Sell-Side Financial Analysts and the CFA Designation Program*

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Abstract

We examine the effects the Chartered Financial Analyst (CFA) designation program has on recommendation performance and career outcomes of the analysts who complete the curriculum and become charterholders. For these analysts, both their recommendation performance and their chances of making the Institutional Investor's All-America Research Team increase during 1993–2015. These effects are attributable to the CFA program curriculum. The results remain largely stable across the pre- and post-2000 subperiods, and they survive an array of robustness checks.

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"Lawyers have to pass the bar, doctors have medical school and even stockbrokers need a license before practicing their crafts. But stock analysts, who can make or break a company's stock with their research, don't need any credentials to hang their shingles on Wall Street."

-- Kelleher (2001)

In modern financial markets, the research by analysts is essential to the production and dissemination of information as well as to the price discovery process; its importance only increases as time goes by. The Chartered Financial Analyst (CFA) designation provides accreditation for analysts in the financial research industry.[1] What the effects are of the designation program on the performance and career development of analysts is of natural interest to academia, practitioners, and regulators. Nevertheless, there is a surprising paucity of evidence on this front.[2] This paper fills this void. Specifically, we investigate whether the CFA designation program affects the recommendation performance and career outcomes of sell-side analysts.

Our study covers a broad section of sell-side analysts (close to 9,900 analysts) and uses a large sample of investment recommendations that span the period from 1993 to 2015. We find that the recommendation performance of the analysts who become charterholders improves by about 4.7% a year in abnormal returns and by 0.058 in the information ratio. The probability of these analysts making the Institutional Investor's annual All-America Research Team also increases by around 2.0 percentage points, which represents a 19% increase in probability. Moreover, these economically significant effects are mainly attributable to the CFA program curriculum. We also separate the sample into two subperiods: 1993–2000 and 2001–2015, with

[1] The CFA Institute is the trade association of both buy-side and sell-side analysts. Buy-side analysts work for money managers and provide research for in-house use by money managers, and sell-side analysts work for brokerage firms and provide research for the firms' clients. Unless otherwise stated, we use the term "analysts" to refer to sell-side analysts in this paper. Also, we use "brokerage firm" or "firm" to refer to an analyst's employer and we use "company" to refer to the entity that an analyst covers.

[2] There is relatively little literature on the CFA program. This literature often uses small samples and focuses on buy-side analysts (see Shukla and Singh 1994; Brockman and Brooks 1998; Miller and Tobe 1999). De Franco and Zhou (2009) compare forecast performance, as measured by timeliness and accuracy, of sell-side equity analysts with and without a CFA designation.

the latter subperiod corresponding to an era subject to regulatory reforms on analysts' research.[3] The results remain largely stable across the two subperiods with the only exception that the designation program's effect on performance as measured by the information ratio becomes virtually nil in the post-2000 subperiod. Furthermore, our findings survive an array of robustness checks. Taken together, these results highlight the efficacy of this designation program in the financial research industry.

Our paper is naturally related to the research on the determinants of analysts' performance and career outcomes (see Lys and Sohn 1990; Stickel 1995; Clement 1999; Jacob, Lys, and Neale 1999; Hong and Kubik 2003; Li 2005; De Franco and Zhou 2009; Emery and Li 2009; Li, Sullivan, Xu, Gao 2013). The paper contributes to the literature by providing a long-run analysis and identifying the charter-holding status as a relevant characteristic.

Further, we contribute to the occupational regulation research in two respects. First, Kleiner (2000) notes that largely due to a lack of data, the evidence on occupational certification and regulation is limited. As measures of performance and career outcomes are relatively easier to obtain for analysts than for other professionals, our study provides evidence on accreditation in the financial industry. Second, unlike many widely examined certification programs such as those for lawyers, physicians, and public school teachers, the CFA program does not involve a formal specialty education. Because formal education increases human capital, our study of the CFA designation program helps zero in on the effects of accreditation on analysts.

Our study also is of practical importance. According to the CFA institute, regulators, colleges, and certification programs in over 30 countries recognize the CFA charter as a proxy for meeting certain licensing and/or qualification requirements. Some investors have advocated

[3] U.S. regulators introduced six major changes to analysts' research in the early 2000s: Regulation Fair Disclosure (Reg FD) of 2000, NASD Rule 2711 and NYSE Rule 4722 of 2002, Sarbanes-Oxley Act (SOX) of 2002, Global Research Analysts Settlement (Global Settlement) of 2003, and the SEC's Regulation Analyst Certification of 2003.

for the CFA designation program to become a licensing requirement (see Bengoechea and Larocco 2017). The first step of any policy-making is to determine whether the program indeed improves analysts' competency and career outcomes. Moreover, acquiring the CFA designation usually requires lengthy preparations and costs thousands of dollars. Therefore, it is important to know whether the substantial resources spent on preparing and administrating the exams are justified.

A caveat is in order. The findings of our study allude to the CFA designation program's effects and remain silent on whether analysts who obtain the designation are better to begin with than those who do not. Moreover, because it takes years for an analyst to complete the curriculum and obtain the CFA designation, its economic significance is not attainable in a trading strategy that simultaneously goes short in stocks covered by CFAs before they become charterholders and long in stocks covered by CFAs after they become charterholders. Nor is it our objective to promote a new trading strategy in this study; we focus on examining the effects of the CFA designation program per se.

The CFA Designation Program and Related Literature

The CFA designation is a voluntary program administrated by the CFA Institute. Both the number of CFA charterholders and the number of CFA candidates have grown substantially in recent years. As listed in the CFA Institute website, regulators in countries such as the United Kingdom, Singapore, Canada, and the United States have adopted the CFA designation as a competency requirement, and many business schools around the world have integrated a majority of the CFA program curriculum into their own courses.

According to the CFA Institute, "The CFA Program is comprised of three levels, each culminating in an exam. You must pass each level sequentially, and fulfill other requirements of

the program… In general, each level of the program requires 250 hours of preparation" through a "self-study curriculum." The exams cover a substantial amount and diversity of material.[4] The combined pass rate of the three levels of exams has been below 50% in recent years. Other key requirements of the program include a bachelor's degree and at least three years of acceptable professional experience in investment decision-making (four years for candidates that registered for the 2005 program for the first time and all candidates that remained in the program after 2007). The CFA charterholders also need to make a pledge to the Code of Ethics; discipline measures include loss of the designation in cases of violations.

While each of these requirements appears to be constructive, whether the CFA designation program improves the performance and career of the analysts who obtain the designation is still unclear. On the one hand, the 750 hours of self-study to pass the CFA exams could improve analysts' performances and careers. On the other hand, this self-study might have no effect on performance because self-study is different from formal schooling, and the curriculum might not be transformable to improved performance. In fact, the research on occupational regulation generally shows that, while generating increased earnings in the affected industry, licensing and certification requirements produce no improvements in the quality of applicants or in the quality of the service provided.[5]

The importance of the CFA designation calls for a careful analysis of the program's effect on the human capital of financial analysts; it also stipulates distinguishing between alternative

[4] The four parts of its Candidate Body of Knowledge include ethical and professional standards, tools, asset valuation, and portfolio management. Each exam level covers all four parts, but with a different focus. Level I focuses on tools, which include quantitative methods, economics, financial statement analysis, and corporate finance. Level II focuses on asset valuation, which includes analyses of equity and debt investments, derivatives, and alternative investments. Level III focuses on portfolio management. Each exam level also gives 10% to 15% weights to ethical and professional standards.

[5] See, e.g., Rottenberg (1980) for a review of earlier literature and Card (1999), Goldhaber and Brewer (2000), Angrist and Guryan (2004), and Kugler and Sauer (2005) for more recent examples. Note that this literature differentiates between mandatory licensing and voluntary certification, such as mandatory licensing/certification for lawyers, dentists, physicians, and teachers, and voluntary certification for auto mechanics.

explanations. The paper that is closest in spirit to ours is De Franco and Zhou (2009). They report somewhat mixed evidence when comparing the earnings forecasts of CFA charterholders and non-charterholders during the period from January 1999 to December 2005. They conclude that the CFA charterholders perform better in the pre-designation period and that the difference indicates their better innate ability. They also conclude that CFA charterholders perform better in the post-designation period and that the difference is a reflection of the skills acquired through the CFA program.

Our study differs from De Franco and Zhou's (2009) work in several aspects. The first and foremost difference is that we use the difference-in-differences ("diff-in-diff" hereinafter) approach to address the selection bias that is associated with the analysts' decisions to study for the CFA exams and obtain the designation. Second, we conduct a long-run analysis of whether the CFA curriculum increases the human capital of sell-side analysts, and we focus on investment recommendations instead of earnings forecasts.[6] Third, we examine the effect of the CFA designation on career outcomes as well.

Further, our empirical design more conclusively differentiates between the two alternative explanations, namely, signaling versus human capital improvement that are tested by De Franco and Zhou (2009). Because they only use simple regressions and do not control for selection bias in their study, it is hard to distinguish between the two alternative explanations. In contrast, we draw from the research and control for the innate ability with analyst fixed effects, in addition to some common control variables, in the regressions (see Hausman and Taylor 1981; Jacob, Lys,

[6] Our study focuses on investment recommendations for the following reasons. Recommendations provide an important assessment of companies by sell-side analysts (see Bradshaw 2004), and they are highly valued by investors (see Womack 1996; Francis and Soffer 1997; Barber, Lehavy, McNichols, and Trueman 2001). Bradshaw (2009) illustrates a simple schematic of analysts' actual decision-making, which starts with publicly available information and ends with a justifiable recommendation released to investors that during the process of earnings forecasting, is an intermediate product. Bradley, Clarke, Lee, and Ornthanalai (2014) find that compared to management guidance and earnings announcements, analysts' recommendations are the most important information disclosure channel.

and Neale 1999; Li 2005; Emery and Li 2009). The inclusion of analyst fixed effects adjusts for analyst-specific characteristics, particularly those related to innate ability; otherwise, omissions of such characteristics from regressions might yield biased estimates on the effects of the CFA designation. The inclusion of analyst fixed effects in regressions also makes our empirical analysis a diff-in-diff estimation; such an estimation better isolates the CFA designation program's effect by appropriately controlling for performance changes in counterfactuals not related to the designation program. Further, because signaling pertains to innate ability, the inclusion of analyst fixed effects filters out signaling and traces the performance change before and after the CFA designation to the human capital enhancement via the curriculum.

Empirical Strategy

Our basic research design centers around estimating the following equation:

$$y_{i,j,t} = \alpha_i + \gamma_t + \beta \times CFA_{i,t-1} + \delta \times X_{i,j,t-1} + \varepsilon_{i,j,t} \qquad (1)$$

In Equation (1), *y* is the dependent variable of interest that measures the analysts' performance or career outcomes, *i* indexes analysts, *j* indexes analysts' brokerage firm affiliations, and *t* indexes time. For explanatory variables, α is the analyst fixed effect, γ is the time fixed effect, $CFA_{i,t-1}$ is a dummy variable that equals one if analyst *i* is a CFA charterholder as of the end of calendar year *t-1* and zero otherwise, and *X* is a vector of control variables to be defined in the Data and Variables section.

After controlling for the usual suspects and fixed effects, the parameter estimate on *CFA* characterizes the CFA designation program's effect on the analyst's performance (career outcome) as the performance (career outcome) change in the CFA charterholders from the pre-designation to the post-designation periods relative to the performance (career outcome) change

in the non-charterholders during the same time span.[7] Note that this particular parameter estimate does not capture the overall difference in performance (career outcomes) between charterholders and non-charterholders; the use of analyst fixed effects inherently filters this difference out of the model.

The fact that CFA charterholders receive the designation in different years renders two cohorts of analysts as the control group in our analysis: the set of analysts that have not become CFA charterholders as of the end of sample period (i.e., by 2015), and the set of charterholders before they receive the CFA designation. The two cohorts provide both cross-sectional and time-series variations for identifying the outcome of interest in our study; in particular, the control group helps capture the secular trend in analysts' performance and career outcomes that, if omitted, biases our estimation of the CFA designation program's effect.

Moreover, this diff-in-diff approach, together with the brokerage, analyst, and time fixed effects, controls for heteroscedasticity due to three types of correlations in the error terms. Such correlations comprise: (1) correlations across different analysts in a given brokerage firm and a given year (i.e., cross-sectional correlation), (2) correlations across different analysts in a given brokerage firm over time (i.e., across-analyst serial correlation), and (3) correlations within the same analyst over time (i.e., within-analyst serial correlation). We thus report robust *t*-statistics that adjust for clustering at the brokerage level for the parameter estimates.

In Equation (1), the analyst fixed effect model controls for the potential Heckman's (1979) selection bias – a unique type of "omitted variables" bias that results from the use of nonrandomly selected samples in estimating behavioral relations. The choice of becoming a CFA charterholder is clearly nonrandom, and those analysts who choose to become CFA charterholders might differ fundamentally from those who do not in ways that would influence

[7] With Equation (1), we essentially use a diff-in-diff approach for estimations (see Bertrand and Mullainathan 2003).

the outcome of this study. For example, CFA analysts might have different innate abilities and motivations from non-charterholders. These differences could affect their initial decisions on whether to go through the CFA program, thereby making it difficult to know whether the potential performance difference between CFA charterholders and non-charterholders is due to the CFA designation program or to the different innate abilities and motivations. Hausman and Taylor (1981) argue that the fixed effect model offers a common, unbiased technique to control for omitted variables in panel data sets.[8] Jacob, Lys, and Neale (1999) follow up and use analyst fixed effects to adjust for analysts' aptitude and innate ability. Consequently, we include analyst fixed effects in Equation (1) to deal with the bias due to the analysts' time-invariant unobserved characteristics that affect their performance and career outcome.

Furthermore, if the selection bias is also due to certain time-varying unobserved characteristics, we conduct several tests à la Heckman's (1979) 2-step procedure that we combine with the fixed effect model. The 2-step procedure serves as a metric to further tackle the selection bias; it also serves to check the robustness of our empirical results.

It takes a significant amount of time for an analyst to complete the CFA program.[9] The lengthy waiting time toward receiving the designation creates a non-charterholder sample that is tainted with CFA candidates. For example, if a particular analyst is identified as holding the CFA designation in calendar year *t*, this analyst might be a CFA charterholder, a CFA candidate, or a

[8] The research also uses instrumental variables and Heckman's (1979) 2-step procedure to deal with selection bias (see Heckman, Ichimura, Smith, and Todd 1998). The two methods face practical challenges here. Appropriate instrumental variables such as measures of innate ability are not readily available. The choice to finish the CFA program again is not available to the CFA charterholders, which is likely to render the Heckman's (1979) procedure inaccurate. Moreover, the timing of an analyst's decision to go through the CFA program is unknown, further weakening the efficacy of Heckman's procedure.

[9] Because each level of the CFA exams is offered once a year (Level I is offered twice a year since 2003) and analysts need to have at least three years of relevant work experience, it takes at least three years to finish the CFA program. Moreover, because there is no time limit within which a candidate has to complete the program, analysts thus can take a few years off between the preparations for the exams. Therefore, the actual time for an analyst to finish the program could be much more than three years. Further, some analysts could finish the exams before gaining the required experience, while other analysts could meet the minimum experience requirement before finishing all three exams.

non-candidate during prior years. While we cannot clearly measure the effect of this bias on our estimates, this bias hinders our ability to detect the differences in the outcome variables between CFA charterholders and non-charterholders in our paper. Thus, any beneficial effects that we might find for the CFA designation program are likely to provide an estimate of the lower bound of these benefits.

Data and Variables

We obtain our primary data from the Institutional Brokers Estimate System (I/B/E/S). The I/B/E/S database provides the name, brokerage affiliation, earnings forecasts, and stock recommendations of each analyst as well as a unique code for each analyst that allows us to track them. The recommendations are standardized with integer ratings from 1 through 5 that correspond to "strong buy," "buy," "hold," "underperform," and "sell," respectively. We exclude analysts who issue only "hold" recommendations. Because I/B/E/S does not give analysts' full names (last names and first initials only), we search news articles in databases such as Lexis-Nexis and ProQuest to find the first name of each analyst. If our search results have multiple analysts with the same first and last names, we match the information on brokerage firm affiliations with that in the I/B/E/S database to identify the analyst. We then hand-collect information about whether and when analysts receive the CFA designation from the annual Membership Directory of the Association for Investment Management and Research.

Measures of Analysts' Performance and Career Outcome. Our dependent variables of interest are performance and career outcome. We first create an analyst's recommendation portfolio, which follows the research (see Li 2005; Emery and Li 2009; Li, Sullivan, Xu, Gao 2013). An analyst's recommendation portfolio is comprised of long positions in stocks that the analyst rated 1 or 2 and short positions in stocks that the analyst rated 4 or 5. Stocks are added to

the portfolio on the recommendation date and removed from the portfolio on the date of any revision to the rating of 3. A stock's classification changes when a superseding recommendation alters the stock's classification. For example, a change from 1 or 2 to 4 or 5 is a revision, whereas an upgrade from 2 to 1 is not a revision because the stock is already classified as in a long position. Reiteration of a previous recommendation does not change a stock's classification. Returns within each year accumulate from the recommendation date until either the date of revision or the end of the calendar year if there is no revision during the remainder of the year. We compute equal-weighted returns for each recommendation portfolio using CRSP's daily returns.[10] We estimate the following Carhart (1997) model:

$$R_{it} = \alpha_i + \sum_{j-1}^{4} \beta_j F_{jt} + \varepsilon_{it}. \qquad (2)$$

Here, R_{it} is the return on the recommendation portfolio of analyst i in excess of the 3-month T-bill return on day t, α_i is the Jensen's alpha from the multifactor model that measures the average daily abnormal return on the portfolio of analyst i given the daily frequency of our data, β_j is the regression coefficient for factor j, F_{jt} is the return of factor j on day t, and ε_{it} is an error term for the portfolio of analyst i on day t. The research finds that Fama and French's (1993) three factors (the return on the CRSP value-weighted market index in excess of the 3-month T-bill return, the size factor, and the book-to-market factor) and Carhart's (1997) momentum factor are related to systematic risk or investment styles that have nothing to do with the contribution of skill. We thus include the four factors in our analysis to avoid rewarding analysts for simply exploiting these factors. For estimations, we require each recommendation portfolio to have at least three months of data within a year.

[10] Our approach is similar to that of *The Wall Street Journal's* rankings that give a weight of 2, 1, 0, -1, and -2 to stocks that the analysts rated 1 through 5. Alternative weighting schemes of recommended stocks do not affect our results.

We use *ALPHA* and *INFORATIO* as the model intercept and its affiliated *t*-statistic, respectively, to measure analysts' recommendation performance. *INFORATIO,* which stands for "information ratio," is essentially the Sharpe ratio in a multifactor model setting. This metric is used extensively as a performance measure, because it controls for both the systematic and idiosyncratic risks in an investment.

We use *IISTAR*, a dummy variable that equals one in a year when an analyst appears in the Institutional Investor's All-America Research Team and zero otherwise to measure the analyst's career outcome. Compared to other analysts, an All-America Research Team analyst is more likely to get promotion, internally or externally, and receive better compensation. The variable is also a common proxy for the analyst's reputation in related research (see Stickel 1992).

Control Variables. Our analysis enlists several control variables that are known to affect analysts' performance and career outcomes. Jacob, Lys, and Neale (1999) use the number of research reports issued by an analyst (NREPORT) to measure the timeliness of reports, which represents the willingness of analysts to exert effort. Clement (1999) and Jacob, Lys, and Neale (1999) argue that an increase in the number of companies covered by one analyst (NCOMPANY), that is, broader coverage, increases a task's complexity; Jacob, Lys, and Neale (1999) also argue that broader coverage broadens industry knowledge. Stickel (1995) and Hong and Kubik (2003) use the brokerage firm's size (BROKERSIZE) as a proxy for marketing ability and the reputation of analysts' firms, respectively. We use *COMPANYSIZE* as a proxy for the information environment of the companies under coverage because the research argues that smaller companies have a more opaque information environment due to less information disclosure through less news and research coverage (see Stickel 1995). We also use *COVERAGE*,

which is the average number of analysts who cover the same company as a particular analyst does, as another measure of the information environment (see Piotroski and Roulstone 2004). To measure the effect of learning-by-doing (see Clement 1999; Jacob, Lys, and Neale 1999), we include *EXPERIENCE* that is the number of years that an analyst has been submitting reports to I/B/E/S; *EXPERIENCE* can also capture an analyst's ability and skillset. Following the literature, we use logarithm values of all the above control variables in our empirical analysis.

Our set of control variables include analyst fixed effects. Ideally, Equation (1) should control for analysts' characteristics such as measures of education or innate ability (e.g., MBA degree and SAT score), other types of experience, or indicators of other important certifications (e.g., Certified Public Accountant). However, these characteristics, interesting by themselves, are extremely difficult, if not impossible, to obtain for the universe of analysts. To the extent that an analyst's status does not change in these aspects (e.g., an analyst has an MBA degree or a CPA designation when entering our sample, or the analyst never obtains those characteristics), our use of analyst fixed effects helps allay such omitted variable bias.

In addition to analyst fixed effects, we include year fixed effects and brokerage fixed effects in the regressions. The inclusion of year fixed effects serves to control for the macroeconomic factors and business conditions that likely affect analysts' performance and career outcomes. The inclusion of brokerage fixed effects filters out the effects of some omitted time-invariant characteristics of a brokerage firm, such as culture and accessible resources, on the performance and career outcomes of the affiliated analysts.[11]

[11] In our empirical exercises, after controlling for analyst and year fixed effects in the regressions, the results barely change with or without brokerage fixed effects. This reflects that the brokerage fixed effects are highly correlated with the analyst fixed effects. The results with brokerage fixed effects are available on request.

As mentioned, CFA candidates could improve their performance because of the learning from the CFA curriculum or because of the buildup of a work skillset as time elapses. In the meantime, non-CFA analysts also hone their skillset from their experience. Therefore, by controlling for experience along with the analyst fixed effects in the model, we effectively focus our study on the incremental effect that corresponds to the learning from the CFA curriculum.

Summary Statistics. By applying the above screening procedures to data, we obtain a sample of 47,488 analyst-year observations for the 1993–2015 period. Panels A and B of Table 1 respectively define and summarize the variables. Of the observations in our sample, 31.4% are associated with CFA charterholders. The four-factor-adjusted *ALPHA* has a mean of 0.436 basis points per day, or equivalently, 1.1% a year $(1+0.436/10000)^{252}-1$); *ALPHA* has a median of 0.206 basis points per day or 0.5% a year. *INFARATIO* has a mean of 0.119 and a median of 0.120. About 10.3% of the observations are associated with All-America Research Team analysts. Analysts spend an average of 10.2 years and a median of 8.8 years on submitting research reports. On average, an analyst produces 44 reports and covers 14 companies a year; the corresponding median values are 33 reports and 13 companies, respectively. A brokerage firm employs an average of 60 analysts with the median number being 39. For the covered companies, about 12, both in mean and in median, analysts follow them per year, and their mean and median market capitalizations equal 8.7 and 3.4 billion dollars, respectively.

Table 2 breaks down the characteristics along with the CFA charterholder status. Our sample includes a total of 9,843 unique analysts with required data in the sample period. Panel A reports the proportion of analysts with the CFA designation. Of the 9,843 sample analysts, 3,386 analysts, or about 34%, are CFA charterholders, and the remaining 66% are non-CFA charterholders. Given there are no formal certification requirements for analysts in place, the

considerable proportion of analysts who have completed the CFA program is anecdotal evidence that the CFA designation program is beneficial to analysts.

Panel B of Table 2 shows the means on the measures of performance and career outcome as well as the control variables for the non-CFA subsample and the CFA subsample, respectively. The CFA charterholders are different from non-charterholders in various aspects. Notably, charterholders have higher incidences of making the annual All-America Research Team: 10% for non-charterholders and 10.8% for charterholders, and the difference is statistically significant at the 1% level. Indeed, the difference of 0.8 percentage points carries a nontrivial economic significance that represents an 8% (=0.8%/10%) increase in the incidence of receiving the All-America Research Team ranking relative to non-charterholders. Also, CFA charterholders appear to gain more experience and conduct more complex tasks than non-charterholders – on average, they spend 1.4 more years engaged in research activity and cover one more company. Compared to non-charterholders, CFA charterholders are affiliated with smaller brokerage firms and follow less-covered companies. Interestingly, CFA charterholders have a slightly higher *ALPHA* and a lower *INFORATIO*, issue slightly more research reports, and cover slightly smaller companies; but all these differences are not statistically significant.

Empirical Results

This section presents the empirical results with the dependent variables that measure analysts' recommendation performance and career outcomes. As explained earlier, the coefficient estimate for the dummy variable *CFA*, as shown in Equation (1), is the key parameter of interest, which characterizes a diff-in-diff estimate of the CFA designation program's effect.

Effects of the CFA Designation Program on Analysts' Recommendation Performance. We first look at the effects of the CFA program on recommendation performance

measured by *ALPHA and INFORATIO*. Table 3 shows the results of estimating the fixed effect models for the full sample period of 1993 to 2015.

The first column contains the results with *ALPHA* as the dependent variable. The coefficient estimate for *CFA* is 1.808 and is statistically significant at the 1% level (*t*-stat. = 4.17). The estimate is also of economic significance. Using untabulated detailed information on the distribution of ALPHA, we infer from this point estimate that obtaining the CFA designation helps move an analyst's position up, if starting from the median level of the distribution, to approximately the 70 percentile of the pack. Also, the coefficient estimates in this model with *ALPHA* as the dependent variable are essentially measures of the daily return performance in basis points. Thus, this point estimate for *CFA* indicates an equivalent increase in the annualized excess return of 4.661 percentage points ($=(1+1.808/10000)^{252}-1$) as a result of achieving the CFA designation. As discussed above, this coefficient estimate in the model of analyst fixed effects mainly captures the CFA designation program's effect. It is worthy pointing out that the coefficient for *CFA* does not measure the performance gap between charterholders and non-charterholders. Therefore, we should not interpret this point estimate as meaning that a CFA charterholder outperforms a non-charterholder by 1.808 basis points in daily returns.

Regarding the set of control variables in this model, this column shows that two variables have statistically significant estimates. The coefficient estimates for *LNCOVERAGE* and *LNNREPORT* are both negative and significant at the 1% level, which indicates that thinly covered companies have higher abnormal returns and that issuing more research reports hurts the analysts' recommendation performance. Notably, the coefficient estimate for *LNEXPERIENCE* is not statistically significant at all (*t*-stat. = 0.13), which indicates that learning-by-doing has

little bearing on the increase in *ALPHA* after analyst fixed effects and other fixed effects are controlled for.

In the second column of Table 3, we report the results of estimating the fixed effect models with *INFORATIO* as the dependent variable. The estimated coefficient for *CFA* is 0.058 and significant at the 5% level (*t*-stat. = 2.42). Consistent with the results for *ALPHA*, the estimated coefficients on both *LNCOVERAGE* and *LNNREPORT* are significantly negative for *INFORATIO*. In addition, the coefficient estimate for *LNNCOMPANY* is positive and strongly significant (*t*-stat. = 3.31), which indicates that broader coverage helps boost the information ratio of an analyst's recommendations likely due to the knowledge spillover across companies covered by the analyst.

To check whether the estimates are robust across time, we separate our sample into two subperiods, 1993–2000 and 2001–2015. A series of regulatory reforms that affect the analysts' research were initiated between late 2000 and 2004. These regulatory reforms inevitably changed the environment facing analysts and, in turn, their behavior and performance as well. Thus, our effects might not be due to the CFA designation program per se but to the regulatory reforms. We choose 2000 as the split year so that the earlier subperiod provides clean evidence on the effect of the CFA designation program, if any, without the confounding influence of the regulatory reforms.

Table 4 has the results of estimating the fixed effect model over the two subperiods. the first two columns show that the estimated coefficients for *CFA* remain positive and statistically significant for the 1993–2000 subperiod, regardless of the performance measures. Specifically, when *ALPHA* is the performance measure, the estimated coefficient is 1.307 (*t*-stat. = 2.04); when *INFORATIO* is the performance measure, the estimated coefficient is 0.079 (*t*-stat. = 2.12).

Like in Table 3, both *LNCOVERAGE* and *LNNREPORT* carry significantly negative coefficient estimates with either performance measure as the dependent variable, and *LNNCOMPANY* has a significantly positive coefficient estimate when *INFORATIO* is the performance measure. Notably, the coefficient estimates on *LNEXPERIENCE* are statistically insignificant in both columns.

The third and fourth columns of Table 4 present the estimation results for the 2001–2015 subperiod. When the performance measure *ALPHA* is the dependent variable, the variable *CFA* retains a positive and statistically significant coefficient estimate; it is 1.983 (*t*-stat. = 3.64) and significant at the 1% level. When *INFORATIO* is the performance measure, the estimated coefficient for *CFA* is positive and not significantly different from zero.[12]

In summary, the results in Table 3 show that the CFA program significantly improves the recommendation performance of analysts in the 1993–2015 subperiod, and the effect is economically significant. The two sets of subperiod results in Table 4 show that the program's effect on analysts' performance as measured by abnormal returns remains largely stable and robust across time. Moreover, the results in both tables show that learning-by-doing as represented by the analysts' experience is hardly responsible for the increase in performance after we control for analyst fixed effects and other fixed effects, which tilts the balance toward the CFA designation program's effect as the explanation for the performance improvement.

[12] The results in Table 4 show that the identical empirical model appears to have greater explanatory power in the earlier subperiod than in the later subperiod. A further investigation finds that much of the explanatory power derives from the analyst fixed effects, and the fixed effects happen to produce a better fit in the earlier subperiod. Several economic forces could jointly contribute to the different roles of the analyst fixed effects between the two subperiods. A series of regulatory reforms have been introduced and implemented since the early 2000s, which have inevitably affected analysts' research and behavior. Also, the financial markets have evolved dramatically since the turn of the century, especially with innovations and technological advances in the financial sector that have reshaped the microstructure of trading and processing and dissemination of information. Additionally, the later subperiod comprises of several big market swings and two economic recessions, especially the 2008 financial crisis and the ensuing Great Recession. Those episodes have had profound and long-lasting effects on the financial sector as a whole. Because these economic forces overlap with each other and tend to work jointly, it is not easy to isolate the effect of each force on the explanatory power of the analyst fixed effects.

Effects of the CFA Program on Analysts' Career Outcomes. The popularity of the CFA program indicates its potential benefit in enhancing analysts' market value and career outcomes. In this subsection, we examine the effect of completing the CFA program on the incidence of being ranked as a top analyst by the Institutional Investor magazine. Table 5 reports the results from estimating the fixed effect model with *IISTAR* as the dependent variable. Because *IISTAR* is an indicator variable, we essentially estimate a linear probability model with fixed effects.

We first assess the full sample results listed in the first column. The estimated coefficient for *CFA* is significantly positive at 0.020 and significant at the 1% level (*t*-stat. = 2.99). The estimate is also economically significant. Given that the average incidence rate of making the All-America Research Team equals 0.103 in our sample, this point estimate means that the CFA designation increases the probability by 19.42% (=0.020/0.103). The estimated coefficients for *LNEXPERIENCE*, *LNNREPORT*, *LNNCOMPANY*, and *LNROKERSIZE* are all positive and statistically significant at the 1% level, which indicates that analysts who have longer experience, issue more research reports, cover more companies, and work in larger brokerage firms have a greater chance to make to the All-America Research Team. There is some weak evidence that researching thinly covered companies renders an analyst as a top-ranked analyst. The size of the companies under coverage does not appear to matter much for an analyst to make the team.

The second column reports the estimation results for the 1993–2000 subperiod, which are remarkably similar to the full sample results. In particular, the estimated coefficient for *CFA* remains positive at 0.016 and statistically significant at the 5% level. This result again means that analysts have a greater chance of appearing in the All-America Research Team after they have received the CFA designation. Given that the average value of *IISTAR* is 0.113 in this subperiod,

this point estimate represents a 14.16% (=0.016/0.113) increase in the probability of becoming an All-America Research Team analyst with the CFA designation. The estimates on the other control variables are sensible and similar to the full sample results too. The third column presents the estimation results for the 2001–2015 subperiod. The CFA designation continues to have a significant and positive effect on *IISTAR*. The estimated coefficient for *CFA* is 0.017 (*t*-stat. = 2.00). Given that the average value of *IISTAR* is 0.077 in this latter subperiod, this point estimate represents an increase of 22.08% in the probability of becoming an All-America Research Team analyst for those with the CFA designation.

To summarize, the CFA designation program significantly increases the probability of making the All-America Research Team. Being an All-America analyst likely brings about favorable career outcomes such as promotions, internal or external, and better compensation; it also enhances the analyst's visibility and reputation in the industry. Therefore, our results show that completing the CFA program can benefit an analyst's future career outcome in both financial and nonfinancial ways.

Conclusion

In this paper, we investigate whether the CFA designation program affects the recommendation performance and career outcomes of sell-side analysts. We find that the designation program improves these analysts' recommendation performance by about 4.7% a year in abnormal returns and by 0.058 in the information ratio over the 1993–2015 period. The designation program also increases the probability of an analyst making the Institutional Investor's annual All-America Research Team by around 19%. These economically significant effects are likely attributable to the learning from the CFA program curriculum. Moreover, the

results remain largely stable across the pre- and post-2000 subperiods with the exception that the CFA designation program appears to have few effects on the information ratio of analysts' recommendations in the later subperiod. Furthermore, the results survive a host of robustness checks.[13]

Taken together, the results allude to the efficacy of voluntary occupational licensing/certification in the financial research industry and indicate that the CFA designation program's effect can be incremental to the effect of regulatory reforms on financial analysts. Given the importance of analysts' research to the financial markets, the beneficial effects of the CFA designation program help rationalize spending considerable resources on preparing and administrating the CFA exams each year.

[13] In particular, controlling for selection by using the Heckman's (1979) approach does not change any of the findings in the paper. The results are available on request.

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Table 1. Variable Definitions and Summary Statistics

Panels A and B respectively define and summarize the variables in our paper. All variables are calculated within a calendar year. We measure the performance of individual analysts using the Carhart (1997) four-factor model in which the daily returns on *recommendation portfolios* of individual analysts are regressed on the CRSP value-weighted NYSE/AMEX/NASDAQ market index returns in excess of the 3-month T-bill returns, size, book-to-market, and momentum factors. We follow Li (2005), Emery and Li (2009), and Li et al. (2013) to create an analyst's recommendation portfolio that is made up of long (and short) positions in stocks rated 1 or 2 (and 4 or 5) by the analyst. Stocks are added to the portfolio on the recommendation date and removed from the portfolio on the date of any *revision* to the rating of 3. The sample period is 1993 to 2015.

Panel A. Variable Definitions

CFA	Dummy variable that equals one for the years that an analyst is a CFA charterholder, and zero otherwise.
ALPHA	The intercept of the Carhart (1997) model in basis points.
INFORATIO	The *t*-statistic for the intercept of the Carhart (1997) model.
IISTAR	Dummy variable that equals one if the analyst is an Institutional Investor All-American analyst, and zero otherwise.
LNEXPERIENCE	Logarithm of the number of years that an analyst has been submitting reports to I/B/E/S.
LNCOVERAGE	Logarithm of the average number of analysts that cover the same companies that an analyst covers at the end of the prior calendar year.
LNNREPORT	Logarithm of the number of research reports that an analyst issues.
LNNCOMPANY	Logarithm of the number of companies that an analyst covers.
LNBROKERSIZE	Logarithm of the number of analysts employed by the analyst's brokerage firm. For analysts who switch firms within a given year, we use the time-weighted average of the two firms.
LNCOMPANYSIZE	Logarithm of the mean market capitalization of the companies that an analyst covers at the end of the prior calendar year.

Panel B. Summary Statistics

variable	N	Mean	Stdev	P1	P25	Median	P75	P99
CFA	47488	0.314	0.464	0	0	0	1	1
ALPHA (Basis Points)	47488	0.436	29.113	-47.134	-1.714	0.206	2.195	51.023
INFORATIO	47347	0.119	1.217	-2.309	-0.523	0.120	0.766	2.427
IISTAR	47488	0.103	0.304	0	0	0	0	1
EXPERIENCE (Years)	47488	10.174	7.348	0.132	4.000	8.832	15.000	28.978
NREPORT	47488	43.961	41.960	2	12	33	64	184
NCOMPANY	47488	13.881	8.977	1	8	13	18	42
BROKERSIZE	47488	60.273	63.209	1	17	39	83	296
COVERAGE	47488	11.636	5.828	2	7.223	10.909	15.246	27.949
COMPANYSIZE ($Billion)	47488	8.669	14.938	0.086	1.163	3.403	9.572	72.226

Table 2: Summary Characteristics of Sample Analysts

This table shows the characteristics of the sample analysts. See Table 1 for variable definitions. The sample consists of 47,488 analyst-year observations for 9,843 unique analysts. Panel A shows the number of analysts in each category and the number as a percentage of the overall sample of 9,843 analysts. Panel B reports the means of the variables for the non-CFA subsample and the CFA subsample (including observations both before and after receiving the designation); the last column lists the *t*-test results for the difference in the means of those variables between CFA and non-charterholders. The ** and * indicate (2-sided) statistical significance at the 1% and 5% levels, respectively. The sample period is from 1993 to 2015.

Panel A. CFA Composition

	CFA		Non-CFA		Total	
Number of analysts	3,386	(34.40%)	6,457	(65.60%)	9,843	(100.00%)

Panel B. Characteristics of Analysts: CFAs versus non-CFAs

Variable	NonCFA		CFA		CFA-NonCFA
	N	Mean	N	Mean	
ALPHA	26279	0.412	21209	0.465	0.054
INFORATIO	26193	0.122	21154	0.117	-0.005
IISTAR	26279	0.100	21209	0.108	0.008**
EXPERIENCE	26279	9.541	21209	10.958	1.418**
NREPORT	26279	43.876	21209	44.066	0.190
NCOMPANY	26279	13.434	21209	14.435	1.001**
BROKERSIZE	26279	62.684	21209	57.285	-5.399**
COVERAGE	26279	11.827	21209	11.399	-0.428**
COMPANYSIZE	26279	8.732	21209	8.590	-0.142

Table 3. The CFA Program and Analyst Performance

This table reports the results of estimating the fixed effect model in which the dependent variables are measures of analysts' performance: *ALPHA* and *INFORATIO*. The coefficient estimates are in basis points when *ALPHA* is the dependent variable. See Table 1 for variable definitions. Robust *t*-statistics adjusted for clustering at the brokerage-firm level are reported in parentheses. The ** and * indicate (2-sided) statistical significance at the 1% and 5% levels, respectively. The sample period is 1993 to 2015.

	$ALPHA_t$	$INFORATIO_t$
CFA_{t-1}	1.808**	0.058*
	(4.17)	(2.42)
$LNEXPERIENCE_{t-1}$	0.032	-0.000
	(0.13)	(-0.01)
$LNCOVERAGE_{t-1}$	-1.156**	-0.053*
	(-2.74)	(-2.57)
$LNNREPORT_{t-1}$	-0.577*	-0.040**
	(-2.54)	(-2.77)
$LNNCOMPANY_{t-1}$	0.433	0.065**
	(1.14)	(3.31)
$LNBROKERSIZE_{t-1}$	-0.098	-0.004
	(-0.60)	(-0.37)
$LNCOMPANYSIZE_{t-1}$	0.204	-0.002
	(1.29)	(-0.25)
ANALYST-FIXED EFFECTS	YES	YES
YEAR-FIXED EFFECTS	YES	YES
NOBS	47,488	47,347
ADJUSTED R^2	0.392	0.013

Table 4. The CFA Program and Analyst Performance: Subperiod Analysis

This table reports the results of estimating the fixed effect model in which the dependent variables are measures of analysts' performance, *ALPHA* and *INFORATIO*, over the two subperiods of 1993–2000 and 2001–2015. The coefficient estimates are in basis points when *ALPHA is* the dependent variable. See Table 1 for variable definitions. Robust *t*-statistics adjusted for clustering at the brokerage-firm level are reported in parentheses. The ** and * indicate (2-sided) statistical significance at the 1% and 5% levels, respectively. The sample period is 1993 to 2015.

	1993-2000		2001-2015	
	$ALPHA_t$	$INFORATIO_t$	$ALPHA_t$	$INFORATIO_t$
CFA_{t-1}	1.307*	0.079*	1.983**	0.007
	(2.04)	(2.12)	(3.64)	(0.23)
$LNEXPERIENCE_{t-1}$	0.607	-0.013	-0.289	0.010
	(1.37)	(-0.81)	(-0.98)	(0.56)
$LNCOVERAGE_{t-1}$	-1.460*	-0.064*	0.198	-0.017
	(-2.14)	(-2.08)	(0.26)	(-0.46)
$LNNREPORT_{t-1}$	-0.617*	-0.048**	-0.577	0.007
	(-2.15)	(-2.75)	(-1.63)	(0.18)
$LNNCOMPANY_{t-1}$	0.641	0.075**	0.903	0.024
	(1.04)	(2.58)	(1.55)	(0.44)
$LNBROKERSIZE_{t-1}$	-0.001	-0.017	0.226	-0.002
	(-0.00)	(-0.94)	(1.29)	(-0.13)
$LNCOMPANYSIZE_{t-1}$	0.291	0.010	-0.291	-0.034*
	(1.08)	(0.70)	(-0.98)	(-2.29)
ANALYST-FIXED EFFECTS	YES	YES	YES	YES
YEAR-FIXED EFFECTS	YES	YES	YES	YES
NOBS	20,226	20,212	27,262	27,135
ADJUSTED R^2	0.524	0.037	0.308	0.008

Table 5. The CFA Program and Analyst Career Outcome

This table reports the results of estimating the fixed effect model in which the dependent variable is a measure of analysts' career outcome: *IISTAR*. See Table 1 for variable definitions. Robust *t*-statistics adjusted for clustering at the brokerage-firm level are reported in parentheses. The ** and * indicate (2-sided) statistical significance at the 1% and 5% levels, respectively. The sample period is 1993 to 2015.

	Full Sample	1993-2000	2001-2015
CFA_{t-1}	0.020**	0.016*	0.017*
	(2.99)	(1.96)	(2.00)
$LNEXPERIENCE_{t-1}$	0.015**	0.013**	0.015**
	(5.23)	(3.63)	(4.84)
$LNCOVERAGE_{t-1}$	-0.008	-0.010	-0.007
	(-1.90)	(-1.38)	(-1.25)
$LNNREPORT_{t-1}$	0.012**	0.016**	0.026**
	(2.86)	(3.04)	(3.90)
$LNNCOMPANY_{t-1}$	0.016**	0.016*	-0.010
	(3.55)	(2.54)	(-1.68)
$LNBROKERSIZE_{t-1}$	0.017**	0.017**	0.018**
	(6.95)	(4.06)	(6.57)
$LNCOMPANYSIZE_{t-1}$	0.003	0.006	0.002
	(1.26)	(1.54)	(0.67)
ANALYST-FIXED EFFECTS	YES	YES	YES
YEAR-FIXED EFFECTS	YES	YES	YES
NOBS	47,488	20,226	27,262
ADJUSTED R^2	0.435	0.511	0.416