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The role of confidence and noncognitive skills for post-baccalaureate academic and labor market outcomes

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ABSTRACT

Increasingly researchers include information about noncognitive abilities in their analyses of similar people's educational choices and subsequent labor market outcomes. We contribute to this literature by considering the dual roles of confidence in one's abilities and noncognitive skills and characteristics in predicting several subsequent MBA program and employment outcomes among a sample of GMAT test takers, with a focus on identifying possible gender differences in these relationships. Self-reported noncognitive skills correlate similarly for men's and women's managerial, earnings and employment satisfaction outcomes. In contrast, though, distinct gender differences emerge regarding perceptions of one's mathematical and verbal ability—with confidence in quantitative ability especially associated with men's and confidence in verbal ability mainly associated with women's outcomes. Non-linearity analysis reveals that lower earnings are correlated with men who have low confidence in their quantitative ability and with women who have high confidence in their verbal ability.

1. Introduction

Social scientists, using standard economic models with traditional variables, typically explain less than half the variation in college completion (Lundberg, 2013), earnings (Almlund et al., 2011; Bowles et al., 2001), and the gender pay gap (Grove et al., 2011). To account for more of the differences in those important life outcomes among otherwise similar individuals, scholars have begun increasingly to incorporate noncognitive or personality attributes into their analyses (Bowles et al., 2001; Borghans et al., 2008).[1] Heckman et al. (2006), for example, find that cognitive and noncognitive abilities are similarly important in explaining variations in earnings. Their measures of noncognitive ability, based on self-esteem and locus of control personality inventories, represent the literature's reliance on individual's assessment of abstract aspects of their noncognitive skills.[2] An innovation in our paper is the use of measures of multiple dimensions of confidence and possession of noncognitive skills that are directly valued in the workplace and that are derived from a rich, opportunistic data set, rather than from established personality inventory surveys. In contrast, we use practical "observational" noncognitive skills

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[1] For a summary of this literature, see Thiel and Thomsen (2013), and for more recent work by, for example, Fletcher (2013) and Keller et al. (2015).
[2] Regarding self-esteem, see Tafarodi and Swann (2001), and regarding locus of control, see Lefcourt (1976) and De Brabander et al. (1999).

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by labor market participants of characteristics and skills they would have experienced, such as the ability to work with people from diverse backgrounds, communication ability, and assertiveness.

The two goals of this paper are to determine whether measures of confidence and noncognitive skills influence post-baccalaureate educational attainment and subsequent labor market outcomes and, if so, whether the relationships vary by gender. That is, can a single longitudinal dataset with a particularly rich set of control variables contribute to our understanding of whether various noncognitive measures help account for gender differences in both human capital attainment and in earnings? An innovation in our paper is the use of "soft", non-test-score attributes that seem to increasingly interest employers, policy makers and scholars, derived from a rich, opportunistic data set, rather than from established personality inventory surveys.

A burgeoning literature investigating the puzzle of persistent gender gaps has incorporated into their models and analyses a variety of measures of noncognitive and personality abilities.[3] For example, in explaining the gender pay gap, Fortin (2008) investigates the roles of self-esteem, greed and altruism, Grove et al. (2011) estimate the roles of work/life preferences, ethical standards and altruism, Nikolaon (2012) uses the Big Five personality traits, Nyhus and Pons (2012) use the Big Five personality traits, locus of control and time preferences, and Manning and Swaffield (2008) utilize a set of psychological factors. In a laboratory study, Niederle and Yestrumskas (2008) find that women exhibit greater reluctance to select more difficult tasks, which they attribute to gender differences in confidence and risk aversion. Conflicting field study evidence exists regarding differences in men's and women's performance due to competitive pressure; for example, women have been shown to perform more poorly than men on the high-stakes entry exam to the very competitive Ecole des Hautes Etudes Commercialesin France (Ors et al., 2008), whereas in pay-for-performance tournament schemes female teachers and tennis players do no worse than men (see Lavy, 2012 and Paserman, 2010; respectively). Eckel (2008) reviews evidence from experimental studies that suggest possible explanations for the gender pay gap. "Grit" is an example of a noncognitive variable that has become an education policy buzzword and has caused quite a controversy; Duckworth et al. (2007) and Duckworth (2016), who drew attention to the role of grit, vehemently opposes it becoming a standardized educational outcome with curricula developed to inculcate, tested for and rewarded it (Kamenetz, 2016).

Our study uses data from the GMAT Registrant Survey, a nationally representative longitudinal survey of registrants for the Graduate Management Admission Test (GMAT) that was conducted in four waves from 1990 to 1998. From Wave 1, we identify individuals' confidence in how well they expect to perform on the verbal and the quantitative sections of the GMAT. Importantly, the survey data were linked to testing records of actual subsequent GMAT scores.[4] In addition, we create an index of self-assessed noncognitive skills based on the extent to which individuals report possessing personal skills or attributes deemed important for success as a manager, such as initiative, ability to delegate tasks, being a team player and physical attractiveness. Note that whereas the confidence measures entail the mental exercise of predicting future performance on the GMAT exam, individuals who are, on average, age 27, have experienced as adults and labor market participants the extent to which they perceive they possess the noncognitive skills and attributes. An advantage of our sample is the relative homogeneity of the respondents: college graduates who had been working for, on average, five and a half years and who were serious enough about graduate studies in business administration to have taken the GMAT. This is important since we wish to understand why similar individuals have different outcomes, rather than, say, why a random draw of 27-year old Americans have different educational and career experiences.

Confidence and noncognitive skills measured in Wave 1 are used to estimate MBA attainment in subsequent years and then job-related outcomes five to eight years later (in Waves 3 and 4).[5] Our results suggest that confidence matters for human capital acquisition and subsequent employment outcomes.[6] Self-reported noncognitive attributes (thought to be important for managerial success) correlate strongly and positively with later managerial status, higher earnings and job satisfaction for both women and men. In contrast, distinct gender differences exist regarding the associations between outcomes and perceptions of quantitative and verbal abilities. Confidence in quantitative ability is strongly and positively associated with men's earnings. In contrast, women's greater confidence in verbal ability is importantly correlated with earnings, but negatively so. Non-linearity analysis shows that this result primarily reflects a penalty for women with high verbal-ability confidence, and some evidence suggests that high verbal confidence is related to women selecting into particular types of (less remunerative) jobs, including self-employment and jobs thought to be "socially responsible.Ïaken together, these results suggest that perceptions of different attributes and skills may have divergent effects on long-term outcomes, though establishing a precise causal pathway is not possible with our data.

A major contribution of our paper is the focus on post-baccalaureate educational outcomes and subsequent employment results. To date, the literature has investigated noncognitive variables of pre-teenagers or teenagers and assessed their role

[3] Regarding gender heterogeneity of noncognitive attributes and outcomes, see Braakmann (2009), Fortin (2008), Grove et al. (2011), Manning and Swaffield (2008), Mueller and Plug (2006), and Nikolaon (2012). Also, see Bertrand's (2011) "New Perspectives on Gender" review of this literature from the *Handbook of Labor Economics* (Ch. 17, 1558–1562).

[4] Thus, our pre-test assessment, when controlling for the actual exam performance, conform with the previous literature's definition of "confidence" which is almost always defined as something like "subjective expected performance, relative to objective actual performance" (see, e.g., Niederle and Vesterlund, 2007; Croson and Gneezy, 2009 Croson and Gneezy, 2009).

[5] Unfortunately, our data do not permit us to test the stability of confidence and non-cognitive skill measures over time.

[6] While our empirical strategy entails estimating models with a relatively rich set of control variables, caution should be taken in interpreting the resulting estimates as true causal effects.

for college and work outcomes (e.g., Fortin, 2008). A key distinction of our paper is that we gather measures of confidence and noncognitive skills from early career individuals who, on average, are 27 years old and have been working for five and half years after completing college. Then, we estimate what role those variables have upon subsequent MBA attainment and experiences and for employment outcomes. Given the increasing importance of graduate education, we assess the role of confidence and noncognitive measures on key economic outcomes for young professionals. Based on a sample of people in their late 20s making decisions about a very important human capital investment, we wish to better understand whether and how these measures of confidence and noncognitive skills matter for people who have a richer set of life experiences with which to make the next set of prospective decisions for themselves. Existing scholarship regarding the determinants of gender gaps among doctorates, law school and medical school graduates, and those with other graduate degrees have focused very little on the role of noncognitive or personality attributes.

The rest of this paper proceeds as follows. Section 2 discusses the data and Section 3 our empirical strategy. In Section 4 we first investigate predictors of two confidence measures and index of self-assessed noncognitive skills using a wide array of demographic and human capital variables and then present estimates of the relationships between these measures on future educational and employment outcomes, as well their influence on the gender gap in future earnings. Section 5 concludes.

2. Data and the confidence and noncognitive skills variables

2.1. Data

The data used in our analysis comes from the GMAT Registrant Survey, a longitudinal survey of individuals who registered to take the Graduate Management Admission Test (GMAT), a requirement for admission at the vast majority of MBA programs in the United States. The survey, sponsored by the Graduate Management Admission Council (GMAC), was mailed to the same individuals in four waves, between 1990 and 1998, some of whom took the GMAT and of those some ultimately completed an MBA. The Wave 1 survey occurred from April 1990 to May 1991, shortly after test registration, but prior to MBA enrollment. Of the 5855 individuals who responded to the initial survey, we limit our attention to the 4783 subsequent GMAT test takers for whom we have scores. Our analysis includes a large number of control variables requiring non-missing responses, restricting our sample to 3878 of the initial survey respondents. Our outcomes are derived from Waves 3 and 4 of the survey (occurring approximately 5 and 8 years after the initial survey), of which one or both were responded to by 3220 individuals.[7]

The GMAT Registrant Survey contains a wealth of information about an individual's background, their education experiences, work experience and earnings. Demographic information includes age and indicator variables for race, gender, marriage and whether they have children. Family background data consist of mother's and father's years of education.

Post-secondary education variables include undergraduate GPA, indicator variables representing selectivity of undergraduate institution attended,[8] whether the individual had an advanced degree at the time of the first survey, and whether they were currently in school as a full-time student. Prior work experience is captured by indicator variables representing the amount of total full-time employment at the time of the Wave 1 survey (i.e., less than one year, between 1 and 3 years, between 3 and 5 years, between 5 and 7 years, and more than seven years) and current job tenure (in years). Wave 1 employment variables include whether the individual was currently unemployed, indicator variables for broad classes of industries, hours worked in a typical week, and whether the respondents considered themselves an entry level manager or a mid/upper level manager (versus non-manager). The same managerial variables were updated in Waves 3 and 4 and are then used together with self-employment status, hourly wage, and annual salary variables as employment outcome measures. In addition, to investigate job quality we use multiple measures of job satisfaction found in Wave 4 of the survey. Finally, since the survey data were linked to testing records, we have actual quantitative and verbal GMAT scores. Detailed definitions for all variables we use can be found in Appendix A, Table A1.

2.2. Confidence and noncognitive skills variables

Both common sense and a substantial body of social science research suggest that factors beyond cognitive ability and other traditional human capital variables matter for success in life. Confidence is hypothesized to increase productivity and improve outcomes because ability and effort are complements, so that greater confidence enhances effort (Benabou and Tirole, 2002).[9] A stream of studies have focused specifically on overconfidence.[10] More self-esteem and internal locus of

[7] An analysis of this sample restriction and attrition is provided in Appendix A, Table A2.

[8] These measures were obtained from Barron's Profiles of American Colleges. We collapsed the various undergraduate admission selectivity categories as designated in Barron's into the following three categories: Highly Selective (19% of our sample), Moderately Selective (26%), and the omitted category representing the least selective schools and those not included in the Barron's guide (55%).

[9] According to Tsui (1998), an indicator of leadership confidence, but not social confidence, affects income among individuals in the business management field.

[10] For example, these studies either empirically document (Benoit et al., 2015; Mobius et al., 2011; Moore and Healy, 2008 Mobius et al., 2011; Moore and Healy, 2008) or theoretically motivate (Compte and Postlewaite, 2004; Koszegi, 2006; Santos-Pinto and Sobel, 2005; Steen, 2004; Zabojnik, 2004)

control, for example, have been associated with greater persistence on difficult tasks, aspiring to more prestigious careers, better interview evaluations, more efficient job search strategies, job performance, independence, achievement-oriented tasks, taking initiative, and happiness.[11] A substantial body of literature has found a correlation between self-esteem and locus of control and educational and economic outcomes.[12]

We contribute to the literature on the behavioral determinants of schooling and earnings by creating two measures of confidence and an index of noncognitive skills. Measures of verbal and quantitative confidence come from the Wave 1 survey, which occurred prior either to taking the GMAT, registering for or (potentially) enrolling in an MBA program. Immediately after registering to take the GMAT but before taking the exam, respondents were asked, in the Wave 1 survey, how well they expected to perform on the quantitative and verbal sections of the GMAT. So that a higher number constitutes greater confidence, we reversed the responses which ranged from 1 ('excellent') to 5 ("poor"). Importantly, the survey data were linked to actual GMAT verbal and quantitative scores (rather than asking respondents to self-report their scores). Our measures conform to the definition of confidence as "subjective expected performance, relative to objective actual performance" (e.g., Niederle and Vesterlund, 2007; Croson and Gneezy, 2009 Croson and Gneezy, 2009). Since actual GMAT scores are controlled for throughout our analysis, we interpret these expectations of verbal and quantitative performance as capturing the noncognitive mental state of "confidence" in these areas, beyond their actual abilities embodied in subsequent realized scores.

For our measure of noncognitive skills, we utilize questions from the Wave 1 survey that asked respondents "to indicate the extent to which you think you have each of these 16 characteristics or skills" deemed important for success as a manager or executive. Responses ranged from 1 ("not at all" having the characteristic or skill) to 4 ("very much" having the characteristic or skill). Those 16 skills and attributes are: ability to adapt theory to practical situations, ability to capitalize on change, ability to delegate tasks, ability to motivate others, ability to organize, ability to work with people from diverse backgrounds, assertiveness, being a team player, communication abilities, connections (i.e., "knowing the right people"), good intuition, high ethical standards, initiative, physical attractiveness, shrewdness, and understanding business in other cultures.

These noncognitive characteristics and skills seem like the types of "soft", non-test-score attributes that are of increasing interest to employers, policy makers and scholars.[13] The existing literature typically asks pre-labor-market entrants (i.e., those in high school or younger) to assess purely mental states of their noncognitive skills, such as Rotter's Locus of Control Scale or Rosenberg's Self-Esteem Scale (see, for example, Heckman et al., 2006; Fortin, 2008). By contrast, our respondents, aged 27 on average, would have had labor market experiences for perhaps 6 years with which to observe the extent to which they possess particular characteristics and skills. Thus, we use labor market participants' self-reported "observational" noncognitive skills, whereas much of the literature asks pre-labor-market entrants to assess "mental state"-noncognitive skills.

In the context of estimating the gender wage gap, Montgomery and Powell (2003) summed up all of the noncognitive skills and characteristics responses into a single control variable which they refer to as a "confidence index". Rather than assume an equal contribution of each response, we use principle component analysis to derive a single measure that summarizes all 16 self-assessed characteristics and skills. Specifically, we take the first principle component (or factor), which results in a linear combination of the individual responses that maximizes overall variance. For better interpretation of our estimation results, we normalize this index to zero mean and unit variance, which we then use as an indicator of self-assessed noncognitive skills and characteristics.

2.3. Descriptive statistics

Of the GMAT Registrant Survey dataset, we investigate the sample of GMAT takers who have non-missing values for the large number of the control variables we use. Our sample contains a maximum of 3878 individuals, of which 38 percent obtained an MBA by the end of the sample period. Table 1 displays the means and standard deviations of the variables in our entire sample and separately for both MBA men and women and non-MBA men and women. Also, Table 1 includes p-values to indicate whether significant differences in means exist between men and women in these samples. In the Wave 1 data, both MBA and non-MBA males had significantly higher expected quantitative GMAT scores than did their female counterparts, and non-MBA females had slightly lower expected verbal GMAT scores than did non-MBA males.

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the existence of individuals' overconfidence in their own abilities or likelihood of success. For example, Malmendier and Tate (2008) investigate whether overconfident CEOs lead to value-destroying mergers and the overpayment of target companies, Englmaier (2011) investigates how the overconfidence of managers influences their benefits to firm, and Koellinger et al. (2013) study the role of overconfidence in driving entrepreneurial activity.

[11] See the studies discussed by De Araujo and Lagos (2013), 120–121. Among other things, confidence is thought to be promoted by height (Persico et al., 2004) and beauty (e.g., Mobius and Rosenblat, 2006). For example, regarding height, Persico et al. (2004) have shown that teenage height, not adult height, increases earnings, apparently since teenage height encourages development of noncognitive attributes like confidence.

[12] See, for example, Braakmann (2009), Darity et al. (1997), De Araujo and Lagos (2013), Drago (2011), Filippin and Paccagnella (2012), Graham et al. (2004), Groves, 2005, Heckman et al. (2006), Kalachek and Raines (1976), Keller et al. (2015), Murnane et al. (2001), and Waddell (2006).

[13] According to the Pew Research Center, nearly 6 million of 9.7 million jobs expected to be added in the United States between 2014 and 2024 will require above average levels of preparation, including education, training and prior experience. Even more dramatic will be in the increased demand for softer skills like written and oral communication, interpersonal skills, and management skills (Desilver, 2016).

Table 1
Descriptive Statistics.

	(i)	(ii)	(iii)	(iv)	(v)	p-values	
	Full sample	Male MBAs	Female MBAs	Male non-MBAs	Female non-MBAs	(ii) = (iii)	(iv) = (v)
Wave 1 Confidence Indicators:							
Noncognitive Skills	−0.026	−0.057	0.006	−0.037	−0.003	0.276	0.382
	(0.982)	(0.968)	(0.950)	(1.002)	(0.977)		
Verbal confidence	3.470	3.501	3.512	3.486	3.413	0.800	0.011
	(0.734)	(0.743)	(0.699)	(0.748)	(0.720)		
Quant confidence	3.664	3.906	3.449	3.826	3.383	0.000	0.000
	(0.855)	(0.810)	(0.811)	(0.837)	(0.823)		
Wave 1 Covariates:							
Age	27.300	27.343	26.615	27.772	26.924	0.031	0.000
	(5.760)	(5.696)	(5.532)	(5.928)	(5.619)		
1 yr. <Experience < 3 yrs.	0.242	0.242	0.291	0.226	0.243	0.067	0.296
	(0.428)	(0.429)	(0.455)	(0.419)	(0.429)		
3 yrs. <Experience < 5 yrs.	0.177	0.190	0.187	0.177	0.165	0.893	0.434
	(0.382)	(0.393)	(0.390)	(0.381)	(0.371)		
5 yrs. < Experience < 7 yrs.	0.118	0.100	0.117	0.116	0.133	0.367	0.183
	(0.323)	(0.301)	(0.322)	(0.320)	(0.339)		
Experience > 7 yrs.	0.250	0.265	0.196	0.280	0.223	0.007	0.001
	(0.433)	(0.442)	(0.397)	(0.449)	(0.416)		
Asian	0.172	0.147	0.137	0.192	0.174	0.639	0.212
	(0.377)	(0.355)	(0.345)	(0.394)	(0.379)		
Black	0.122	0.063	0.146	0.093	0.187	0.000	0.000
	(0.327)	(0.243)	(0.354)	(0.291)	(0.390)		
Hispanic	0.156	0.134	0.160	0.167	0.156	0.216	0.446
	(0.363)	(0.341)	(0.367)	(0.373)	(0.363)		
Married	0.291	0.331	0.243	0.318	0.248	0.001	0.000
	(0.454)	(0.471)	(0.430)	(0.466)	(0.432)		
Kids	0.269	0.278	0.191	0.329	0.215	0.040	0.000
	(0.717)	(0.759)	(0.606)	(0.799)	(0.601)		
Mother's Education	14.08	14.58	14.30	13.97	13.81	0.204	0.278
	(3.76)	(3.63)	(3.64)	(3.84)	(3.76)		
Father's Education	13.39	13.68	13.68	13.15	13.41	0.995	0.046
	(3.39)	(3.25)	(3.30)	(3.49)	(3.38)		
Quantitative GMAT	29.14	32.76	29.07	30.08	25.68	0.000	0.000
	(8.64)	(7.94)	(7.51)	(8.71)	(8.13)		
Verbal GMAT	28.20	30.76	29.99	27.79	26.43	0.081	0.000
	(7.99)	(7.21)	(7.48)	(8.14)	(7.91)		
Undergraduate GPA	3.024	3.033	3.157	2.960	3.049	0.000	0.000
	(0.424)	(0.410)	(0.391)	(0.426)	(0.428)		
Selective Undergrad	0.251	0.282	0.252	0.239	0.245	0.257	0.703
	(0.433)	(0.450)	(0.435)	(0.426)	(0.430)		
Highly Selective Undergrad	0.199	0.237	0.241	0.194	0.165	0.874	0.056
	(0.399)	(0.425)	(0.428)	(0.395)	(0.371)		
Other Advanced Degree	0.056	0.046	0.038	0.079	0.042	0.552	0.000
	(0.231)	(0.209)	(0.192)	(0.269)	(0.200)		
Industry: Agricultural	0.165	0.161	0.122	0.164	0.184	0.065	0.178
	(0.371)	(0.367)	(0.327)	(0.370)	(0.388)		
Industry: Manufacturing	0.170	0.206	0.205	0.181	0.121	0.960	0.000
	(0.376)	(0.405)	(0.404)	(0.385)	(0.326)		
Industry: Service	0.168	0.141	0.185	0.151	0.203	0.043	0.000
	(0.374)	(0.348)	(0.388)	(0.358)	(0.402)		
Industry: Finance, Real Estate	0.131	0.145	0.135	0.121	0.133	0.651	0.364
	(0.337)	(0.352)	(0.342)	(0.326)	(0.339)		
Industry: Public Administration	0.078	0.082	0.052	0.082	0.079	0.052	0.787
	(0.268)	(0.274)	(0.222)	(0.274)	(0.270)		
Tenure	2.114	2.392	1.906	2.276	1.808	0.011	0.000
	(3.281)	(3.428)	(2.673)	(3.626)	(2.876)		
Unemployed	0.270	0.229	0.245	0.283	0.289	0.515	0.720
	(0.444)	(0.420)	(0.431)	(0.451)	(0.454)		
In school	0.183	0.163	0.194	0.186	0.187	0.182	0.927
	(0.387)	(0.370)	(0.396)	(0.389)	(0.390)		
Hours (per week)	30.694	33.631	30.768	31.016	28.385	0.020	0.001
	(20.924)	(20.962)	(19.639)	(21.544)	(20.314)		
Entry level Manager	0.171	0.189	0.169	0.171	0.160	0.391	0.463
	(0.376)	(0.392)	(0.375)	(0.376)	(0.367)		
Mid/Upper-level Manager	0.114	0.162	0.059	0.132	0.083	0.000	0.000
	(0.318)	(0.369)	(0.235)	(0.339)	(0.275)		
MBA	0.376	1.000	1.000	0.000	0.000		
	(0.484)	(0.000)	(0.000)	(0.000)	(0.000)		
N	3878	747	444	1512	1175		

Table 1 (*Continued*)

	(i)	(ii)	(iii)	(iv)	(v)	p-values	
	Full sample	Male MBAs	Female MBAs	Male non-MBAs	Female non-MBAs	(ii)=(iii)	(iv)=(v)
MBA outcomes:							
Top 25 MBA	0.149	0.163	0.126			0.082	
	(0.357)	(0.370)	(0.332)				
MBA GPA	3.516	3.527	3.498			0.095	
	(0.273)	(0.275)	(0.269)				
Finance	0.223	0.267	0.151			0.000	
	(0.417)	(0.443)	(0.359)				
Marketing	0.118	0.097	0.153			0.004	
	(0.323)	(0.296)	(0.361)				
N	1191	747	444				
Employment outcomes (Waves 3 & 4):							
Entry level Manager	0.210	0.219	0.233	0.188	0.216	0.465	0.057
	(0.407)	(0.414)	(0.423)	(0.391)	(0.412)		
Mid/Upper-level Manager	0.287	0.347	0.235	0.310	0.234	0.000	0.000
	(0.453)	(0.476)	(0.424)	(0.463)	(0.423)		
Self-employed	0.049	0.041	0.038	0.070	0.035	0.737	0.000
	(0.215)	(0.198)	(0.191)	(0.255)	(0.185)		
Hourly Wage	23.23	26.27	22.51	24.59	19.14	0.076	0.000
	(35.76)	(50.91)	(29.67)	(37.27)	(11.09)		
Annual Salary	53.99	63.86	52.69	57.34	41.45	0.018	0.000
(x $1000)	(80.62)	(112.3)	(68.39)	(85.12)	(25.79)		
General JDI	39.955	40.092	40.160	39.592	40.153	0.917	0.334
	(10.035)	(9.713)	(8.971)	(10.596)	(10.227)		
Work JDI	38.151	39.288	37.545	37.881	37.692	0.012	0.752
	(10.464)	(9.894)	(10.497)	(10.838)	(10.470)		
Pay JDI	18.838	19.684	19.186	19.120	17.434	0.273	0.000
	(7.021)	(6.443)	(6.971)	(6.830)	(7.630)		
N	5012	1237	733	1685	1357		

Notes: Source of data is the GMAT Registrant Survey. MBA Sample includes individuals known to have completed an MBA sometime within the sample period (ie., by Wave 4). Numbers of observations correspond to non-missing values of Wave 1 covariates. Actual sample sizes in regressions may differ due to some additional missing values of confidence indicators and the inclusion of Waves 3 and 4 for employment outcomes. Standard deviations of non-binary variables are reported in parenthesis. The last two columns report *p*-values from two-sided *t*-tests.

Among our sample for Wave 1, men were a bit older and were both more likely to be married and to have children. In addition, men worked 10 percent more hours, had both more work experience and tenure than women, and were more likely to be mid- or upper-level managers. Our sample contains twice as many black female MBAs as black males MBAs. Although women's college GPAs exceeded those of men, men had higher GMAT verbal scores than women and much higher quantitative scores. In general, the differences by gender are comparable between MBAs and non-MBAs.

For outcomes conditional on obtaining an MBA, more males studied finance as their major program at graduate management schools whereas more females concentrated on marketing. Males also had a slightly higher MBA GPA and were a bit more likely to graduate from a top 25 MBA program.

In Waves 3 and 4, the gender earnings gap is significant (MBA males, on average, earned $64,000 versus $53,000 for MBA females, and non-MBA males earned $57,000 versus $41,000 for non-MBA females). Among those with and without MBAs, men remained more likely to be mid- or upper-level managers.

3. Empirical strategy

The descriptive statistics in Table 1 suggest gender heterogeneity in math and verbal confidence and self-assessed noncognitive skills and a rich set of control variables. Given further differences in MBA attainment and career outcomes, our objective is to determine whether noncognitive skills and confidence measures matter for schooling and labor market outcomes and, if so, whether their (conditional) effects differ by gender. The dependent variables we consider for academic outcomes are: (1) whether or not the individual obtained an MBA sometime within the sample period; (2) conditional on MBA attainment, whether that MBA was obtained from a top 25 program, according to *U.S. News & World Report* 1992 rankings; (3) the individual's GPA within the MBA program; and (4) whether the individual reports concentrating their MBA studies in finance or in marketing.

For career-related outcomes, we utilize Waves 3 and 4 of the GMAT Registrant Survey, occurring approximately 5–8 years following the initial survey Wave 1 from which the confidence measures are derived. We ran earnings regressions of both the log of the hourly wage and the log of the annual salary, each calculated from survey responses about earnings and hours

worked.[14] We also consider the role of confidence in future self-employment, by creating an indicator variable for whether the individual reported being self-employed (part- or full-time) at the time of the Wave 3 or 4 survey responses. We consider self-reported managerial status (from Waves 3 and 4) as a categorical dependent variable as either a non-manager, an entry-level manager, or a mid- to upper-level manager. Finally, Wave 4 contains Job Descriptive Index (JDI) surveys, used primarily in the field of industrial organizational psychology, regarding satisfaction with work, pay and promotion opportunities (and the related Job in General survey).[15] The JDI survey questions ask respondents to indicate whether particular words or phrases describe their current employment situation. In order to investigate possible effects on multiple dimensions of non-pecuniary job quality, we include as dependent variables the resulting indexes for each of the JDI surveys.

Our regression analyses all follow from the simple formulation:

$$Outcome_{ij} = f\left(\alpha + X_i\beta + Confidence_{ik} \times \gamma_{jk} + Noncognitive_i \times \delta_j\right) \quad (1)$$

where, for individual i and outcome j, X_i is a vector of control variables (human capital, demographic, and initial employment) all derived from Wave 1 of the GMAT Registrant Survey. $Confidence_k$ represents each of our (k) confidence indicators, and *Noncognitive* is our derived index of non-cognitive skills and characteristics, each also based on Wave 1 survey responses. The coefficients on those variables, γ and δ, are our parameters of interest. The functional form and method of estimation depends on the outcome j being considered. We use ordinary least squares (OLS) in cases where the dependent variable may be considered continuous (log of wage, log of earnings, MBA GPA, and JDI). In cases where the dependent variable is binary (MBA, top 25 MBA, study finance, study marketing, and self-employed) or categorical (managerial status), we use probit and multinomial logit estimation, respectively. In these cases we report the average marginal effect estimated from each observation in the sample or subsample, representing the estimated influence of an increase in the confidence (or non-cognitive) measure by one unit (or one standard deviation) on the probability of observing the outcome (such as, for example, obtaining an MBA).

In all estimation specifications, we include the full set of Wave 1 covariates reported in Table 1 (and detailed in Table A1). Although we have estimated our models with the dataset including men and women together, here we present results of separate regressions for males and females. This allows us to consider distinct relationships by gender, as motivated by the growing literature that investigates possible sources of gender differences in economic outcomes, such as confidence. Finally, using the results from salary and wage regressions, we carry out Oaxaca-Blinder decompositions to investigate the degree to which our non-cognitive and confidence variables, in comparison to other, more traditional, variables can explain the gender earnings gap.

4. Results

We begin by investigating the relationship between our two confidence measures and noncognitive attributes and individuals' demographic characteristics, educational and work backgrounds, and GMAT quantitative and verbal test score. Especially since our noncognitive variables are novel, we evaluate their correlation with whether or not they may be predicted by background variables. We also consider whether predictors of them differ by gender.

Table 2 displays estimates from regressions of each of our confidence and noncognitive measures on the Wave 1 covariates from Table 1 and p-values to indicate significant differences between men and women. The magnitudes of the coefficients represent, for verbal and quantitative confidence, the estimated effects of the independent variables on increasing the confidence response by one category (from a range of 1–5). For the noncognitive ability index, which was normalized, the magnitudes are in terms of standard deviations of this outcome measure. For example, males from highly selective undergraduate schools showed higher self-assessed noncognitive skills (an increase of 0.16 of the standard deviation) compared to males from least-selective undergraduate schools. However, females became less confident in quantitative skills (reduced by 0.17) if they graduated from highly selective undergraduate schools.

Overall, we find that our confidence versus noncognitive measures differ quite a bit in terms of predictability, while many of the predictor variables for a given measure are common across genders. The noncognitive skill index is highly correlated with several demographic and background variables, while verbal and quantitative confidence appear to be more independent of other personal characteristics. For both men and women, blacks and Hispanics reported higher noncognitive skills (both conditional and unconditional on covariates), and Asians reported less (compared to non-Hispanic whites). Mid- and upper-level managers also reported much higher noncognitive abilities – almost a third of a standard deviation higher than their non-manager counterparts. True for both men and women, this may be a testament to the likelihood that our noncognitive measure, compared to our verbal and quantitative confidence measures, is picking up actual noncognitive

[14] Earnings (including monetary bonuses but not one-time starting bonuses) were reported in the surveys in a number of allowable ways (including hourly, weekly, bi-weekly, monthly, or yearly). For those not reporting an hourly wage, we used individual reports of how many hours they work in a typical week to calculate a measure of hourly wage, assuming 50 weeks worked per year. Annual earnings were similarly calculated when earnings were not reported in annual terms. We use both measures of earnings because of this imprecision in annual labor supply and to allow for the joint impact of confidence and non-cognitive skills on earnings and hours worked. The vast majority of respondents reported earnings in annual form (87 percent of women and 91 percent of men).

[15] See Smith et al. (1987) and the JDI website: http://www.siop.org/tip/july10/06jdi.aspx. Of the five JDI surveys, the Supervision and the Coworkers surveys were not included in the GMAT Registrant Survey.

Table 2
Predictors of Confidence Indicators and Noncognitive Skills

	Males			Females					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	p-values		
	Verbal	Quantitative	Noncognitive	Verbal	Quantitative	Noncognitive	(i)=(iv)	(ii)=(v)	(iii)=(vi)
Age	0.007	−0.003	−0.018**	−0.001	−0.018***	−0.008	0.331	0.069	0.387
	(0.005)	(0.005)	(0.007)	(0.006)	(0.007)	(0.009)			
Asian	−0.011	0.039	−0.160***	−0.087*	0.018	−0.171**	0.229	0.756	0.937
	(0.042)	(0.041)	(0.060)	(0.049)	(0.054)	(0.072)			
Black	0.098*	0.068	0.278***	0.059	0.245***	0.159**	0.590	0.023	0.397
	(0.054)	(0.054)	(0.079)	(0.048)	(0.053)	(0.071)			
Hispanic	−0.015	0.007	0.196***	0.021	0.088*	0.142**	0.560	0.202	0.687
	(0.042)	(0.041)	(0.061)	(0.048)	(0.053)	(0.070)			
Married	−0.071*	−0.057	0.113**	0.002	0.029	−0.074	0.226	0.157	0.030
	(0.039)	(0.039)	(0.057)	(0.042)	(0.046)	(0.061)			
Mother's edu.	0.005	0.002	0.010	−0.002	0.001	0.018**	0.326	0.873	0.336
	(0.005)	(0.005)	(0.007)	(0.005)	(0.006)	(0.008)			
Father's edu.	0.008	−0.007	0.015*	0.008	−0.003	−0.003	0.998	0.620	0.185
	(0.005)	(0.005)	(0.008)	(0.006)	(0.007)	(0.009)			
Quant GMAT	−0.019***	0.064***	−0.014***	−0.022***	0.064***	−0.021***	0.420	0.972	0.097
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)			
Verbal GMAT	0.049***	−0.015***	−0.013***	0.051***	−0.015***	0.003	0.670	0.998	0.001
	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.004)			
Undergrad GPA	0.030	0.018	0.156***	0.059	0.030	0.013	0.607	0.841	0.110
	(0.036)	(0.036)	(0.052)	(0.042)	(0.046)	(0.062)			
Selective undergrad	−0.037	0.015	0.086*	−0.090**	−0.021	0.018	0.400	0.003	0.039
	(0.035)	(0.034)	(0.050)	(0.039)	(0.043)	(0.058)			
Highly selective undergrad	0.054	0.017	0.159**	0.004	−0.170***	−0.022	0.307	0.499	0.274
	(0.040)	(0.040)	(0.058)	(0.046)	(0.051)	(0.068)			
Other Advanced Degree	0.069	0.075	0.061	0.018	0.170*	0.064	0.660	0.413	0.981
	(0.060)	(0.059)	(0.087)	(0.086)	(0.094)	(0.127)			
Tenure	−0.024***	−0.012**	−0.017**	−0.010	−0.001	−0.003	0.128	0.257	0.298
	−0.005	−0.005	−0.008	−0.007	−0.008	−0.011			
Unemployed	−0.071	−0.049	0.143	−0.092	−0.004	0.028	0.842	0.691	0.447
	−0.073	−0.072	−0.106	−0.083	−0.091	−0.124			
In School	0.034	0.061	0.189***	−0.074	−0.003	−0.083	0.144	0.431	0.015
	−0.049	−0.049	−0.071	−0.056	−0.062	−0.085			
Hours (per week)	−0.002	0.000	0.005*	0.000	0.001	0.002	0.533	0.846	0.397
	−0.002	−0.002	−0.003	−0.002	−0.002	−0.003			
Entry Level Manager	0.073*	−0.028	0.058	0.011	−0.037	0.125*	0.353	0.793	0.507
	−0.041	−0.041	−0.059	−0.046	−0.051	−0.070			
Mid/Upper-Level Manager	0.045	−0.015	0.341***	0.057	0.038	0.366***	0.856	0.572	0.857
	−0.049	−0.048	−0.070	−0.067	−0.074	−0.101			
Adjusted R^2	0.220	0.379	0.070	0.236	0.293	0.054			
N	2232	2232	2232	1604	1604	1604			

Note: Columns (i)–(vi) report estimated coefficients from OLS regressions, with robust standard errors in parentheses. Each regression also included work experience variables, kids, and broad industry indicator variables (Table 1). ***, **, and * indicate that the coefficient is statistically significantly different from zero at the 1, 5 and 10 percent levels, respectively. The last 3 columns report *p*-values of tests for coefficient differences by gender.

skills developed with work experience. Not surprisingly, the most robust predictors of verbal and quantitative confidence, for both men and women, were actual verbal and quantitative GMAT scores. But surprisingly, however, quantitative scores positively relate to quantitative confidence (and similarly for verbal scores and verbal confidence) but scores in one area (quantitative or verbal) of the exam have a conditional *negative* relationship with confidence in the *other* area. These cross-effects have about 25–40 percent of the impact of actual test scores within the area. Quantitative scores also negatively impact self-reported noncognitive skills.

Other differences in predictors of confidence vary significantly by gender. Married men tend to have greater self-assessed noncognitive skills, a relationship that contrasts with the negative (but insignificant) point estimate found for married women. Males who graduated from highly selective undergraduate institutions reported possessing significantly more noncognitive skills than graduates of other programs. Conversely, graduating from elite institutions negatively impacted quantitative confidence for women, but not men. Similarly, males who were currently full-time students in Wave 1 reported higher noncognitive attributes, while women who were currently students reported lower noncognitive abilities.

Table 3 displays the relationship between the two confidence measures and noncognitive abilities and MBA experiences for males (Panel A) and females (Panel B), while Table 4 does so for employment outcomes. Our focus in these tables is on the estimated coefficients (or marginal effects) for the three noncognitive and confidence variables, but these regression results

Table 3
Effects of Confidence Indicators and Noncognitive Skills on MBA Outcomes.

	(i) Obtained MBA	(ii) Obtained Top 25 MBA	(iii) MBA GPA	(iv) Study Finance	(v) Study Marketing
Panel A: Males					
Noncognitive Skills	0.020*	−0.003	0.008	0.006	0.005
	(0.012)	(0.013)	(0.011)	(0.017)	(0.013)
Verbal Confidence	−0.050***	−0.019	0.014	−0.072***	0.026
	(0.018)	(0.018)	(0.016)	(0.026)	(0.018)
Quantitative Confidence	−0.026	0.014	0.038**	−0.023	−0.033*
	(0.018)	(0.020)	(0.017)	(0.027)	(0.019)
N	1810	735	649	700	700
Joint significance	0.007	0.633	0.050	0.025	0.194
Pseudo/Adj. R^2 w/Conf. and Noncog.	0.049	0.345	0.151	0.098	0.095
Pseudo/Adj. R^2 w/o Conf. and Noncog.	0.044	0.342	0.145	0.087	0.084
Panel B: Females					
Noncognitive Skills	0.026**	0.024	−0.005	−0.003	0.048**
	(0.014)	(0.017)	(0.014)	(0.019)	(0.022)
Verbal Confidence	−0.015	−0.019	−0.038*	0.018	0.078**
	(0.021)	(0.023)	(0.023)	(0.028)	(0.032)
Quantitative Confidence	−0.048**	−0.025	0.013	0.001	−0.020
	(0.019)	(0.022)	(0.018)	(0.025)	(0.028)
N	1323	441	390	427	391
Joint significance	0.021	0.282	0.292	0.924	0.012
Pseudo/Adj. R^2 w/Conf. and Noncog.	0.079	0.336	0.225	0.192	0.127
Pseudo/Adj. R^2 w/o Conf. and Noncog.	0.073	0.324	0.223	0.191	0.094
p-values of tests for gender differences in coefficient estimates					
Noncognitive Skills	0.764	0.218	0.424	0.892	0.126
Verbal Confidence	0.197	0.966	0.048	0.053	0.286
Quant Confidence	0.324	0.186	0.286	0.673	0.472
Jointly different	0.495	0.400	0.053	0.211	0.148

Notes: Reported in columns (iii) are coefficient estimates from OLS regressions, and all others columns report average marginal effects from probit estimations. Estimations were carried out separately by gender and included all covariates from Table 1. Columns (ii)-(v) are conditional on MBA attainment. ***, ** and * indicate the coefficient is significantly different from zero at the 1, 5 and 10 percent levels, respectively. Joint significance reports the p-value for the joint significance of the noncognitive skills and confidence variables. Pseudo/Adj. R^2 reports pseudo R^2 for columns (i), (ii), (iv), (v) and adjusted R^2 for columns (iii) with or without the noncognitive skills and confidence variables. The lower panel reports p-values from tests for gender differences in coefficients, with Wald tests used for linear estimations and LR tests over fully gender interacted models for ML estimations.

are based on controlling for all of the covariates in Table 1.[16] While the adjusted R^2 (or pseudo-R^2) only modestly increase with the addition of our confidence and noncognitive variables, several of our key variables are individually significant in these specifications, and they are jointly significant in the majority of the models. Regarding their individual marginal effects, several broad patterns emerge from our analysis.

First, as shown in Table 3, our confidence measures appear to serve somewhat as sorting mechanisms for MBA studies, but with gender heterogeneity. Men (but not women) with higher verbal confidence are less likely to obtain an MBA. Quantitative confidence, however, deters women from completing an MBA.[17] Conditional on MBA attainment, verbal confidence also influences one's choice to concentrate their studies. Men with higher verbal confidence are significantly less likely to concentrate in finance coursework. On the other hand, women with higher verbal confidence are not deterred from studying finance, but rather are more likely to study marketing.

Second, greater self-assessed noncognitive skills are associated with a greater likelihood of both women and men obtaining an MBA. Furthermore, noncognitive skills reinforce the role of verbal confidence in driving women MBAs to concentrate in marketing. Interestingly, while confidence and noncognitive skills matter for MBA attainment, they do not significantly affect the likelihood of graduating from a top-rated university. Finally, regarding performance while in school, we see that while quantitative confidence is positively related to grade point average for men, verbal confidence has the opposing effect for women. Both the consistent role of noncognitive skills, and this gendered relationship regarding verbal versus quantitative confidence, are also largely mimicked in our employment related results.

Turning to the employment-related outcomes in Table 4, we observe that self-assessed noncognitive skills are strongly associated with being a mid- to upper-level manager and with higher wages and salaries. Though seemingly modest in

[16] Several demographic, human capital and work experience variables (not reported in Table 3) were significantly associated for both men and women with either obtaining an MBA (e.g., GMAT scores) or a top 25 MBA (e.g., the selectivity of the undergraduate school, and father's education). Other factors varied by gender. In particular, Asians, blacks and Hispanics were all much more likely than whites to graduate from top 25 MBA programs (conditional on MBA attainment), as were those who attended a selective or highly selective undergraduate institution. Women who, in Wave 1, reported working longer hours or were unemployed or were unmarried, were more likely to obtain elite MBAs.

[17] Our observation that MBA attainment is negatively related to an individuals' confidence corroborates work by Arcidiacono et al. (2008), who suggest that a non-elite MBA may serve as a substitute for typically unobservable personal characteristics or skills.

Table 4
Effects of Confidence Indicators and Noncognitive Skills on Employment Outcomes.

	(i) Non-Manager	(ii) Entry-level Manager	(iii) Mid/Upper-Level Manager	(iv) Self-Employed	(v) Log (Wage)	(vi) Log (Salary)	(vii) General JDI	(viii) Work JDI	(ix) Pay JDI	(x) Promotion JDI
Panel A: Males										
Noncognitive Skills	−0.024**	−0.006	0.029***	0.005	0.021**	0.041***	1.901***	1.808***	0.660***	1.284***
	(0.010)	(0.008)	(0.009)	(0.005)	(0.009)	(0.010)	(0.316)	(0.318)	(0.204)	(0.263)
Verbal Confidence	−0.003	−0.017	0.021*	0.008	−0.019	−0.021	−1.164***	−1.041**	−0.692**	−0.655*
	(0.014)	(0.012)	(0.012)	(0.007)	(0.013)	(0.015)	(0.448)	(0.450)	(0.288)	(0.372)
Quantitative Confidence	−0.024*	0.021*	0.003	−0.011*	0.031**	0.048***	−0.019	0.546	0.193	0.104
	(0.014)	(0.012)	(0.012)	(0.007)	(0.013)	(0.015)	(0.448)	(0.449)	(0.288)	(0.372)
N		2855		2754	2735	2735	1345	1328	1335	1343
Joint Significance		0.001		0.185	0.009	0.000	0.000	0.000	0.003	0.000
Pseudo/Adj. R^2 w/conf. and noncog.		0.121		0.088	0.262	0.302	0.040	0.042	0.039	0.079
Pseudo/Adj. R^2 w/o conf. and noncog		0.117		0.084	0.260	0.296	0.014	0.018	0.031	0.006
Panel B: Females										
Noncognitive Skills	−0.028**	0.000	0.028***	0.008*	0.024**	0.045***	0.948***	1.181***	0.596**	0.702**
	(0.012)	(0.010)	(0.010)	(0.005)	(0.010)	(0.012)	(0.347)	(0.376)	(0.261)	(0.310)
Verbal Confidence	−0.030*	0.011	0.019	0.007	−0.062**	−0.077***	−1.061*	−0.304	−0.852**	0.028
	(0.018)	(0.015)	(0.014)	(0.007)	(0.016)	(0.019)	(0.544)	(0.580)	(0.405)	(0.482)
Quantitative Confidence	0.017	−0.013	−0.004	−0.007	−0.000	0.009	0.223	0.075	0.541	0.636
	(0.016)	(0.014)	(0.013)	(0.006)	(0.003)	(0.017)	(0.488)	(0.522)	(0.365)	(0.436)
N		2047		2028	1941	1941	957	944	954	958
Joint Significance		0.026		0.184	0.000	0.000	0.014	0.015	0.012	0.022
Pseudo/Adj. R^2 w/conf. and noncog.		0.096		0.123	0.269	0.259	0.012	0.015	0.106	0.055
Pseudo/Adj. R^2 w/o conf. and noncog		0.092		0.115	0.262	0.250	0.004	0.007	0.065	0.049
p-values of tests for gender differences in coefficient estimates										
Noncognitive Skills		0.800	0.771	0.354	0.960	0.990	0.036	0.151	0.903	0.109
Verbal Confidence		0.146	0.742	0.964	0.048	0.030	0.816	0.262	0.884	0.211
Quant Confidence		0.026	0.468	0.955	0.079	0.096	0.676	0.506	0.559	0.371
Jointly different		0.108	0.894	0.816	0.032	0.023	0.220	0.330	0.951	0.222

Notes: Reported in columns (i)-(iii) are average marginal effects from multinomial logit estimation, column (iv) reports average marginal effects from probit estimations, and columns (v)-(x) report coefficient estimates from OLS regressions. Estimations were carried out separately by gender and included all covariates from Table 1. Estimations reported included current employment observations from Waves 3 and 4 of the GMAT Registrant Survey. ***, **, and * indicate the coefficient is significantly different from zero at the 1, 5, and 10 percent levels, respectively. Joint significance reports the p-value for the joint significance of the noncognitive skills and confidence variables. Pseudo/Adj. R^2 reports pseudo R^2 for columns (i)-(iv) and adjusted R^2 for columns (v)-(x) with or without the noncognitive skills and confidence variables. The lower panel reports p-values from tests for gender differences in coefficients, with Wald tests used for linear estimations and LR tests over fully gender interacted models for ML estimations.

Table 5
Oaxaca-Blinder Decomposition of Gender Earning Gap.

	(i) Log(Salary)	(ii)	(iii) Log(Wage)	(iv)
	Wave 1 Variables	Updated variables	Wave 1 Variables	Updated variables
Raw Gap (male–female)	0.243***	0.243***	0.167***	0.167***
Explained	0.085***	0.145***	0.067***	0.068***
Noncog. Skills	−0.003**	−0.001*	−0.001*	−0.001*
Verbal Conf.	−0.001	−0.001	−0.001	−0.001
Quantitative Conf.	0.011**	0.007*	0.005	0.006
Test scores	0.031***	0.029***	0.034***	0.031***
Experience/Tenure	0.014***	0.017***	0.011***	0.016***
Married/kids	0.001	0.006**	0.002	0.006***
Education	−0.004	−0.002	−0.003	−0.002
Industry	0.005**	0.009***	0.002	0.008***
Hours	0.028***	0.067***	0.013***	−0.012***
Other variables	0.004	0.014**	0.005	0.017***
N	4780	4602	4780	4602

Note: Reported are the Oaxaca-Blinder decomposition results of gender differences in log(Salary) and log(Wage), including how much of the differences are explained by various (groups of) covariates. Reference coefficients for the decomposition are those from a pooled (male and female) regression model (following Neumark, 1988). Regressions included covariates (Table 1) available in wave 1 in columns (i) and (iii) and covariates with updated values, if any, from waves 3 and 4 in columns (ii) and (iv). ***, ** and * indicate the contribution is significantly different from zero at the 1, 5 and 10 percent levels, respectively.

magnitude, the influence that noncognitive skills may have on future earnings is not trivial: a standard deviation increase in this measure is associated with a 4 percent increase in annual earnings, an effect as large as obtaining an MBA from a typical (non-elite) program.[18] Corresponding with this relationship with earnings, noncognitive attributes are related to both men's and women's satisfaction with their pay, as well as significantly and positively related to satisfaction with one's work environment, their opportunities for promotion, and satisfaction with their job in general.[19]

We also find strong significant effects of our confidence measures on earnings, though these differ by gender. Men enjoy a premium for quantitative confidence, such that increasing this measure by one category (such as moving from expecting to do "average" on the quantitative portion of the GMAT to doing "above average", the two most common categories of responses) is associated with almost 5 percent higher annual earnings. Despite having similar high returns to quantitative skills (ie., actual quantitative GMAT scores) as men, women observe no premium on confidence in this area. Rather, verbal confidence is associated with lower wages and salaries for women.[20] Verbal confidence is also negatively associated with attitudes towards one's pay, both for women and for men. In fact, in contrast to the apparent effects of noncognitive skills, this measure of confidence has a broad negative impact on job satisfaction, as reflected in almost all the JDI indexes. Furthermore, with the exception of self-employment, our noncognitive and confidence measures are found to be jointly statistically significant in predicting all of the employment outcomes, each measured between 5 and 8 years later.

Because we observe significant associations between earnings of our noncognitive skills and confidence variables (in ways that differ by gender), and we also observe differences in the levels of these variables by gender (Table 1), we now turn to investigating their effect on the gender earnings gap. Table 5 reports results from an Oaxaca-Blinder decomposition of both the gender wage gap and the gender salary gap. Two specifications are provided: one which only includes our covariates from Wave 1, and another that updates these variables to current values when possible (such as tenure, industry of employment, hours and graduate degrees).[21] The raw salary gap is estimated to be around 24 percent, of which only 8.5 percentage points are explained by our initial covariates, and 14.5 percentage points are explained using the current employment/education variables. This leaves about a 10 percent gap that remains unexplained, both in salary and in wages.

We find that both noncognitive skills and quantitative confidence explain small but statistically significant portions of the gap. Quantitative confidence is especially non-trivial in its contribution, contributing about 13 percent of the explained gap in the predictive (Wave 1) specification. While relatively small, for this group of aspiring business professionals, this amount exceeds the combined effects of marriage and children, more than our broad industry variables, and about two thirds of that explained by initial experience and tenure. It also has about a third of the explanatory power of actual test

[18] Arcidiacono et al. (2008), who also use data from the GMAT Registrant Survey, focus on estimating the return to an MBA for various types MBA programs.
[19] To further investigate the possibly heterogeneous roles of various types of non-cognitive skills, we estimated log earnings regressions with each component of our composite non-cognitive skill measure included as separate variables. These results are shown in Table A4 of the Appendix. Both men and women are found to have high returns to initiative, as well as differing positive returns to physical attractiveness (self-assessment). Ability to motivate others and "knowing the right people" (connections) are positively associated with earnings for men. "Being a team player" is strongly and positively rewarded for women, as is "ability to adapt theory to practice." Interestingly, "ability to organize" and "good intuition" are penalized for women.
[20] The gendered relationships of these confidence indicators to future earnings are also reflected in joint significance tests for differences in coefficients across the samples (displayed in the bottom panel of Table 4).
[21] These current employment and education variables, are of course, likely to be influenced by the confidence and non-cognitive skill indicators. For this reason we provide the alternative specifications.

Table 6
Effects of High and Low Confidence and Noncognitive Skill Indicators on Future Earnings.

	Log(Salary)		Log(Wage)	
	Males	Females	Males	Females
Noncognitive Skills – Low	−0.073***	−0.065**	−0.042*	−0.046*
	(0.024)	(0.030)	(0.022)	(0.025)
Verbal Confidence – Low	0.033	0.083	0.056	0.057
	(0.042)	(0.052)	(0.038)	(0.043)
Quantitative Confidence – Low	−0.105**	−0.002	−0.058	0.011
	(0.044)	(0.037)	(0.040)	(0.031)
Noncognitive Skills – High	0.042*	0.050*	0.030	0.004
	(0.025)	(0.029)	(0.023)	(0.024)
Verbal Confidence – High	−0.035	−0.123**	−0.023	−0.074*
	(0.036)	(0.050)	(0.033)	(0.041)
Quantitative Confidence – High	0.044*	0.041	0.022	0.000
	(0.026)	(0.046)	(0.024)	(0.038)
N	2735	1941	2735	1941
Joint significance	0.000	0.007	0.074	0.202
Adj. R2 w/Conf. and Noncog.	0.301	0.254	0.261	0.262
Adj. R2 w/o Conf. and Noncog.	0.296	0.249	0.260	0.261

Note: Reported are coefficient estimates from OLS regressions over employment observations from Waves 3 and 4 of the GMAT Registrant Survey, with robust standard errors in parentheses. Low (high) noncognitive confidence was defined as being the bottom (top) 20% of the sample, and low (high) verbal or quantitative confidence was defined as being the lowest 2 categories or highest 1 category, respectively, of survey responses. All regressions were carried out separately by gender and included all covariates from Table 1, in addition to dummy variables for survey wave and for MBA completion. ***, ** and * indicate the coefficient is significantly different from zero at the 5 and 10 percent levels, respectively. Joint significance reports the p-value for the joint significance of the noncognitive skills and confidence variables.

scores. Interestingly, noncognitive skills explain a negative portion of the gap, working in women's favor. Given our previous results, this should not be surprising, as men and women are similarly rewarded for noncognitive skills, and women report higher levels of these skills on average.

Finally, since a positive coefficient on a confidence or noncognitive indicator in an earnings regression might indicate either a premium for highly confident people or a penalty for people with particularly low confidence, we investigate the relationship between confidence or noncognitive skills and future earnings further by estimating the association between the earnings outcomes and individuals with particularly low or particularly high confidence or noncognitive skills. We define these as being in the bottom or top 20 percent in our noncognitive index, or by being in the lowest two or highest one category for the confidence variables.[22] Displayed in Table 6, our analysis reveals that the significant positive wage and salary effects are driven more by penalties for low rather than rewards for those with high noncognitive skills.[23] Conversely, we observe a penalty for high verbal confident women more than a benefit associated with low verbal confidence.[24]

The suggested effect on annual salary of being in this high verbal confidence group among women is quite striking: all else equal, being in this select group is associated with 12.3 percent lower earnings. Several explanations for this finding are possible. High verbal confidence could be acting as a preferential sorting mechanism that steers women away from lucrative, more quantitative, jobs. However, notably, these women are on average somewhat *more* likely to concentrate their studies in finance, though not significantly so (Appendix A, Table A5). Another possibility is that these women select into part-time employment or more flexible employment, perhaps in particular due to marriage or motherhood (in line with behavior observed by Bertrand et al. (2010) among University of Chicago MBAs in the years after graduation). Fewer hours worked can also result in lower hourly wages, especially for many business occupations (Goldin, 2014). In fact, in additional analyses not shown here, we find that women with high verbal confidence tend to work significantly *more* hours than other women. Additionally, they are no more or less likely to be married, have kids, or to have exited the labor force.[25]

Finally, although high verbal women are not shown to have higher job satisfaction using the JDI measures (Appendix A, Table A6), we consider other possible dimensions of job selection that may lead to lower earnings. First, we find that high verbally confident women are significantly more likely to be self-employed than other women (Appendix A, Table A6). This may reflect self-employment acting as a compensating differential, or might result from over-entry into the self-employment sector on the basis of overconfidence (Camerer and Lovallo, 1999; Koellinger et al., 2013). Second, a couple other survey questions provide some additional insight. When asked about various aspects of their job (in Wave 3 of the survey), women with high verbal confidence are significantly more likely to indicate that "the work is interesting". Even more striking is

[22] Low verbal confidence constitutes 6.6 percent of the sample, while high verbal confidence constitutes 7.0 percent of the sample. Low quantitative confidence constitutes 7.8 percent of the sample, while high quantitative confidence is associated with 16.1 percent of the sample.

[23] High versus low confidence/non-cognitive skills were also investigated with regard to our other outcomes, as shown in Appendix A, Tables A5 and A6.

[24] Possible nonlinear effects of each confidence measure were also investigated by including squared terms of these measures. The coefficients on these terms were not statistically significant.

[25] Another possibility is that high verbally confident women receive lower earnings because of either a failure to negotiate (compared to other women) or receive a penalty for doing so. See, for example, Bowles et al. (2007). Unfortunately, we are unable to test this hypothesis.

the highly significant likelihood of these women reporting, regarding the decision to take their current job, that it was very important that the work would make a contribution to society. When included in earnings regressions, this variable is associated with quite a large penalty. It's inclusion also lowers the penalty associated with high verbal confidence among women by about 20 percent. So, while we are unable to completely explain the significantly lower earnings observed for this group of women, these variables suggest to us that high verbal confidence is likely sorting women into different types of (lower paying) jobs.

5. Conclusion

Our motivation for investigating the link between measures of confidence and noncognitive skills is to increase our understanding of the factors associated with graduate degree and subsequent labor market outcomes, especially regarding potential gender heterogeneity. We contribute to this literature by creating and evaluating novel noncognitive variables. First, we create an index from several self-reported noncognitive characteristics and skills deemed important for success as a manager (e.g., initiative, ability to work with others and to delegate, and being a team player) and likely impacted by previous work experiences. These predominantly observational "soft", non-test-score attributes are of increasing interest to employers, policy makers and scholars.[26] Next, we derive measures of confidence in verbal and quantitative abilities from participants' expectations of their verbal and quantitative GMAT scores linked to actual GMAT verbal and quantitative scores, which conforms to the definition of confidence as "subjective expected performance, relative to objective actual performance". Since actual GMAT scores are controlled for throughout our analysis, we interpret these expectations of verbal and quantitative performance as indicating confidence in one's own abilities, beyond their subsequent realized scores.

Our analysis yields three main findings. First, confidence and noncognitive skills matter, and do so in different ways for a much broader set of outcomes typically looked at in the literature. Noncognitive skills in particular are quite consistently positively related to several human capital, future earnings, and job satisfaction measures. They also significantly predict being a mid- to upper-level manager (and not a non-manager) 5–8 years later, controlling for a rich set of variables, including initial employment variables managerial status. Both of our confidence measures also often serve to be significant predictors of several later outcomes, but are more varying in their effects, including several instances where confidence appear to affect outcomes negatively. Overall, our confidence and non-cognitive variables are found to be jointly significant in the majority of specifications and add modestly to the variance in outcomes explained by an already rich set of more traditional human capital and demographic variables. Individually, while some of our estimates are small, others are quite economically meaningful. For example, we find that a one standard deviation increase in noncognitive skills is associated with more than 4 percent higher earnings, on par with estimates of the return to a typical MBA program.

Second, several of the relationships between outcomes and our noncognitive and confidence variables differ by gender. Most notably, confidence in one's verbal skills versus confidence in one's quantitative skills appear to have alternating roles across genders, with quantitative confidence typically driving men's outcomes or decisions and verbal confidence typically doing so for women. For example, verbal confidence is associated with women studying marketing, while quantitative confidence deters men from studying marketing. Similarly, quantitative confidence, controlling for actual quantitative skills, is positively related to future earnings for men, while there is an even larger penalty for verbal confidence in women. Despite these differences by gender, the noncognitive and confidence variables explain only a very modest portion of the gender earnings gap, though quantitative confidence explains almost as much or more than some well-known contributors, like experience or marriage and children. Because women report higher levels of noncognitive skills than men, this variable actually works in women's favor and slightly reduces the unexplained earnings gap.

Third, we find some evidence that the relationships of some of these variables to various outcomes are nonlinear in nature. For example, we estimate a large penalty (in earnings) for women who have particularly high verbal confidence, a smaller and insignificant premium for those with especially low verbal confidence. Some investigation into this group in particular reveals that high verbal confidence may at least partially be acting as a sorting mechanism by steering women toward (lower paying) socially responsible jobs or self-employment.

A number of caveats should guide the interpretation of our results. A primary issue is causality. While our analysis has included a particularly rich set of control variables and exploits a significant time difference between the measurement of our confidence indicators and the realization of outcomes, we acknowledge that firmly establishing causal effects is a difficult (or impossible) task using secondary data sources. Next is the question of the exogeneity of our confidence and noncognitive attributes measures; although our confidence measures, in particular, may be thought to be stable for working age adults, our data do not allow us to provide evidence of such stability. Furthermore, we acknowledge that the noncognitive skills measured here may continue to develop or depreciate over time, in a large part based on work experiences. In this case, our noncognitive variable allows us to investigate the medium- to long-term predictability of a "snapshot" of such skills.

[26] The existing literature typically asks pre-labor-market entrants (i.e., those in high school or younger) to assess purely mental states of their noncognitive skills, such as Rotter's Locus of Control Scale or Rosenberg's Self-Esteem Scale (see, for example, Heckman et al., 2006; Fortin, 2008). Thus, we use labor market participants' self-reported öbservationalñoncognitive skills, whereas much of the literature asks pre-labor-market entrants' to assess m̈ental stateñoncognitive skills. Thus, we use labor market participants' self-reported öbservationalñoncognitive skills, whereas much of the literature asks pre-labor-market entrants' to assess m̈ental stateñoncognitive skills.

Finally, we must appreciate the strengths and weaknesses of using such a distinct sample of individuals in our analysis. Despite being far from a representative cross-section of adults, this sample of prospective MBAs—individuals who took the GMAT but only some of whom ultimately obtained an MBA—is of interest precisely because of the specific sample, as well as the wealth of available data and its longitudinal nature. We analyze the sources of inequality of outcomes among a relatively homogeneous group, college graduates who have worked for a handful of years and were serious enough about obtaining an MBA to take the GMAT exam. Our data come from the GMAT Registrant Survey, a nationally representative four wave longitudinal survey, which allows measurement of confidence in Wave 1 and estimates of its subsequence influence on graduate school and labor market outcomes (for the latter, five or more years later), minimizing possible concerns about ex-post rationalization. Also, in contrast to the existing literature's attention to the transition from high school to college to work, this paper contributes to our limited knowledge of the effects of multiple measures of confidence on academic progression and performance at the post-bachelor's level. Our findings of the significant role of noncognitive skills for a sample of individuals who earn above average incomes, that is MBAs and other business professionals, complement Lindqvist and Vestman's (2011) results about noncognitive skills' importance for economic outcomes at the low end of the income distribution.

Here we investigate these confidence measures not because we think they are *the* key to understanding educational and career developments, but rather to determine whether intuitively obvious channels of influence are associated with such important life outcomes. A growing body of research focuses on the role of noncognitive and personality variables as a critical behavioral component of the standard human capital models of educational and labor market outcomes. Currently little is known about how to measure noncognitive attributes. Psychologist have developed various personality inventories that have been strongly correlated with important life outcomes. In most studies of noncognitive ability, those measures are self-assessed but in some instances are determined by personal interviews, for example, with teachers, parents and psychologists (e.g., Lindqvist and Vestman, 2011). Here we use opportunistic data to determine whether self-assessed questions that elicit measures of confidence affect future outcomes, even if they were not originally designed for that purpose. Although one might plausibly expect such measures to not matter since we control for a rich set of personal and family characteristics and educational and employment experiences, we provide evidence that they do and that they vary significantly by gender.

Beyond measuring these traits, social scientists seek to get inside the "black box" to better understand whether and how confidence and other noncognitive attributes increase productivity in educational and in employment settings. For both of those questions, presumably context matters considerably. Despite the considerable attention paid to talent management, we are not aware that employers have established generally agreed upon mechanisms to identify noncognitive attributes of employees or prospective hires and what matching occurs between such characteristics and skills and types of organizations, jobs and particular tasks. These are questions for further research. Since we find further evidence that these noncognitive skills matter in adulthood, our results provide additional support for early interventions that increase the noncognitive skills of disadvantaged children and yield substantial social payoffs, especially relative to later remedial education and training (as Heckman et al. (2010)'s assessment of the Perry Preschool Program).

Appendix A.

See Tables A1–A6 .

Table A1
Variable Definitions.

Variable	Description	Source
Wave 1 Confidence Indicators:		
Noncognitive Skills	One index derived from the principal component analysis as the normalized first component of 16 noncognitive skills/attributes, including initiative, ethical standards, communication skills, work with diversity, shrewdness, ability to organize, physical attractiveness, assertiveness, capitalize on change, delegate tasks, adapt theory to practice, understanding cultures, intuition, motivate others, team player, and connections. These indicators are measured based on responses to "Please indicate the extent to which you think you have each of these characteristics or skills. . .{1='very much', 0="somewhat", "not very much", or "not at all"}	GMAT Registrant Survey, wave 1
Verbal Confidence	Reversed values based on response to "Overall, how well do you expect to do on the verbal and quantitative (mathematics) sections of the GMAT?{1='excellent', 2="above average", 3="average", 4="below average", 5="poor"}	GMAT Registrant Survey, wave 1
Quant Confidence	see above	GMAT Registrant Survey, wave 1
Wave 1 Covariates:		
Age	Years of age as in Wave 1	GMAT Registrant Survey, wave 1
1 yr. <Experience < 3 yrs.	Years of total full-time (>35 h per week) work experience greater or equal to 1 year and less than 3 years	GMAT Registrant Survey
3 yrs. <Experience < 5 yrs.	Years of total full-time (>35 h per week) work experience greater or equal to 3 years and less than 5 years	GMAT Registrant Survey
5 yrs. <Experience < 7 yrs.	Years of total full-time (>35 h per week) work experience greater or equal to 5 years and less than 7 years	GMAT Registrant Survey
Experience >7 yrs.	Years of total full-time (>35 h per week) work experience greater or equal to 7 years	GMAT Registrant Survey
Asian	Dummy variable for being Asian	GMAT Registrant Survey, wave 1
Black	Dummy variable for being Black	GMAT Registrant Survey, wave 1
Hispanic	Dummy variable for being Hispanic	GMAT Registrant Survey, wave 1
Married	Dummy variable for being Married in Wave 1	GMAT Registrant Survey, wave 1
Kids	Number of children living with the respondent (at least one-half of the time) in Wave 1	GMAT Registrant Survey, wave 1
Mother's Education	Mother's education in years	GMAT Registrant Survey, wave 1
Father's Education	Father's education in years	GMAT Registrant Survey, wave 1
Quantitative GMAT	Actual quantitative GMAT score	GMAT Registrant Survey and ETS records
Verbal GMAT	Actual verbal GMAT score	GMAT Registrant Survey and ETS records
Undergraduate GPA	Overall average grade point average, out of 4.00.	GMAT Registrant Survey, wave 1
Selective Undergrad	Dummy variable for selective undergraduate schools based on Barron's Profiles of American Colleges	GMAT Registrant Survey, Barron's Barron's Profiles of American Colleges
Highly Selective Undergrad	Dummy variable for highly selective undergraduate schools based on Barron's Profiles of American Colleges	GMAT Registrant Survey, Barron's Barron's Profiles of American Colleges
Other Advanced Degree	Respondent reported having obtained a non-business graduate degree	GMAT Registrant Survey
Industry: Agricultural	Dummy variable for respondent's most recent full-time job (in Wave 1) being in the industry of agricultural, forestry and fisheries	GMAT Registrant Survey, wave 1
Industry: Manufacturing	Dummy variable for respondent's most recent full-time job (in Wave 1) being in the industry of manufacturing	GMAT Registrant Survey, wave 1
Industry: Service	Dummy variable for respondent's most recent full-time job (in Wave 1) being in the industry of service	GMAT Registrant Survey, wave 1

Table A1 (*Continued*)

Variable	Description	Source
Industry: Finance, Real Estate	Dummy variable for respondent's most recent full-time job (in Wave 1) being in the industry of finance, insurance and real estate	GMAT Registrant Survey, wave 1
Industry: Public Administration	Dummy variable for respondent's most recent full-time job (in Wave 1) being in the industry of public administration	GMAT Registrant Survey, wave 1
Tenure	Years since working at most recent full-time job as of Wave 1	GMAT Registrant Survey, wave 1
Unemployed	Dummy variable for being unemployed in Wave 1	GMAT Registrant Survey, wave 1
In School	Dummy variable for being enrolled or once enrolled in an undergraduate degree program at college or university in Wave 1	GMAT Registrant Survey, wave 1
Hours (per week)	Hours per week on the most recent full-time job as of Wave 1	GMAT Registrant Survey, wave 1
Entry Level Manager	{1 = "I am/was a first or entry level supervisor or manager"; 0 otherwise} in wave 1	GMAT Registrant Survey, wave 1
Mid/Upper-Level Manager	{1 = "I am/was a middle or higher level manager"; 0 otherwise} in wave 1	GMAT Registrant Survey, wave 1
MBA	Obtained MBA degree by Wave 4	GMAT Registrant Survey
Outcomes that are conditional on MBA:		
Top 25 MBA	Obtained MBA degree from Top 25 programs by Wave 4	GMAT Registrant Survey, U.S. News & World Report 1992 rankings
MBA GPA	GPA in MBA program	GMAT Registrant Survey
Finance	Dummy variable equals 1 if major field of study in MBA program is Finance	GMAT Registrant Survey
Marketing	Dummy variable equals 1 if major field of study in MBA program is Marketing	GMAT Registrant Survey
Employment outcomes (Waves 3 and 4):		
Hourly Wage	Calculated from reported earnings and hours worked per week	GMAT Registrant Survey
Annual Salary	Calculated from reported earnings and hours worked per week	GMAT Registrant Survey
Self-employed	Dummy variable for being self-employed in Wave 3 and 4	GMAT Registrant Survey
Entry Level Manager	{1 = "I am/was a first or entry level supervisor or manager"; 0 otherwise} in waves 3 and 4	GMAT Registrant Survey, waves 3 and 4
Mid/Upper-Level Manager	{1 = "I am/was a middle or higher level manager"; 0 otherwise} in wave 3 and 4	GMAT Registrant Survey, waves 3 and 4
General JDI	Based on responses to "Think of your job in general. All in all, what is it like most of the time?{Ÿes, No or Can't decide} 17 phrases listed, such as pleasant, bad and so on. 0, 1 or 3 points assigned to each answer. The general JDI is the sum of the points.	GMAT Registrant Survey, Wave 4
Work JDI	Based on responses to "Think of the work you do at present. How well does each of the following words or phrases describe your work?Ï8 phrases listed. 0, 1 or 3 points assigned to each answer. The work JDI is the sum of the points.	GMAT Registrant Survey, Wave 4
Pay JDI	Based on responses to "Think of the pay you get now. How well does each of the following words or phrases describe your present pay?{Ÿes, or No or Can't decide} 9 phrases listed. 0, 1 or 3 points assigned to each answer. The pay JDI is the sum of the points.	GMAT Registrant Survey, Wave 4
Promotion JDI	Based on responses to "Think of the opportunities for promotion that you have now. How well does each of the following words or phrases describe these?{Ÿes, No or Can't decide} 9 phrases listed. 0, 1 or 3 points assigned to each answer. The promotion JDI is the sum of the points.	GMAT Registrant Survey, Wave 4

Table A2
Wave 1 Variable Means by Selected or Non-Attritted Sample.

	(i) Wave 1 respondents w/non-missing GMAT	(ii) Main sample: After dropping missing survey covariates	(iii) Waves 3 and/or 4 Respondents	(iv) p-value (present vs. missing in Waves 3 and/or 4)
Noncognitive Skills	−0.007	−0.026	−0.039	0.055
Verbal Confidence	3.456	3.470	3.489	0.001
Quant Confidence	3.641	3.664	3.670	0.368
Age	27.333	27.300	27.351	0.219
1 yr. < Experience < 3 yrs.	0.241	0.242	0.242	0.908
3 yrs. < Experience < 5 yrs.	0.178	0.177	0.180	0.347
5 yrs. < Experience < 7 yrs.	0.117	0.118	0.114	0.078
Experience > 7 yrs.	0.257	0.250	0.256	0.042
Asian	0.180	0.172	0.153	0.000
Black	0.139	0.122	0.113	0.000
Hispanic	0.157	0.156	0.159	0.357
Female	0.424	0.417	0.423	0.147
Married	0.292	0.291	0.299	0.010
Kids	0.264	0.269	0.276	0.167
Mother's Education	14.076	14.074	14.086	0.675
Father's Education	13.337	13.394	13.423	0.239
Quantitative GMAT	28.715	29.147	29.420	0.000
Verbal GMAT	27.612	28.203	28.641	0.000
Undergraduate GPA	3.022	3.024	3.029	0.079
Selective Undergrad	0.248	0.251	0.257	0.040
Highly Selective Undergrad	0.193	0.199	0.200	0.606
Other Advanced Degree	0.054	0.056	0.056	0.599
Industry: Agricultural	0.165	0.165	0.179	0.000
Industry: Manufacturing	0.163	0.170	0.172	0.570
Indistry: Service	0.167	0.168	0.173	0.091
Industry: Finance, Real Estate	0.123	0.131	0.133	0.445
Industry: Public Admin.	0.077	0.078	0.083	0.004
Tenure	2.108	2.114	2.168	0.023
Not Working	0.280	0.270	0.252	0.000
In School	0.188	0.183	0.186	0.254
Hours (per week)	30.160	30.694	31.425	0.000
Entry-level Manager	0.169	0.171	0.178	0.006
Mid/Upper-level Manager	0.112	0.114	0.116	0.395
N	4527 − 4783	3878	3220	

Notes: Reported are the means of all covariates (determined in Wave 1 of the GMAT Registrant Survey) of varying subsamples. Column (i) conditions on survey response and GMAT scores, but allows for varying missing values for each of the survey control variables. Column (ii) reports means of our primary sample, which omits individuals with missing values for any covariates. Column (iii) reports means for the same Wave 1 variables, conditional on observing those individuals in Waves 3 and/or 4 (the survey waves from which our outcome variables are drawn). Column (iv) reports p-values from t-tests for differences in means between those who remained in the sample in Waves 3 and/or 4 versus those who attritted from the sample between Waves 1 and 3.

Table A3
Factor Loadings of 16 Noncognitive Variables Using Principle Component Analysis (one factor).

Variable	Factor 1	Uniqueness
Initiative	0.495	0.755
Ethical standards	0.271	0.927
Communication skills	0.496	0.754
Work with diversity	0.440	0.807
Shrewdness	0.419	0.824
Ability to organize	0.444	0.803
Physical attractiveness	0.392	0.846
Assertiveness	0.605	0.634
Capitalize on change	0.640	0.591
Delegate tasks	0.593	0.649
Adapt theory to practice	0.563	0.683
Understanding cultures	0.450	0.797
Intuition	0.594	0.648
Motivate others	0.644	0.585
Team player	0.425	0.820
Connections	0.458	0.790

Table A4
Estimates of Confidence Indicators and 16 Noncognitive Variables on Wages and Salaries.

	Male		Female	
	Log(Wage)	Log(Salary)	Log(Wage)	Log(Salary)
Verbal Expectations	−0.019	−0.023	−0.062***	−0.081***
	(0.010)	(0.020)	(0.020)	(0.020)
Quant Expectations	0.025*	0.042***	−0.009	0.006
	(0.010)	(0.010)	(0.010)	(0.020)
Initiative	0.056***	0.067***	0.067***	0.099***
	(0.020)	(0.020)	(0.020)	(0.020)
Ethical Standards	−0.028*	−0.025	−0.012	−0.054**
	(0.020)	(0.020)	(0.020)	(0.030)
Communication Skills	0.000	0.001	−0.004	0.005
	(0.020)	(0.020)	(0.020)	(0.020)
Work with Diversity	0.023	0.013	−0.019	−0.033
	(0.020)	(0.020)	(0.020)	(0.020)
Shrewdness	0.014	0.030**	−0.012	−0.022
	(0.010)	(0.010)	(0.010)	(0.020)
Ability to Organize	−0.015	−0.034**	−0.035**	−0.046**
	(0.010)	(0.020)	(0.020)	(0.020)
Physical Attractiveness	0.027*	0.033*	0.072***	0.062***
	(0.020)	(0.020)	(0.020)	(0.020)
Assertiveness	0.028*	0.038**	0.022	0.046**
	(0.020)	(0.020)	(0.020)	(0.020)
Capitalize on Change	−0.027*	−0.021	−0.006	−0.01
	(0.020)	(0.020)	(0.020)	(0.020)
Delegate Tasks	−0.029**	−0.032**	−0.019	−0.018
	(0.010)	(0.020)	(0.020)	(0.020)
Adapt Theory to Practice	0.000	−0.003	0.031*	0.039**
	(0.010)	(0.020)	(0.020)	(0.020)
Understanding Cultures	−0.01	0.002	0.009	0.035**
	(0.010)	(0.010)	(0.010)	(0.020)
Intuition	−0.022	−0.027	−0.034**	−0.050**
	(0.020)	(0.020)	(0.020)	(0.020)
Motivate Others	0.036**	0.057***	−0.002	0.006
	(0.020)	(0.020)	(0.020)	(0.020)
Team Player	−0.021	−0.026	0.058***	0.069***
	(0.020)	(0.020)	(0.020)	(0.020)
Connections	0.035***	0.043***	0.000	0.009
	(0.010)	(0.010)	(0.010)	(0.020)
N	2735	2735	1941	1941
R^2	0.284	0.327	0.299	0.293

Notes: Reported are coefficients (and standard errors) from OLS. Each regression also included all covariates from Table 1, plus a dummy variable including whether or not the individual obtained an MBA sometime in the sample period. Regressions included observations from the 3rd and 4th survey waves of the GMAT registrant Survey. ***, **, and * indicate that the coefficient is statistically significantly different from zero at the 1, 5 and 10 percent levels, respectively.

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Table A5
Effects of High and Low Confidence and Noncognitive Skill Indicators on MBA Outcomes.

	(i) Obtained MBA	(ii)	(iii) Obtained Top 25 MBA	(iv)	(v) MBA GPA	(vi)	(vii) Study Finance	(viii)	(ix) Study Marketing	(x)
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Noncog Skills – Low	−0.062**	−0.033	0.037	−0.004	0.015	−0.012	−0.005	0.032	−0.016	−0.048
	(0.029)	(0.034)	(0.032)	(0.039)	(0.026)	(0.035)	(0.042)	(0.044)	(0.030)	(0.061)
Verbal Conf. – Low	0.088*	0.044	0.062	−0.005	−0.148***	0.182***	0.165**	−0.012	−0.006	0.000
	(0.049)	(0.056)	(0.049)	(0.071)	(0.043)	(0.058)	(0.065)	(0.077)	(0.052)	omitted
Quant Conf. – Low	−0.035	0.028	0.000	−0.004	0.039	−0.027	−0.009	-0.000	−0.067	0.068
	(0.055)	(0.042)	omitted	(0.054)	(0.054)	(0.041)	(0.092)	(0.061)	(0.078)	(0.066)
Noncog Skills – High	−0.003	0.016	0.036	0.040	0.005	−0.006	−0.025	0.034	0.011	0.030
	(0.030)	(0.033)	(0.032)	(0.036)	(0.028)	(0.033)	(0.045)	(0.045)	(0.031)	(0.051)
Verbal Conf. – High	−0.077*	−0.056	−0.079*	−0.095	−0.024	−0.117**	−0.160**	0.058	0.020	−0.046
	(0.043)	(0.054)	(0.047)	(0.065)	(0.038)	(0.053)	(0.070)	(0.071)	(0.044)	(0.094)
Quant Conf. – High	−0.056*	−0.039	0.009	−0.055	0.112***	0.020	−0.024	−0.036	−0.046	0.077
	(0.031)	(0.049)	(0.030)	(0.052)	(0.028)	(0.049)	(0.045)	(0.060)	(0.032)	(0.074)
N	1810	1323	707	441	649	390	700	427	700	369
Joint significance	0.026	0.622	0.271	0.522	0.000	0.021	0.049	0.951	0.765	0.515
Pseudo/Adj. R^2 w/ Conf. and Noncog.	0.050	0.076	0.344	0.341	0.174	0.243	0.103	0.195	0.092	0.103
Pseudo/Adj. R^2 w/o Conf. and Noncog.	0.044	0.073	0.342	0.324	0.145	0.223	0.087	0.191	0.084	0.094

Note: Reported in columns (v)-(vi) are coefficient estimates from OLS regressions, and all others columns report average marginal effects from probit estimations. The robust standard errors are reported in parentheses. Low (high) noncognitive skills was defined as being the bottom (top) 20% of the sample, and low (high) verbal or quantitative confidence was defined as being the lowest 2 categories or highest 1 category, respectively, of survey responses. Estimations were carried out separately by gender and included all covariates from Table 1. Estimations reported in all columns were cross-sectional. Columns (iii)–(x) are conditional on MBA attainment. ***, **, and * indicate the coefficient is significantly different from zero at the 1, 5, and 10 percent levels, respectively. Joint significance reports the p-value for the joint significance of the noncognitive skills and confidence variables. Pseudo/Adj. R^2 reports pseudo R-square for columns (i)–(iv) and (vii)–(x) and adjusted R-square for columns (v)–(vi) with or without the noncognitive skills and confidence variables.

Table A6
Effects of High and Low Confidence and Noncognitive Skill Indicators on Employment Outcomes.

	(i) Non-Manager	(ii) Entry- level Manager	(iii) Mid/Upper-Level Manager	(iv) Non-Manager	(v) Entry- level Manager	(vi) Mid/ Upper-Level Manager	(vii) Self-employed	(viii)	(ix) General JDI	(x)
	Males			Females			Male	Female	Male	Female
Noncog Skills – Low	0.037*	−0.001	−0.035*	0.032	0.010	−0.042*	−0.010	−0.006	−2.914***	−0.861
	(0.022)	(0.019)	(0.021)	(0.029)	(0.025)	(0.025)	(0.012)	(0.012)	(0.733)	(0.854)
Verbal Conf. – Low	−0.037	0.041	−0.003	0.066	−0.041	−0.024	−0.056*	−0.054*	0.804	−0.090
	(0.040)	(0.032)	(0.037)	(0.050)	(0.045)	(0.043)	(0.029)	(0.031)	(1.263)	(1.527)
Quant Conf. – Low	0.075*	−0.046	−0.028	0.052	−0.036	−0.017	0.030*	−0.004	−2.415*	−0.280
	(0.042)	(0.039)	(0.037)	(0.035)	(0.032)	(0.028)	(0.018)	(0.013)	(1.360)	(1.082)
Noncog Skills – High	−0.057**	−0.013	0.071***	−0.056**	0.016	0.040*	0.005	0.003	1.667**	0.783
	(0.024)	(0.021)	(0.020)	(0.027)	(0.024)	(0.021)	(0.011)	(0.010)	(0.781)	(0.818)
Verbal Conf. – High	0.020	−0.029	0.009	0.013	−0.029	0.017	−0.022	0.034**	−2.324**	−1.522
	(0.034)	(0.030)	(0.030)	(0.048)	(0.042)	(0.036)	(0.018)	(0.015)	(1.092)	(1.440)
Quant Conf. – High	−0.036	0.027	0.009	0.071	−0.051	−0.019	−0.025*	−0.028	−0.910	0.065
	(0.024)	(0.020)	(0.022)	(0.044)	(0.039)	(0.038)	(0.013)	(0.020)	(0.802)	(1.287)
N	2855			2047			2754	2028	1345	957
Joint significance							0.064	0.109	0.000	0.732
Pseudo/Adj. R^2 w/ Conf. and Noncog.	0.122			0.097			0.094	0.134	0.034	0.001
Pseudo/Adj. R^2 w/o Conf. and Noncog.	0.117			0.092			0.084	0.115	0.014	0.004

Note: Reported are marginal effects from multinomial logit estimation in (i)–(vi), marginal effects from probit estimation in (vii)–(viii), and coefficient estimates from OLS regressions in (ix)–(x) over employment observations from Waves 3 and 4 of the GMAT Registrant Survey, with robust standard errors in parentheses. Low (high) noncognitive skills was defined as being the bottom (top) 20% of the sample, and low (high) verbal or quantitative confidence was defined as being the lowest 2 categories or highest 1 category, respectively, of survey responses. All regressions were carried out separately by gender and included all covariates from Table 1, in addition to dummy variables for survey wave and for MBA completion. ***, **, and * indicate the coefficient is significantly different from zero at the 1, 5, and 10 percent levels, respectively. Joint significance reports the p-value for the joint significance of the noncognitive skills and confidence variables. Pseudo/Adj. R^2 reports pseudo R^2 for columns (i)–(viii) and adjusted R^2 for columns (ix)–(x) with or without the noncognitive skills and confidence variables.

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