

AN ABSTRACT OF THE THESIS OF
Riley W. Kinser for the degree of Honors Baccalaureate of Science in Finance and
Honors Baccalaureate of Science in Accountancy presented on May 16, 2014. Title: The
Bold and the Beautiful.

Abstract Approved: _____

John Becker-Blease

This study looks at whether two physical characteristics, physical attractiveness and perceived competence, have an impact on student analysts finding large discrepancies between current price and target price. Equity reports published online by undergraduate and MBA students involved in student investment clubs and portfolio management classes are combined with pictures of the student analysts from their university's archives. These pictures are then rated on attractiveness and competence. I use this data to construct a model to predict an analyst's discrepancy between current price and target price. I find four noteworthy results. At the 5% significance level, analysts ranked in the top 10% in attractiveness are more likely to publish equity reports finding large discrepancies between current price and target price. At the 1% significance level, analysts ranked in the top 10% in perceived competence are more likely to publish equity reports finding large discrepancies between current price and target price. At the 1% significance level, as analysts gain experience in publishing equity reports the discrepancies they find decrease. At the 10% significance level, men find larger discrepancies between current price and target price than women.

Key words: overconfidence, physical attractiveness, competence, student managed funds

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MAY 16, 2014

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The Bold and the Beautiful

By

Riley Kinser

A PROJECT

Submitted to

Oregon State University

University Honors College

In partial fulfillment of

The requirements for the degree of

Honors Baccalaureate of Science in Finance (Honors Scholar)

Honors Baccalaureate of Science in Accountancy (Honors Scholar)

Presented May 16, 2014

Commencement June 14, 2014

Honors Baccalaureate of Science in Finance and Honors Baccalaureate of Science in Accountancy project of Riley Kinser presented on May 16, 2014.

APPROVED:

John Becker-Blease, Mentor, representing Finance

Prem Mathew, Committee Member, representing Finance

Jimmy Yang, Committee Member, representing Finance

Toni Doolen, Dean, University Honors College

I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Riley Kinser, Author

ACKNOWLEDGMENTS

I would first like to thank my advisor, John Becker-Blease, for his patience and his mentorship throughout this entire project. A big thank you to my research team for all their help scoring pictures (Jesselynn Amerling, Kate Anderson, Mallory Bailey, Nathan Berkely, Sarah Croy, Susan Dunham, Emily Durr, Jacob Hampton, Blake Hendricks, Alex Hoffer, Jordan Hopper, Flora Hsu, Michelle Hulquist, Jessica Kim, Cara Kinser, Raquel Kinser, Reid Kinser, Jakob Kloewer, Chris Koenig, Kendl Leichty, Liana Louie, Alex Markgraff, Travis McMasters, Katie Merrill, Lisa Nelson, Chase Norlin, Ashleigh Pilkerton, Athena Proctor, Jane Ropp, Sarah Rudzik, James Tooze, Jacob White, Ashley Wolff, Van Wong.) I would also like to thank my committee members, Prem Mathew and Jimmy Yang for their feedback, support, and flexibility in the final stages of my thesis.

Finally I would also like to thank my parents, Ralph and Cara Kinser, my girlfriend, Michelle, and my friends for their love and support throughout my entire college experience.

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The Bold and the Beautiful

I. Introduction

“If they’re not a CFP pro, you just don’t know.” states the tagline of the 2014 advertising campaign by the Certified Financial Planner Board of Standards. While their ads play out as a funny, reality TV-esque situation where individuals seeking financial advice are duped into trusting a disc jockey, the ads highlight the problem of how looks can be deceiving. Using only physical appearance, individuals can form a variety of opinions of others ranging from how physically attractive someone is to how competent they anticipate them to be. These judgments we make of others likely plays a subtle, yet important, role in how we interact with each other. Perhaps over the course of a lifetime these subtle judgments others place upon us shape our own self-confidence. If these subtle differences in how we interact with each other have a cumulative effect it is possible we would see individuals who are perceived to be extremely attractive or extremely competent becoming overconfident in themselves. One way to examine this is by looking at an individual’s financial decisions to see if their physical appearance plays a role in the kinds of investment recommendations they issue.

Classic economic theory has largely evolved around the notion of rational behavior on the part of market participants. While individuals may behave in irrational ways, researchers and theorists have long assumed the “average” investor is rational. However, over the past two decades, the field of Behavioral Finance evolved, drawing into question whether markets are indeed dominated by rational decision-making. One suspected source of investor irrationality revolves around overconfidence. Since the first financial markets, overconfidence has been the bane of investors and speculators alike.

While similar to confidence, which can be described as a realistic awareness of one's abilities or accuracy of information, overconfidence refers to an overly optimistic assessment of one's abilities or accuracy of information. Prior research has found overconfidence has a deleterious effect on investors' wealth due to excessive trading and poor risk-reward allocations, resulting in poor relative returns (Barber and Odean, 2001).

The sources of overconfidence remain difficult to identify. Past research has suggested gender, attributional biases, genetics, experience, and education can influence overconfidence (Biais, Hilton, and Mazurier's, 2005; Grinblatt and Keloharju, 2009; Menkhoff, Schmeling, and Schmidt, 2013). In this thesis, I will examine an additional potential source of overconfidence, namely physical appearance. The first facet of physical appearance I will take into consideration is physical attractiveness. Physical attractiveness is a long sought after trait by individuals; examples of individuals and even whole societies modifying themselves to improve their aesthetic appearance are abundant. One common explanation for this phenomenon is to improve confidence in oneself. The second facet of physical appearance I will examine is competence. Individuals who appear to have greater cognitive ability may also be treated differently similar to those who are physically attractive.

The clothes we wear, the haircuts we choose, and how we decorate our body has also been shown to impact the way we perceive an individual's competence (Johnson and Roach-Higgins, 1987; Paek, 1986; Reed and Blunk, 1990). The "CFP Pro" advertising campaign is a good example of how the appearance of competence can play a large role in interactions. Individuals who are or feel attractive or competent may be less insecure

and, as a result, have greater self-confidence that may carry over into other aspects of their lives and evolving into overconfidence.

In this paper I will explore this hypothesis using data collected from student investment clubs and classes that manage real-money portfolios. Students in these classes and clubs act as equity researchers publishing reports and recommendations on companies. These reports, as well as pictures of the analysts, are publicly available online hosted on their university's website which makes them easily accessible. Using these pictures I am able to assess physical attractiveness and perceived competence through the use of a panel of raters. Through performing multivariate regressions I am able to find statistically significant results for both physical attractiveness and perceived competence.

I find four noteworthy results. At the 5% significance level, analysts ranked in the top 10% in attractiveness are more likely to publish equity reports finding large discrepancies between current price and target price. At the 1% significance level, analysts ranked in the top 10% in perceived competence are more likely to publish equity reports finding large discrepancies between current price and target price. At the 1% significance level, as analysts gain experience in publishing equity reports the discrepancies they find decrease. At the 10% significance level, men find larger discrepancies between current price and target price than women.

The paper is organized as follows. The next section provides a brief literature review of relevant works relating to overconfidence, interpreting traits based on appearance, and previous studies on the correlation between physical appearance and success in the labor market, CEOs, and democratic elections. Section III contains the hypothesis development. Section IV provides the data and presents the methodology used

in this paper. Section V provides my results. Section VI discusses opportunities for future research. Finally, Section VII contains some concluding remarks.

II. Literature Review

The effects of overconfidence on investment decision making are a well-known danger to investors. For example, Barber and Odean (2001) investigate a possible explanation for the large volume of trading seen in the New York Stock Exchange in 1998 which produced a turnover rate of 76%. Rather than this trading being entirely the result of rational investors seeking to rebalance portfolios, minimize taxes, or make additions/withdrawals from their portfolios the authors hypothesize that overconfident speculative traders may be responsible. Psychologists had previously found men are more overconfident than women in areas such as finance, which led Barber and Odean to hypothesize men would trade more frequently than women and as a result be financially hurt by their excessive trading. To test this hypothesis, the authors used trading records for 37,664 households from a large discount brokerage firm. Barber and Odean find the average turnover rate of equities for men was nearly 1.5 times that of women and while both men and women reduce their possible returns through excessive trading, men tend to do so by 94 basis points more per year than women. Furthermore single men tend to trade 67% more often than single women which reduce single men's returns by 144 basis points per year compared to single women.

While Barber and Odean (2001) explore overconfidence in the form of one's belief they have better information/are smarter than everyone else, Biaisi, Hilton, and Mazurier (2005) investigate the intensity of overconfidence in judgment decisions. Biaisi

et al evaluated this form of overconfidence through the miscalibration of the precision of one's information, as well as self-monitoring, through attentiveness to social cues. Using 245 participants from Toulouse University and the London Business School and an experimental financial market game with asymmetric information, the authors tested their hypothesis that miscalibrated traders would be vulnerable to the winner's curse and that self-monitors would behave strategically to achieve superior results. Biais et al find men tend to trade more often than women similar to Barber and Odean (2001) but there was no correlation between gender and miscalibration in their study. Furthermore, when Biais et al split their data by gender they find miscalibration does not hurt the performance of women but does lead to worse performance in men.

Overconfidence is not the root of irrational decision making. Rather it is the manifestation of an unknown number of sources (Barber and Odean, 2001; Grinblatt and Keloharju, 2009; Menkhoff, Schmeling, and Schmidt, 2013). Individuals who are sensation seekers tend to also show signs of overconfidence in their investment decisions. For example, Grinblatt and Keloharju (2009) investigate the role sensation seeking and overconfidence play in how often investors trade stocks. To test whether sensation seeking and overconfidence play a role in stock trading frequency Grinblatt and Keloharju link together data from a variety of sources including: Finnish Central Securities Depository certificates of stock ownership and trades data of households domiciled in Finland, Helsinki Exchange stock market data, Finnish Vehicle Administration driver data, Finnish Armed Forces psychological profiles, and data from the Finnish Tax Administration. The authors mined the Finnish Vehicle Administration driver data for speeding-related tickets which was used to measure individuals' degree of

sensation seeking. Finnish Armed Forces psychological profiles included a leadership inventory assessment which provided 8 scales of leadership including self-confidence. This self-confidence measure was converted into an overconfidence measure using regression techniques for shareholders with driver's licenses prior the creation of the Finnish Vehicle Administration database. The authors found those who received more speeding tickets (sensation seekers) and those who exhibited more overconfidence according to the psychological assessment tend to trade more often. While measures of sensation seeking via driving records were correlated with gender it did not account for differences in gender trading activity.

As individuals gain more experience in financial markets however their overconfidence tends to diminish. For instance, Menkhoff, Schmeling, and Schmidt (2013) investigate whether observed behavioral biases such as overconfidence tend to disappear with increased experience to financial markets or if they persist throughout life. To test this, Menkhoff et al perform an online-experiment using individual investors (non-professionals), institutional investors (professionals), and investment advisors (professionals) where the subjects were asked to create estimates for two major stock indices and create confidence intervals for their recommendation. After which the participants were asked to evaluate their own personal performance in comparison to other investors. After analyzing the results of the survey comprising 496 subjects the authors find systematic differences in overconfidence between the two professional groups, investment advisors being the most overconfident. More interestingly, the authors find although increased experience reduces miscalibration overconfidence, miscalibration

overconfidence increases with age. These findings also indicate experience cannot be simply approximated by professionalism or age.

While the effects over the course of a lifetime are subtle, one's physical appearance may have a significant impact on one's self-perception. Stereotypes are likely a common experience for most individuals, and first impressions can be important. The experiences that shape an individual begin immediately after being born and the experiences individuals have with their peers may have a large impact on how they view themselves later in their adult life. For example, Cogsdill, Todorov, Spelke, and Banaji (2014) investigate whether young children could infer character traits from pictures of faces similar to adults and at what age adult-like responses developed. Adults and children ages 3 – 10 years old viewed computer generated pictures that were either designed to be high or low in levels of perceived trustworthiness, dominance, and competence. Faces of opposing levels of a trait were presented together and then participants were asked which face appeared high or low in that particular trait. In the first experiment, 141 children ages 3 – 10 participated in person at local museums and in the laboratory while 99 adults participated online. Although 3 and 4 year olds responded with robust adult-like consensus they were less consistent than 5 and 6 year olds or 7 – 10 year olds. A second similar experiment with 213 children ages 3 – 10 and 301 adults found similar results to experiment one. In summary, children even at the earliest age of 3 make reliable inferences about character similar to adults and by age 7 children show a level of consensus equaling adults.

In addition to children as young as three being able to make adult-level judgments of personality based on facial appearance, research suggests one's face is not likely to

change significantly over the course of their lifetime. For instance, Adams (1977) investigates how an individual's perceived beauty changed over the course of their life. To explore the continuity of beauty across time Adams performed two tests, the first with photos of children as they progressed from Kindergarten to 6th Grade and the second with adults at three stages of their life: adolescence, young and married, and middle aged. These pictures were rated by groups of female college students for facial attractiveness in children and facial and body attractiveness in adults. Adams finds that while body attractiveness was prone to changing over time facial attractiveness changed slowly and was not prone to major changes in evaluation. This work also reconfirms previous research suggesting individuals hold a common standard of attractiveness.

People's naive judgments of other's character and personality traits are not baseless. In fact, these naive assessments can accurately infer some personality traits associated with risk-taking. For instance, Mishra and Sritharan (2012) investigate whether people could accurately infer other's personality traits associated with risk taking using facial photographs. To test this hypothesis Mishra and Sritharan used a group of 58 men and 57 women from an undergraduate psychology class at the University of Lethbridge. These participants completed the *Zuckerman's Sensation-Seeking Scale*, *Eysenck's Impulsivity Scale*, *Retrospective Behavioral Self-Control Scale*, and the *Domain-Specific Risk Taking Scale* to assess personality traits associated with risk-taking, next participants participated in a future discounting problem, and finally participants completed the *Problem Gambling Severity Index* to assess gambling tendencies. After participation in the various tests a photograph of each participant was taken which was shown to a panel of 19 men and 23 women who rated each picture on a

scale of 1 – 10 for perceived willingness to take on risk. A third panel of 12 men and 19 women also rated the pictures on a scale of 1 – 10 for physical attractiveness. The authors find that on average, pictures rated for risk-propensity are significantly correlated with personality traits associated with risk-taking, future discounting, and problem gambling and marginally correlated with general gambling tendencies. Attractiveness and gender do not seem to affect risky personality traits or future discounting but gender does play a role in accounting for variance in problem gambling and general gambling.

Similar to the previous paper, Ball, Eckel, and Heracleous (2010) investigate whether physical ability influenced both perceived and actual gender differences. Using a simple lottery-choice experiment the authors were able to measure the risk aversion tendencies of participants. This experiment included six gambling options of varying risk and return and included making predictions about other participant's choices. Physical ability was measured through four different metrics: hand strength, physical health as a function of height, weight, perceived strength and attractiveness, self-perceptions of athleticism, and finally personality-based measures of strength. The authors find participants are able to accurately predict men choose riskier gambles but they exaggerate the differences between genders greatly. They also find both men and women underestimated their target's risk tolerance and that a participant making a prediction about another participant was largely based on their own choices. Most importantly the authors find that participants predicted riskier choices for other participants that appeared attractive while in-fact more attractive persons choose less-risky options on average. Their research also reconfirmed previous studies indicating women are more risk-averse

than men, physically weaker people are more risk-averse than stronger people, and people with “Type-A” personalities favor higher risk choices.

Researchers have also found physical appearance has an impact on individuals’ success in the labor market. This beauty premium rewards physically attractive individuals despite there being little evidence they are more productive than their unattractive counterparts. For instance, Hamermesh and Biddle (1994) investigate the impact physical appearance has on an individual’s earnings ability. Hamermesh and Biddle utilized the 1977 Quality of Employment Survey with 1,515 workers, the 1971 Quality of American Life survey with 2,164 respondents, and the 1981 Canadian Quality of Life study with 3,415 observations which included data on respondents’ looks and position in the labor market to assess the effects of physical appearance on participants’ position within the labor market. From these surveys Hamermesh and Biddle obtained hourly earnings and categorized respondents’ appearance by below average, average, and above average. Upon analyzing the datasets together, the authors find evidence that both physical attractiveness has a positive impact on earnings and that more attractive workers earn a premium in wages over just average workers. The authors also find evidence that the labor market sorts better-looking people into occupations where physical appearance may improve productivity.

In a follow up study, Biddle and Hamermesh (1998) investigate the economic effect of beauty on individuals’ earnings. Biddle and Hamermesh used a relatively homogeneous group comprised of graduates from a single law school and then measured earnings differentials and differences in physical attractiveness. This data set utilized the school’s follow-up surveys of their past students’ career progress 5 and 15 years after

graduation and linked it with published books of photographs of incoming students between 1969 and 1984. Pictures were rated independently by 4 raters, a male under 35, a female under 35, a male 35 or older, and a female 35 or older on a scale of 1 – 5. The data set included over 4,400 students. Biddle and Hamermesh find strong evidence beauty was not only correlated, but was actually the source of the differences seen in earnings within their sample.

Similarly, Mobius and Rosenblat (2006) also investigate the beauty premium appearing during wage negotiation in an experimental labor market where physical attractiveness has no effect on performance. To test this, the authors used undergraduate and graduate students from Tucuman, Argentina and divided them into groups of “workers” and “employers” where workers were paid to solve as many computer mazes as possible in 15 minutes. Employers would then estimate the productivity of workers and set wages. Visual and oral interaction was varied between workers and employers and workers were asked to estimate their future productivity after solving the maze the first time. Mobius and Rosenblat find physically attractive workers appear more confident and as a result receive increased wages under the oral interaction even after controlling for worker confidence and other characteristics.

In addition to physical attractiveness, perceived competence has also been found to be an important trait in determining an individual’s success as a CEO. CEOs who are more competent looking are more likely to run larger companies and earn larger salaries. For instance, Rule and Ambady (2008) investigate the relationship between physical appearance and CEOs’ company performance. To test this, Rule and Ambady asked 100 undergraduates in an introductory psychology class to view photos of CEOs of the 25

largest and smallest companies in the 2006 Fortune 1,000 and rate them on competence, dominance, likeability, facial maturity, and trustworthiness using a 7-point scale. A second group of 34 participants were asked to rate physical attractiveness separately. Rule and Ambady then examined whether these judgments by participants had any relation to the companies' financial performance as measured by revenues and profits for 2004 through 2006. Rule and Ambady find that after controlling for age, affect, and attractiveness, CEO's faces with high ratings of power-related traits (competence, dominance, and facial maturity) are significantly related to company profits. Interestingly, participant ratings of CEO's perceived leadership ability is also strongly correlated to company profits but is not strongly correlated to power-related traits. After controlling for leadership, power-related traits are still statistically significant at predicting profits suggesting that perception of leadership is not related to perceived power.

In a similar study, Graham, Harvey, and Puri (2014) investigate the relationship between facial traits and the compensation/performance of CEOs. Through a series of three online experiments the authors utilized 2,000 participants to compare facial features of CEOs to a control group of non-CEOs with the similar age, race and gender. The first experiment compared CEOs and non-CEOs in a pair-wise comparison on 4 dimensions: beauty, competence, trustworthiness, and likeability. The second experiment compared large firm CEOs to CEOs of small firms on those same 4 dimensions. Finally, the third experiment asked 230 university students to rank each CEO on a scale of 1 to 5 for the 4 dimensions. Because competence had been shown to be the most important factor in the research thus far and beauty had been shown to be an important factor in previous studies

the authors recruited an additional 208 university students to focus purely on competence and beauty. The authors find that both CEOs are perceived to look more competent than non-CEOs and large firm CEOs are perceived to be more competent than small firm CEOs. Furthermore, these results are reflected in CEO compensation where one standard deviation increase in the appearance of competence is associated with an 11-14% increase in total compensation. However more competent looking CEOs do not appear to run their companies better than less competent looking CEOs. Finally, when separating the CEOs into internal vs external hires the authors find externally hired CEOs were more strongly correlated with appearance and compensation than were internally hired CEOs.

Both physical attractiveness and perceived competence have been found to play a role in election outcomes despite voters saying they believe other attributes to be more important. For example, Todorov, Mandisodza, Goren, and Hall (2005) investigate how inferences of traits can be developed with only a 1-second exposure to pictures of faces and how it may influence decision making. To test this, the authors asked naive participants to rate candidates for the U.S. Senate and House between 2000 and 2004 on competence. Participants were presented with pairs of black-and-white head shots of the winners and runners up and asked to identify which person was more competent looking with only 1-second exposure to the images. Then in a second test the authors asked participants to rate each candidate on competence, trustworthiness, intelligence, leadership, honest, charisma, and likeability. Finally participants were asked which candidate they would have voted for in a political election. Todorov et al find the candidates perceived to be more competent won 71.6% of Senate races and 66.8% of

House races and when participants were limited to 1-second exposure perceived competence correctly predict 67.6% of actual Senate results.

In another similar example, Sussman, Petkova, and Todorov (2013) investigate whether naive participants' ratings of facial appearance could predict the winners of an election when there was a wide range of candidates. The authors recruited 223 U.S. residents via *Amazon Mechanical Turk* to rate pictures of the eighteen 2011 Bulgarian presidential candidates on competence, dominance, honesty, likeability, and physical attractiveness. These attributes were selected by collecting data from 140 respondents across 7 regions within Bulgaria over the Internet and then asking 1020 Bulgarian respondents in person which attribute they felt was most important. U.S. participants were asked to rate the candidates on only one attribute using a 5-point scale and then rate them on how likely they would be to vote for them for public office on a 7-point scale. Sussman et al find perceived competence is the best indicator of both actual and hypothetical election outcomes. This was despite the fact that the other metrics which were selected by Bulgarian voters as traits they value most in their President had been included.

III. Hypothesis Development

Overconfidence as a general source of irrational human behavior is a well-documented human trait within the field of psychology (Lichtenstein, Fischhoff, Phillips, 1982; Keren, 1991). Prior to Barber and Odean investigating it as a possible explanation for high market turnover, little had been published on the topic relating to investment

decision making. Barber and Odean (2001) speculated that because previous psychologists had found men to be more overconfident than women in areas such as finance then perhaps men might trade more frequently because of their overconfidence in their own ability. This hypothesis was found not only true but that this excessive trading was also hazardous to investor returns to the tune of single men underperforming single women by 144 basis points per year on average due to their frequent trading. Biais, Hilton, and Mazurier (2005) further investigated the intensity of overconfidence in a controlled environment using an experimental financial market. Biais, Hilton, and Mazurier's (2005) work confirmed that of Barber and Odean (2001) finding participants who miscalibrated the precision of their information took excessive risk leading to worse performance on average, but they also found gender was not correlated to miscalibration. Grinblatt and Keloharju (2009) further connected the role between overconfidence and risk taking finding subjects who received more speeding tickets (sensation seekers) and those that exhibited greater overconfidence via psychological assessment tended to trade excessively as well. In a study of investment professionals and individual investors Menkhoff, Schmeling, and Schmidt (2013) found that while experience led investors to be less overconfident in their abilities, age worked against them by increasing the miscalibration of their own information's precision. These studies suggest overconfidence has a detrimental impact on investor wealth and may stem from multiple sources.

A recent study by Cogsdill, Todorov, Spelke, and Banaji (2014) investigating children's ability to infer character traits from pictures of faces found that children as young as 3 were able to identify trustworthiness, dominance, and competence with robust

adult-like consensus which only continued to improve with age. This suggests the ability to infer traits from facial features develops early in child development and without significant social interaction. And physical appearance changes slowly, Adams (1977) investigated how beauty changes over time through childhood (Kindergarten to 6th grade) and through stages of adulthood finding that while body attractiveness could change drastically over time facial attractiveness was much slower to change and remained relatively consistent over a lifetime. This research also reconfirmed previous studies finding that individuals hold a common standard of attractiveness.

Mishra and Sritharan (2012) found naive judgments of personality based on pictures correlate actual personality traits associated with risk-taking, future discounting, and problem gambling as well as marginally correlated tendencies towards general gambling. A similar study by Ball, Eckel, and Heracleous (2010) reconfirmed previous studies, finding women are more risk-averse than men, physically weaker people are more risk-averse than physically stronger people, and Type-A personality individuals favor greater risk. Most interestingly Ball, Eckel, and Heracleous (2010) found physically attractive people are perceived to favor riskier decisions when in fact they make less risky decisions on average.

The effects of physical attractiveness and perceived competence on individuals' success have been well documented. Hamermesh and Biddle (1994 & 1998) as well as Mobius and Rosenblat (2006) each observed evidence of a beauty premium in the labor market where physically attractive employees earn more than their less attractive counterparts. While explanations such as the labor-market self-sorting might explain the findings of Hamermesh and Biddle it fails to explain the beauty premium identified in

Mobius and Rosenblat's controlled experimental labor market. Instead Mobius and Rosenblat proposed their beauty premium is a result of attractive workers having greater confidence in their abilities despite physical attractiveness having no effect on performance in the experimental labor market. Rule and Ambady (2008) investigated the relationship between CEO physical appearance and company performance finding that CEOs faces with high ratings in power-related traits (competence, dominance, and facial maturity) are strongly correlated with greater company profits after controlling for age, affect, attractiveness, and perceived leadership ability. A follow up study by Graham, Harvey, and Puri (2014) further refined the work of Rule and Ambady finding CEOs are perceived to be more competent than non-CEOs and large-firm CEOs are perceived to be more competent than small-firm CEOs. Graham, Harvey, and Puri also find one standard deviation of increased perceived competence correlates with an 11-14% increase in total compensation despite there being no evidence they ran their companies more effectively. Perceived competence has also been found to play a role in political election outcomes. Todorov, Mandisodza, Goren, and Hall (2005) found that given a 1-second exposure to a photo, survey participants could identify the most competent looking candidate which correctly predicted 66.8 – 71.6% of the actual winners in democratic elections. A similar study by Sussman, Petkova, and Todorov (2013) found that ratings of perceived competence is a better indicator of actual and hypothetical election outcomes in the 2011 Bulgarian Presidential election than are ratings of perceived attributes singled out by Bulgarian voters as most important.

Recognizing one's physical appearance changes slowly over a lifetime, perceptions of physical attractiveness are relatively common, and the ability to infer

character traits from facial features develops at a young age I hypothesize that individuals who are perceived to be physically attractive or competent looking may develop a stronger sense of self-confidence which manifests as overconfidence.

IV. Data/Methodology

To test this hypothesis I opted to use publicly available equity research reports and photos of undergraduate and graduate level students participating in university investment clubs and student portfolio management classes all of which involved real money portfolios ranging in value from \$1,000,000 to \$3,500,000. This data provides a number of benefits. First, the students all manage a substantial amount of real money which suggests a certain degree of responsibility among the students to make rational and well thought out decisions. Second, the data provides access to a relatively consistent age and experience group of undergraduate students which is important as age and experience have been found to impact an investor's overconfidence. The data also provides a sizeable MBA population with which to compare to the undergraduate population. Third, the data is easily and publically accessible extending over a number of years making it an advantageous data rich group to explore. The students within this sample likely have a strong likelihood to pursue careers in the financial sector upon graduating; finding bias here may suggest bias within the professional equity research profession.

Data

Student Group Selection

In a preliminary search I uncovered few private schools which shared information about their student investment clubs and courses online. This led me to target public schools exclusively. Using the U.S. News & World Report *2014 Top Public Schools* list, I identified 122 public schools in the U.S. from which to collect data. Using Google's search engine, each school was methodically searched for along with the words "Student Investment Group," "Student Investment Club," and "Student Managed Funds" and then the first page of results for each search was scoured for any information related to student groups. From that process, 9 schools were identified as having student investment clubs or classes with an active website containing pictures and equity reports. These 9 schools were analyzed more closely to assess the quality of the information and ultimately narrowed down to 4 schools with large databases of pictures and reports. These schools were the University of Connecticut, University of Illinois - Urbana-Champaign, University of Iowa, and the University of Oregon.

Equity Reports

I was able to collect 965 total equity reports from the four universities. These equity reports were all converted to PDFs and then anonymized for security. Reports were then searched through by hand for the following information: University Name, Date, Company Name, Current Price, Valuation Methodologies Used and Intrinsic Value (Discounted Cash Flows Model, Comparable Model, Dividend Discount Model, Residual income Model, Price / Earnings Ratio Models), Target Price, Analyst Recommendation,

and Author(s) Name. Reports missing authors, target prices, current price/date, or corresponding analyst picture had to be removed from the sample. This left 741 total equity reports which were about evenly distributed across each university.

Pictures of Student Analysts

I was able to collect 569 pictures of analysts from the four universities. These pictures were all anonymized for security after authors had been linked to their corresponding equity reports. After removing pictures which did not have a corresponding equity report, I was left with a sample of 482 photographs including 16 duplicates all from a single school. These pictures were coded by hand with the following information: University Name, Date (if available), Gender, Ethnicity, Dress (Business Formal or Casual), and Picture Clarity, then saved into PowerPoint for the research team to evaluate.

Methodology

Picture Rating

Pictures were separated across three PowerPoint files with 177 pictures or less in each PowerPoint. Corresponding Excel spreadsheets were also made to go alongside the PowerPoint files which members of the research team used to input ratings of pictures' perceived competence and physical attractiveness. Both physical attractiveness and perceived competence were rated on a scale of 1 to 5, 1 being "Not Competent" or "Not Attractive" and 5 being "Very Competent" or "Very Attractive." Raters were also asked to manually type the code of the picture every 25 images to ensure they were rating the

correct picture. Research team raters were asked to rate the PowerPoint file corresponding to their birthday: January – April reviewing PowerPoint 1, May – August reviewing PowerPoint 2, and September – December reviewing PowerPoint 3. The Research team was comprised of 35 members (20 female, 15 male; 29 Caucasian, 6 Asian) ranging in age from 16 to 51 and were almost all personally known by the researchers. Raters were asked only to complete one PowerPoint file but were allowed to complete additional files if they desired. Raters spent on average approximately 1 hour completing each PowerPoint file. Three raters' data were removed from the aggregate results because they were found to be extremely gender biased. These raters systematically rated pictures of the opposite gender above average while rating pictures of their gender below average distorting the results.

Analysis

Using these data, I perform an ordinary least squares regression where the margin of safety (calculated as the difference between target price and current price divided by current price) is dependent on physical attractiveness, perceived competence, gender, race, and MBA status. I first perform a regression using attractiveness and perceived competence as continuous variables and find no significant results. However, it is possible these signs of overconfidence are not smooth or continuous, perhaps there is a threshold that when crossed where individuals suddenly perceive themselves to be “attractive” or “competent” and begin to exhibit signs of overconfidence. I perform OLS models looking at the top and bottom quartiles and deciles reprocessing attractiveness and perceived competence as dummy variables that take the value of one for individuals

within the target of the regression. The quartiles and bottom decile provide no interesting results however the top decile provides significant results.

To further investigate these results and in an attempt to better control for experience I decided to perform the top decile OLS models again looking only at analysts first reports and then at their last reports. A fourth model evaluating the top decile was also performed using each analyst's average margin of safety in an attempt to control the issue to experience.

V. Results

Table 1 reports a variety of inter-rater reliability statistics including Fleiss' Kappa, Krippendorff's Alpha, and Intra-Class Correlation Coefficient. These results provide an important disclaimer on my further results indicating poor inter-rater consensus. However while normally these results would indicate an unreliable source of data I believe in this use they actually indicate two things. First this data has substantial deviation within it among raters; this should weaken our ability to find significance. Second, and perhaps more importantly, this dataset is simply too small. This can be seen by how large the 95% confidence interval is. Had I been able to increase the size of my rater pool I believe it is likely that these coefficients would have increased and the confidence interval would have narrowed significantly.

Table 1: Inter-rater reproducibility

	Coefficients			CI 95% (ICC)
	Fleiss' Kappa	Krippendorff's Alpha	ICC	
Survey 1				
Competence	.05	.05	.19	.12 - .59
Attractiveness	.10	.11	.40	.30 - .78
Survey 2				
Competence	.04	.04	.16	.10 - .55
Attractiveness	.13	.13	.41	.27 - .79
Survey 3				
Competence	.06	.06	.20	.62 - .11
Attractiveness	.14	.14	.43	.25 - .81

ICC - Intra-Class Correlation Coefficient

Table 2 reports summary statistics on the variables used in my regressions. This data is calculated using the sample's 210 analysts and 502 reports. Physical attractiveness and perceived competence scores are based on data collected by between 12 and 16 raters.

Table 2: Summary statistics

	Mean	Median	SD	Min	Max
Attractiveness	2.643	2.571	.763	1.000	4.625
Competence	3.128	3.143	.599	1.600	4.636
Margin of Safety	.324	.242	.284	.000	1.403
Female	.186	0	.390	0	1
MBA	.490	0	.501	0	1
Asian	.129	0	.336	0	1
African	.014	0	.119	0	1
Indian	.119	0	.325	0	1
Report Number	2.700	2	.740	1	5

Table 3 reports the results of four OLS regressions relating to the top decile physical attractiveness and perceived competence. Model 1 predicts analysts' percent margin of

safety using all individual analyst reports. Model 2 predicts analysts' percent margin of safety using only analysts' first individual reports. Model 3 predicts analysts' percent margin of safety using only analysts' last individual reports. Model 4 predicts analysts' percent margin of safety using each analysts' average margin of safety

Table 3: OLS estimations regarding the impact of physical attractiveness and perceived competence on margin of safety

Dependent variable: Margin of Safety (%)				
	Model 1	Model 2	Model 3	Model 4
Intercept	.2396*** (.027)	.2370*** (.028)	.2496*** (.041)	.2492*** (.029)
Top Decile Attractiveness	.0886** (.043)	.0900 (.063)	.1027 (.065)	.0961* (.056)
Top Decile Competence	.1163*** (.044)	.0756 (.068)	.0416 (.069)	.0865 (.069)
Female	-.0589* (.034)	-.0440 (.054)	-.0973* (.056)	-.0842 (.055)
MBA	.1532*** (.028)	.1167*** (.041)	.2476*** (.045)	.1532*** (.042)
Asian	.0727* (.039)	.0287 (.059)	.1122* (.061)	.0973 (.061)
African	.0009 (.131)	-.0978 (.146)	-.0424 (.153)	-.0804 (.151)
Indian	-.0699* (.038)	-.0675 (.059)	-.0398 (.061)	-.0629 (.060)
Report Number	-.0321*** (.010)	N/A N/A	-.0358** (.014)	N/A N/A
n	502	210	210	210
Adj. R ² (%)	9.68	3.28	14.93	7.68
F-Statistic	7.21	1.90	5.08	3.23

Notes: Model 1 predicts analysts' percent margin of safety using all individual analyst reports. Model 2 predicts analysts' percent margin of safety using only analysts' first individual reports. Model 3 predicts analysts' percent margin of safety using only analysts' last individual reports. Model 4 predicts analysts' percent margin of safety using each analysts' average margin of safety. The dependent variable is margin of safety calculated as the percent difference between the analyst's target price and the current price at publication. Top decile attractiveness and top decile competence are dummy variables that take on the value of one when an analyst is rated in the top 10% in either physical attractiveness or perceived competence respectively. Female is a dummy variable that takes the value of one if the author is a woman. MBA is a dummy variable that takes the value of one if the author is part of an MBA program. Asian, African, and Indian are dummy variables that take the value of one if the author appeared to be of Asian, African, or Indian descent respectively. Report Number is a nominal variable that corresponds to the number of the reports an analyst has written at the date of that report. The standard errors are reported under the coefficients. Single, double, triple * denote significance at the 10%, 5%, and 1% levels respectively.

Within model 1, for both physical attractiveness and perceived competence, I find statistically significant results. At the 5% significance level, analysts ranked in the top 10% in attractiveness are more likely to publish equity reports finding large discrepancies between current price and target price. At the 1% significance level, analysts ranked in the top 10% in perceived competence are more likely to publish equity reports finding large discrepancies between current price and target price.

Within models 2 and 3, which use only analyst's first reports and last reports respectively, I am unable to find results of statistical significance regarding physical appearance. Rather than interpreting this as a negative result I believe this is a result of shrinking the number of observations significantly from 502 to 210. With more observations it is possible significance would appear.

Within model 4, which uses average margin of safety, I find significance at the 10% level that analysts ranked in the top 10% in attractiveness are more likely to publish equity reports finding large discrepancies between current price and target price.

Across models 1 and 3, I find significance at the 10% level that men find larger discrepancies between current price and target price than women. This is in line with my expectations as past research has shown men to be more overconfident than women Barber and Odean (2001). Across these models I also find some statistically significant evidence related to race having an impact on analysts' margin of safety. While there was a fair portion of students who appeared to be of Indian or Asian descent I believe this is more likely the result of random chance considering the small number within the sample. Also within models 1 and 3 I find very strong evidence at the 1% and 5% level of significance that as analysts gain experience in publishing equity reports the

discrepancies they find decrease. This is very interesting as although it is in line with expectations and past research it indicates that the impact experience has on overconfidence may appear more rapidly than thought Menkhoff, Schmeling, and Schmidt (2013). While Menkhoff, Schmeling, and Schmidt found experience in terms of years helped reduce overconfidence I find results suggesting that simply writing additional equity research reports has an immediate and cumulative effect.

Across all models, at the 1% level of significance, I find students within MBA programs to be more likely to publish equity reports finding large discrepancies between current price and target price. Because most students who enroll for MBA programs do so with the goal of obtaining a high paying or desirable job upon graduating there is a strong emphasis on professional development and standing out to potential employers. Similarly, these equity reports are shared online which may cause MBAs to view this as one of their opportunities to stand out to employers. Publishing buy recommendations is more likely to attract attention because it takes a strong position on a stock unlike a hold recommendation which is less risky. Rather than interpreting this to suggest that MBAs are more overconfident than undergraduates I believe this is a result of strong influences on MBAs to issue buy recommendations.

VI. Future Research

These findings are interesting and significant enough to warrant additional research into how physical appearance may play a role on overconfidence and risk-taking in general. Future research may explore the same question addressed in this paper using

data from professional equity research analysts. While this data set is particularly interesting because of its unique use of undergraduate and MBA students, it is weak due to its inconsistency of equity analysis and photographic quality across both time and institution. Reports from professional equity researchers will likely prove to be much more consistent over the years and hopefully, due to the public face of equity analysts, professional photographs will be much more consistent.

Further, a recent study by Dreber, Gerdes, and Gränsmark (2013) investigating how risk taking and performance are affected by opponent's attractiveness in ranked chess games between experts poses an interesting question. The authors found evidence suggesting male chess players choose significantly riskier strategies when matched with attractive female opponents but women's strategies were not affected by the attractiveness of their opponents. This raises the question of whether male students within student investment clubs could be encouraged to make riskier recommendations in the presence of attractive females within the group. To further study the impact physical appearance has on financial decision making this may pose an interesting topic. The dataset I analyzed here does not indicate which students may have interacted significantly which prevents this type of analysis from being done.

The dataset I used in this paper has not been completely exhausted of all value. Further efforts into refining it and exploring the data could yield other surprising results. For example, the current dataset does not take into consideration the composition of the investment portfolios at the time of each report being published. As a result it is impossible with the current dataset to differentiate hold recommendations when the recommendation could equally mean "do not buy" or "continue to hold." It is possible

there is a significant difference between reports updating existing positions within the fund and initiating reports. By incorporating the composition of each fund over time into the dataset hold recommendations could become a very interesting recommendation to take into account alongside buy recommendations.

Another limitation of this paper and this dataset was the use of a single picture to assess an analyst's attractiveness. Adams (1977) suggests an individual's facial physical appearance changes slowly over their lifetime. Taking this into account it may be beneficial to incorporate an additional photo from a more recent data of the analyst for robustness. LinkedIn profiles are fairly commonplace among investment professionals and students alike, because each profile gets to select their profile picture it is reasonable to assume LinkedIn profile pictures are likely the best photograph of that person. This is in contrast to pictures taken within college investment clubs and classes where some students may have been unprepared for picture day and/or had unflattering pictures of them taken that day. LinkedIn profiles pictures would also come with the added benefit of a consistent thumbnail size which would be beneficial. Pictures used in my analysis varied in quality and size of the years and was difficult to control for.

VII. Conclusion

This paper has demonstrated some intriguing evidence that overconfidence in investment recommendations may be correlated with physical appearance. While physical attractiveness and perceived competence don't appear to form a continuous impact on an individual's overconfidence there does appear to be a threshold at which

individuals suddenly begin to perceive themselves differently. Upon crossing this threshold it appears that an individual's self-confidence manifests into overconfidence as a result of their high degree of physical attractiveness or perceived competence. This paper also finds men are more overconfident than women and that experience reduces overconfidence reconfirming the work of Barber and Odean (2001) and Menkhoff, Schmeling, and Schmidt (2013) respectively. Because each analyst produced between only 1 and 5 reports this suggests that experience needed to counteract the effects overconfidence may also be more rapidly acquired than previously thought.

My results weigh heavily in favor of a behavioral explanation. If physical attractiveness and perceived competence have an impact on an individual's economic behaviors then there are significant economic implications. Despite the intriguing results it is important to note these findings do not explain the existence of overconfidence by themselves. Rather they simply provide additional evidence in support of a behavioral explanation rather than the neoclassical hypothesis for economic decision making. The opportunity is ripe for future research to both improve upon tools for measuring overconfidence as well as better identifying the origins of overconfidence itself.

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