**Person A**



**Person B**

Who do you think is more attractive?\*

- Person A
- Person B

**Just a few short questions about you.**

How old are you?\*

What is your gender?\*

- Female  
 Male

What is your nationality?\*

Are you a student?\*

- Yes, I am  
 No, I just graduated (in the last 3 months)  
 No, I am not a student

have you studied (or are currently studying) a degree or major in marketing or behavioural economics?\*

- Yes, I studied/ study a major in either  
 Yes I studied/ study a degree in either (masters, bachelors, etc)  
 No

How did you complete this survey?\*

- on a laptop or pc  
 on a cell phone

## *Appendix B – Influences of being a student*

Independent sample t-tests were used to see if there is a significant difference between the preferences of managers according to students and non-students. The Levene's test was used to check the assumption of equal variances for the t-test. In the cases that this assumption was not met the Welch t-test was used instead of the independent sample t-tests. Thus the significance recorded in the table below pertains to the t-test applicable according to the results of the Levene's test. The results of the affects of being a student on the choices of who is attractive is shown in the table below.

	Mean of the students' choices**	Mean of the non-students' choices**	Levene's test for equality of variance	Significance for if there is a difference between students and non-students
Question 1	0.78	0.76	0.381	0.654
Question 2	0.61	0.61	0.841	0.919
Question 3	0.24	0.30	0.075	0.343
Question 4	0.54	0.56	0.565	0.790
Question 5	0.47	0.41	0.056	0.400
Question 6	0.49	0.47	0.608	0.819
Question 7	0.27	0.39	0.002*	0.077
Question 8	0.72	0.79	0.032*	0.293
Question 9	0.75	0.67	0.016*	0.207
Question 10	0.88	0.79	0.001*	0.111
Question 11	0.35	0.36	0.775	0.885
Question 12	0.48	0.42	0.109	0.480
Question 13	0.54	0.48	0.570	0.433
Question 14	0.60	0.55	0.234	0.472
Question 15	0.21	0.23	0.565	0.770
Question 16	0.69	0.59	0.020*	0.182
Question 17	0.32	0.38	0.120	0.392
Question 18	0.96	0.98	0.028*	0.179
Question 19	0.49	0.47	0.608	0.819
Question 20	0.55	0.52	0.503	0.659
Question 21	0.87	0.82	0.061	0.334
Question 22	0.99	0.94	0.000*	0.110
Question 23	0.39	0.27	0.000*	0.087
Question 24	0.52	0.52	0.812	0.893
Question 25	0.49	0.70	0.000*	0.003*

\*signify statistical significance at  $p < 0.05$ . Note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.

## *Appendix C – Influences of studying in this field*

Independent sample t-tests were used to see if there is a significant difference between the preferences of managers according to people who have studied in behavioural economics or marketing and those that have not. The Levene's test was used to check the assumption of equal variances for the t-test. In the cases that this assumption was not met the Welch t-test was used instead of the independent sample t-tests. Thus the significance recorded in the table below pertains to the t-test applicable according to the results of the Levene's test. The

results of the affects of studying in this field of research on the choices of who is attractive is shown in the table below.

	Mean of the respondents' choices if they have not studied in this field**	Mean of the respondents' choices if they have studied in this field**	Levene's test for equality of variance	Significance for if there is a difference between respondents
Question 1	0.80	0.70	0.014*	0.209
Question 2	0.61	0.64	0.362	0.675
Question 3	0.26	0.28	0.556	0.762
Question 4	0.57	0.47	0.509	0.231
Question 5	0.47	0.40	0.060	0.454
Question 6	0.49	0.47	0.615	0.835
Question 7	0.31	0.30	0.847	0.924
Question 8	0.75	0.72	0.556	0.762
Question 9	0.73	0.74	0.577	0.786
Question 10	0.87	0.81	0.061	0.325
Question 11	0.36	0.34	0.601	0.802
Question 12	0.49	0.49	0.563	0.672
Question 13	0.53	0.51	0.724	0.812
Question 14	0.59	0.57	0.801	0.896
Question 15	0.19	0.32	0.001*	0.086
Question 16	0.65	0.70	0.139	0.499
Question 17	0.33	0.36	0.439	0.680
Question 18	0.97	0.96	0.622	0.805
Question 19	0.49	0.47	0.615	0.835
Question 20	0.50	0.70	0.000*	0.010*
Question 21	0.85	0.87	0.428	0.698
Question 22	0.97	1.00	0.014*	0.014*
Question 23	0.36	0.36	0.866	0.932
Question 24	0.51	0.57	0.046*	0.429
Question 25	0.54	0.57	0.315	0.671

\*signify statistical significance at  $p < 0.05$ . Note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.



## *Appendix D – Influences of different appliances used to answer the survey*

Independent sample t-tests were used to see if there is a significant difference between the preferences of managers according to which device people responded on. The Levene's test was used to check the assumption of equal variances for the t-test. In the cases that this assumption was not met the Welch t-test was used instead of the independent sample t-tests. Thus the significance recorded in the table below pertains to the t-test applicable according to the results of the Levene's test. The results of the affects of answering the survey on a laptop or cell phone on the choices of who is attractive is shown in the table below.

	Mean of the respondents' choices when using a cell phone**	Mean of the respondents' choices when using a laptop**	Levene's test for equality of variance	Significance for if there is a difference between respondents
Question 1	0.77	0.78	0.623	0.804
Question 2	0.68	0.58	0.001*	0.118
Question 3	0.21	0.28	0.008*	0.196
Question 4	0.56	0.54	0.511	0.759
Question 5	0.48	0.44	0.404	0.597
Question 6	0.44	0.50	0.104	0.378
Question 7	0.36	0.28	0.034*	0.261
Question 8	0.86	0.69	0.000*	0.001*
Question 9	0.77	0.71	0.067	0.382
Question 10	0.85	0.86	0.778	0.887
Question 11	0.53	0.28	0.000*	0.000*
Question 12	0.37	0.50	0.000*	0.059
Question 13	0.51	0.53	0.576	0.693
Question 14	0.67	0.55	0.000*	0.064
Question 15	0.37	0.15	0.000*	0.001*
Question 16	0.73	0.63	0.002*	0.145
Question 17	0.23	0.38	0.000*	0.019*
Question 18	0.97	0.96	0.325	0.625
Question 19	0.41	0.51	0.023*	0.149
Question 20	0.47	0.57	0.397	0.139
Question 21	0.88	0.84	0.188	0.519
Question 22	0.99	0.97	0.159	0.486
Question 23	0.41	0.33	0.044*	0.257
Question 24	0.42	0.56	0.718	0.047*
Question 25	0.60	0.52	0.014*	0.250

\*signify statistical significance at  $p < 0.05$ . Note that 0.000 is not necessarily 0, but can just be less than 0.0005.

\*\* The scale is from 0 to 1, where 1 means that 100% of respondents choose the manager from the top 100 firms and 0 means that 100% of the respondents choose the manager from the bottom 100 firms.