Wealth Generation as a Form of Expertise: An Examination from 2002-2016 of Elite Education, Cognitive Ability, and the Gender Gap Among Billionaires

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Abstract

The study of expertise has focused on areas such as chess, music, and sports. Here, we argue that *wealth generation* can also be considered a form of expertise. This study examines 14,246 global *Forbes* billionaires across 15 years (2002-2016) to examine historical trends of elite education and cognitive ability, looking at the world (and U.S. specifically) as a function of industry, country, sex, self-made status, and net worth. The results reveal that the elite education and cognitive ability level of billionaires has remained relatively stable over time, suggesting the billionaire filtering structure has remained relatively unchanged. Yet, at least within the U.S., the percentage of elite educated and cognitively talented billionaires entering the technology and especially the finance and investment sectors has increased over time. These results suggest that one factor to consider in increasing inequality in the U.S. may be the role of human talent in selecting areas of occupational expertise that have amplified their ability to generate wealth in more recent years. This paper broadens the definition of expertise to include wealth generation—the idea that the development of wealth expertise may have skills that transcend field—and suggests deliberate practice cannot be the full explanation of success for this area of expertise. A multidisciplinary perspective can help test the strength and generality of expertise theories, more comprehensive models of expertise should account for abilities and education, and the investigation of expertise models should account for historical changes.

Keywords

wealth expertise, elite education, wealth inequality, historical examination, talent

Introduction

Expertise development has traditionally been studied in domains such as sports, music, and games like chess (e.g., Ericsson, 2014; Ericsson, Krampe, & Tesch-Romer, 1993). However, there has been a recent push for more comprehensive theoretical models of expertise (e.g., for a review, see Hambrick, Macnamara, Campitelli, Ullen, & Mosing, 2016) and a broader multidisciplinary approach to studying expertise (Gobet, 2016). Indeed, expertise research has started to move into domains such business, law, politics, and even journalism (e.g., Volden, Wiseman, & Wai, 2016; Wai, 2013; Wai & Perina, 2018; Wai & Rindermann, 2017), though there has been less research to date focused on wealth accumulation (e.g., Wai & Lincoln, 2016) and the idea that this might also be a form of expertise.

A cottage industry exists around wealth creation (e.g., multiple organizations track the characteristics and habits of the wealthy), in large part because the idea that making money is a skill or form of expertise is attractive. For example, money managers often will demonstrate their "talent" at growing wealth to attract future clients by pointing to their rate of returns in the past. But throughout history, there has been much contention over whether wealth generation is really a form of expertise where talent has a role to play, and how much of becoming rich is simply due to "luck" or things like nepotism (Galbraith, 1994; Pluchino, Biondo, & Rapisarda, 2018). Many models of expertise suggest that general cognitive ability likely plays a role in expertise development (for a review, see Subotnik, Olszewski-Kubilius, & Worrell, 2011). Though certainly not the only important predictor, this perspective would align with the idea that cognitive talent differences may, at least in part, be important in explaining wealth inequality. Additionally, Ericsson's deliberate practice model focuses on the idea that practice largely can account for individual differences in domain performance (Ericsson, 2014; Ericsson et al., 1993). In contrast to this, Macnamara, Hambrick, and Oswald (2014) showed that deliberate practice accounted for less than 1% of the performance variance in occupations. The review by Hambrick et al. (2016) strongly suggests that deliberate practice cannot be the full explanation of individual differences in performance across expertise domains studied. Another way to approach the estimation of the role of talent and practice in success is to examine the role of general cognitive ability first, and then consider that as an important source of variance to account for (e.g., Lubinski, 2004) prior to assessing the impact of other factors, such as practice or even luck, which are also important.

Broadening definitions and domains of expertise research to incorporate wealth generation and maintenance, therefore, may be important to test the generality of theoretical models of expertise and expert performance. Though wealth generation is on a continuum, an extreme level of this type of expertise, at least at present, is attaining billionaire status. Due to the many pathways of attaining billionaire status, it may seem that wealth generation is too broad to be considered as a form of expertise. There are, after all, so many different paths to attain billionaire status, with the paths themselves through particular industries that are arguably quantitatively and qualitatively different. The study of expertise has traditionally focused on carefully examining one particular domain as the venue for research (e.g., chess, running).

However, another way of studying expertise is to start with an outcome such as extreme wealth and then consider the domains through which such extreme wealth was generated such as different industries (e.g., real estate, technology). In fact, the study of comprehensive theoretical models of expertise (e.g., Hambrick et al., 2016) examines expertise development across multiple domains purposefully to shed light on what elements do or do not generalize across domains. Thus, looking at a large sample of billionaires across time and across industry or domain might shed light in a new way on different ways wealth expertise manifests itself.

Another way of thinking about wealth generation as a form of expertise is to consider that the skills and interests in wealth generation likely can and do transcend a specific domain or field. For example, a strong interest and desire to make money would lead an astute entrepreneur or investor to choose an industry based on wealth generation potential as a primary factor. The industry chosen would be selected not on interest in developing expertise within that industry, but rather because it is a good match to the individual's particular skill sets, interests, connections, and know-how at the time. This would maximize the leveraging of that domain to increase the likelihood of wealth generation. For example, generating an idea, recognizing and seizing an opportunity, a willingness to take extreme risks, convincing others to invest in the idea, and sticking with the idea through lows and highs (or failing and generating a new idea) until eventual fruition are all general skills that likely transcend field in developing wealth expertise. Thus, the educational selectivity and cognitive ability required for a certain pathway to wealth

expertise may be important to consider. That is, understanding the role that certain elite schools may play in different domains of wealth expertise can shed light on the role of educational filtering mechanisms and corresponding cognitive ability that different domains of wealth expertise may require.

The study of occupational leaders or elites (e.g., Hacker, 1961; Khan, 2012) has attracted much public discussion and academic interest across multiple disciplines, especially in the U.S. due to a focus on income inequality and what factors might explain why a tiny fraction of the population holds an enormous fraction of wealth (Piketty & Saez, 2003; Solow, 2014; Stiglitz, 2011). The path to becoming a billionaire is often linked to many personal and contextual factors such as family wealth and connections, attending highly selective schools and accessing networks, cognitive ability, and luck (Wai, 2013, 2014; Wai & Lincoln, 2016). Prior research examined the education and ability levels of Fortune 500 CEOs across the last two decades (Wai & Rindermann, 2015), and uncovered that such levels remained relatively stable across time. This suggests that the occupational filtering or selection structure for Fortune 500 CEOs has been unchanged for at least the last two decades. It remains to be explored whether this holds in other domains. Murray (2003) investigated human accomplishment across the full span of history, from 800 B. C. to 1950, so studying samples after 1950 is important for contemporary understanding, but at the same time the historical trends in the last 50 years are likely but a blip in comparison to accomplishment going back in time.

Scholars that span disciplines have commented on the role that technology may have played in amplifying the impact of highly talented individuals. For example, the economist Krueger (2012, p. 5) noted things have "favored people with the analytical skills to get the most out of technology." The economist Mankiw (2013, p. 23) stated "changes in technology have allowed a small number of highly educated and exceptionally talented individuals to command superstar incomes in ways that were not possible a generation ago." Indeed, prior research

uncovered that, in more recent years, the billionaires around the world who accumulated their wealth from the technology and finance and investment sectors tended to have very high levels of elite education and corresponding cognitive ability (Wai, 2013, 2014). This also appeared true for 30-millionaires (Wai & Lincoln, 2016). Psychologists Aguinis and O'Boyle (2013) argued that changes in work have handsomely rewarded a handful of star performers who contribute the vast majority of value in innovation.

Given these comments, it is surprising that it has not been as widely considered that one partial explanation for increases in wealth and other forms of inequality, especially within the U.S., could be that academically gifted or intellectually talented and exceptionally productive individuals may be choosing to pursue opportunities with increasing frequency that lead to the accumulation of wealth. In essence, they may be choosing to develop expertise in attaining wealth. Industries that rely on technology or the ability to use money to make money may have become very rewarding for people with exceptional analytical skills. These ongoing discussions highlight that it is unclear whether elite education and ability selectivity for billionaires or for individual sectors have changed or remained the same over time and should be investigated.

An historical analysis of the education and cognitive ability level of billionaires within these sectors could inform the idea that highly educated and cognitively advanced people may be increasingly developing expertise in technology, finance, and investments. Therefore, in this paper, we examine the role of general cognitive ability among billionaires across a number of years through the proxy of elite education. Further, in order to assess the idea that highly educated and cognitively advanced people may be increasingly developing expertise in technology, finance, and investments, we conduct an historical analysis of the education and cognitive level of billionaires within these sectors. More broadly, to examine the extent to which expertise in wealth generation is driven by expertise in specific domains, we examine

billionaires across the many different industries or sectors in which they made their money. Broadly, we test the generality of expertise models by moving into a relatively unexplored domain of expertise, that of wealth generation.

Present Study

The present study draws from the *Forbes* global billionaires database from across a recent span of 15 years (2002-2016) to examine historical trends of elite education and cognitive ability of billionaires looking at the world overall and U.S. as a function of industry, country, sex, self-made status, and net worth. Additionally, we examined whether elite educated and talented people have been entering the technology and finance and investment sectors at higher rates over time. To examine the role that domain pathways matter in expertise development in wealth generation we examine elite education and ability as a function of industry or domain in which the billionaires obtained their wealth. Wealth expertise is on a wide continuum, and examining those who have made it to the top is important in its own right, just as is examining extraordinary performers in other types of domains. There are many paths to develop this type of expertise. What are those paths? What role does education and ability play?

Samples

World's Billionaires

Data on the 14,246 (M = 12,793, F = 1,311; age range = 18 to 101, average ≈ 63) billionaires from 2002-2014 and 2016 were taken from *Forbes* magazine's database. Data from 2002-2014 were acquired directly from the *Forbes* wealth team and data from 2016 were independently collected from the website in 2016. Variables from the database created that were used in this analysis include country, higher education, industry in which wealth was obtained, net worth, age, sex, and self-made status. *Forbes* (Dolan, 2018) defines self-made "as someone who built a company or established a fortune on her own, rather than inheriting some or all of it."

Method

In accordance with previous studies (e.g., Wai 2014; Wai & Perina, 2018) we categorized individuals into the "Elite School" category if they met one or all of the following three core criteria:

1. **Attended an elite undergraduate institution within the U.S.** Attendance at one of the 21 national universities and 8 liberal arts colleges that had median combined SAT Critical Reading and Math scores of 1400 or higher (America's Best Colleges, 2013). ACT composite scores were re-calculated into SAT scores using the ACT (2011) concordance table. The 25th and 75th percentile scores were then averaged. This criterion was used as the SAT and ACT have both been shown to measure general ability to a large degree (Frey & Detterman, 2004; Koenig, Frey & Detterman, 2008), and it is considered a reasonable proxy indicator that the individual was in the top one percent in ability in the American population (e.g., Murray, 2012). Table 1a gives a ranked list of these 29 schools by SAT (math + verbal) scores.

2. **Attended an elite graduate institution within the U.S.** Attendance at one of the top 12 American law schools or business schools based on average test scores from the *U.S. News* rankings was used as a proxy measure of top cognitive ability, as this list represents roughly the top 10% of LSAT and GMAT test-takers within each pool (GMAT, 2013; LSAC, 2007). These institutions are listed in Tables 1b and 1c in ranked order to test scores. Additionally, graduate school attendance to any of the 29 institutions listed in Table 1a was also included as this indicated high GRE scores.

3. **Attended an elite school outside the U.S.** In order to include non-American individuals who attended highly selective institutions within their home countries, the *QS World University Rankings* (2012) were used to determine elite school status within each country. The top 10 schools within each country that were listed in the *QS* rankings were considered elite schools and a proxy of the top 1% of cognitive ability for non-American schools (e.g., for more detail see Wai, 2014).

Table 1. Schools attended that indicate top one percent in ability status (ranked by ability)

1a. National Universities and Liberal Arts Colleges	Combined SAT Math and Critical Reading Scores
1. California Institute of Technology	1525
2. Harvey Mudd College	1500
2. Princeton University	1500
4. Yale University	1495
5. Harvard University	1490
5. Massachusetts Institute of Technology	1490
7. University of Chicago	1485
8. Columbia University	1475
9. Washington University in St. Louis	1465
9. University of Notre Dame	1465
11. Pomona College	1460
12. Stanford University	1455
12. Dartmouth College	1455
14. Northwestern University	1445
14. Vanderbilt University	1445
16. Duke University	1440
16. University of Pennsylvania	1440
16. Swarthmore College	1440
19. Brown University	1430
19. Rice University	1430
19. Tufts University	1430
22. Amherst College	1425
23. Williams College	1420
24. Carleton College	1415
25. Johns Hopkins University	1410
25. Carnegie Mellon University	1410
25. Bowdoin College	1410
28. Cornell University	1400
28. Haverford College	1400

1b. Law Schools	Average LSAT Scores
1. Yale University	173.5
1. Harvard University	173.5
3. Columbia University	172.5
4. New York University	172
5. University of Chicago	170
6. Stanford University	169.5
7. Duke University	169
7. Georgetown University	169
9. University of Pennsylvania	168.5
9. University of Michigan - Ann Arbor	168.5
11. University of Virginia	168
11. Northwestern University	168

1c. Business Schools	Average GMAT Scores
1. Stanford University	730
2. Harvard University	724
3. University of Chicago	719
3. Yale University	719
3. New York University (Stern)	719
6. University of Pennsylvania (Wharton)	718
6. Dartmouth College (Tuck)	718
8. Columbia University	716
9. University of California Berkeley	715
10. Northwestern University	712
11. Massachusetts Institute of Technology	710
12. University of Michigan - Ann Arbor (Ross)	703

Note. These data were taken from the 2013 *U.S. News* rankings (America's Best Colleges, 2013).

A combined SAT Critical Reading and Mathematics score of 1400 or greater places an individual in the top three percent of all test takers and well within the top one percent in ability of all seventeen-year-olds in the population.

An LSAT score of 168 or higher and a GMAT score of 700 or higher places an individual in roughly the top 10 percent of test takers in the respective pools.

Given that the fraction of the college graduate population who go on to take the GMAT and LSAT are an extremely select group, individuals who attended one of these schools are likely well within the top one percent in ability.

Adapted from Wai (2013).

Results

Figure 1 shows the percentage of billionaires who were elite educated and earned their money in various sectors as categorized by *Forbes*, along with the overall trend for the world in the first panel (32% to 38% from 2002-2014 with 2016 being at a low of 29%), and for the U.S. specifically in the second panel (41% to 47%, with about 43% overall across time).

The first panel for the world in Figure 1 has more categories than the second panel for the U.S. because there was sufficient data across all industries for reasonably stable descriptive trends to be captured. Broadly, the pattern of finance, investments, and technology being above average and media being below average replicated across the world and U.S. Within the

U.S., however, there appeared to be an increase of elite educated billionaires in the technology and finance and investment sectors over time, whereas a drop of elite educated media billionaires over time, with the overall trend quite stable (about 42% to 47%). For example, in the U.S. in 2002, 62% of the finance and investments sector were elite educated whereas in 2016, 73.5% were elite educated. Technology (2002: 50%, 2016: 63%) also showed an increase, whereas Media (2002: 42.9%, 2016: 25%) showed a decrease. Elite education appeared to have the greatest value in the technology and finance and investments sectors, and relatively lower value in the other sectors. Alternatively, elite educated people tended to filter into the technology and finance and investments sectors more than other sectors.
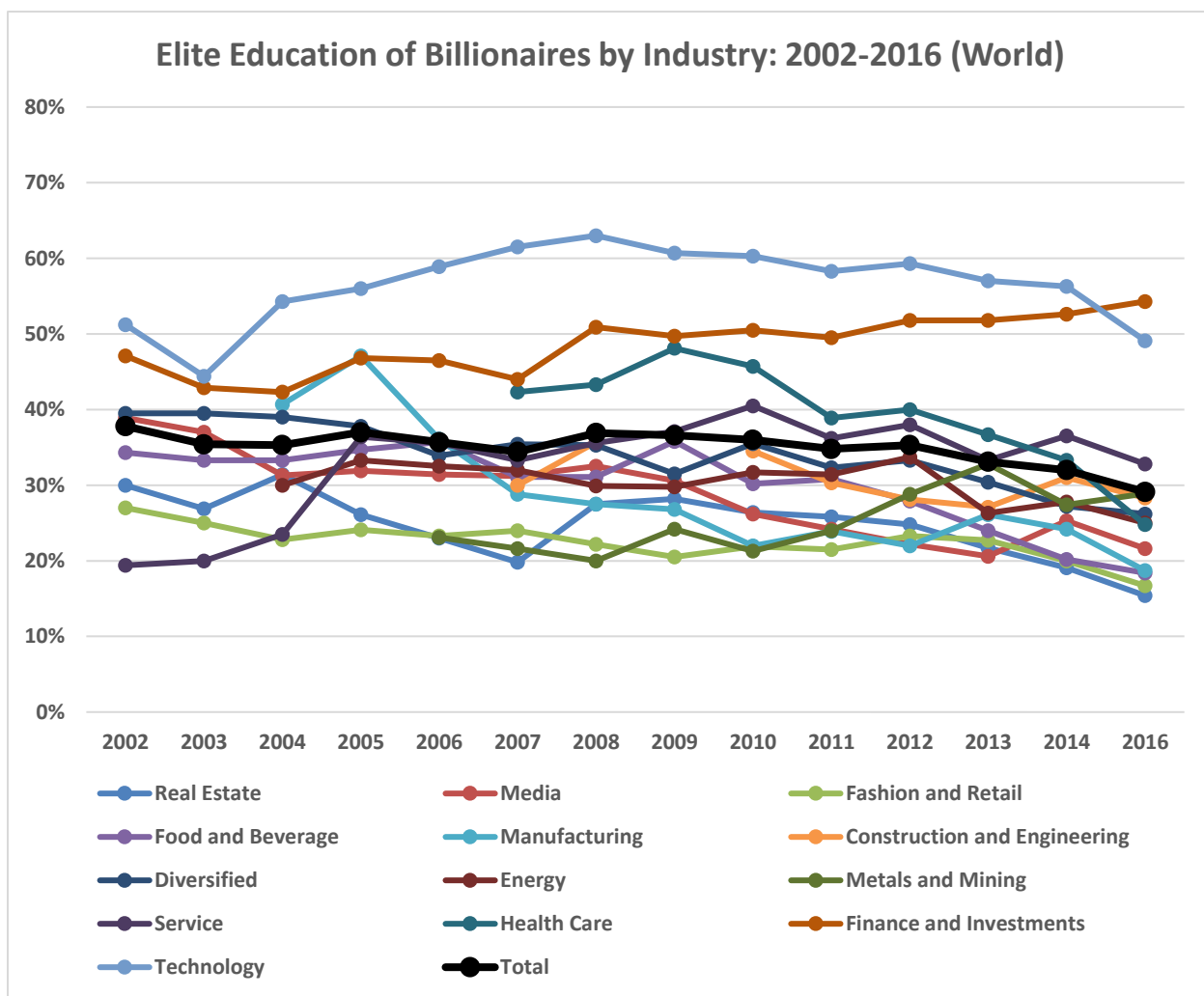

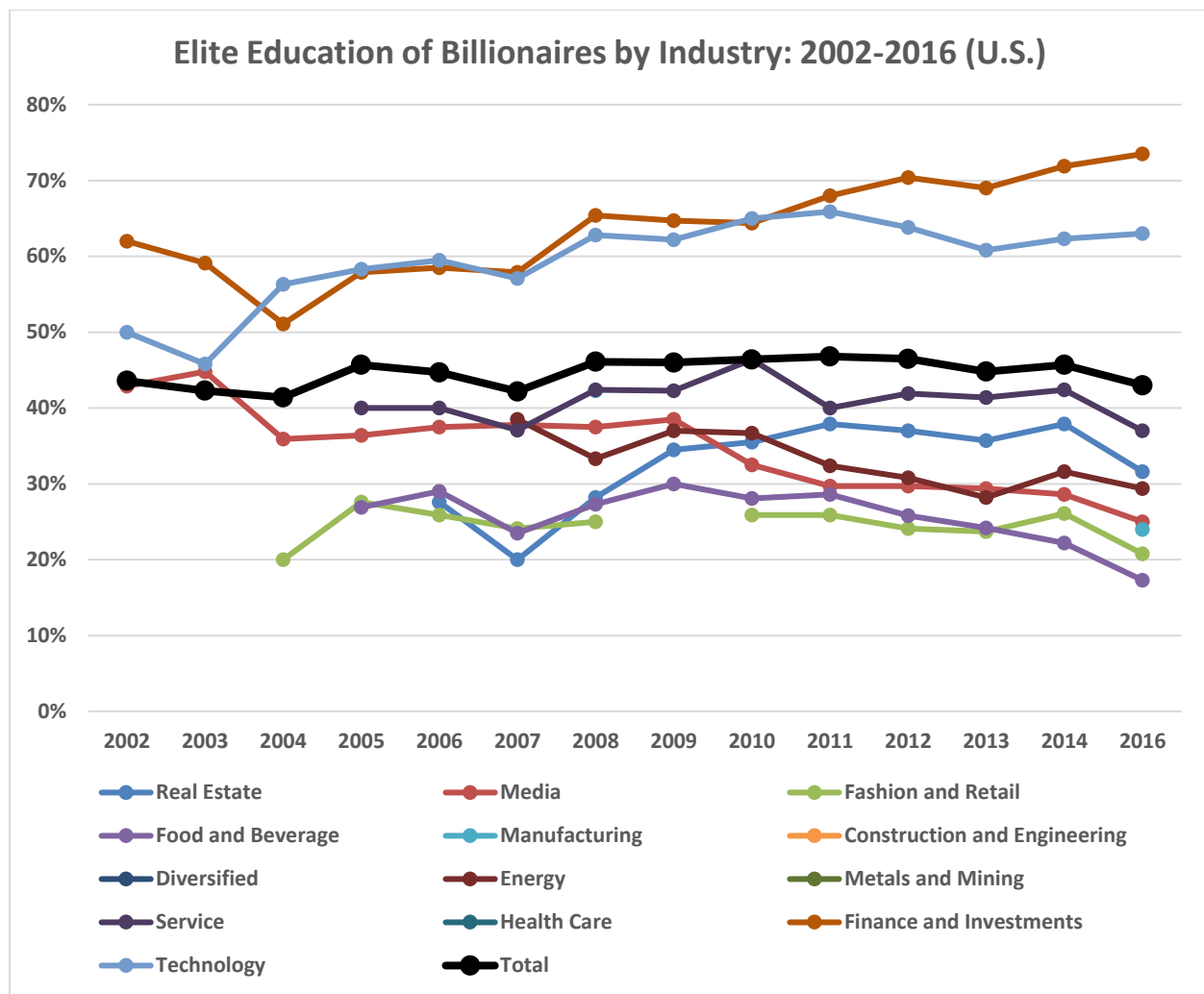**Figure 1.** Elite education by industry: World and U.S./World

Figure 1. Elite education by industry: World and U.S./U.S.

Figure 2 shows elite education as a function of country, specifically the U.S., Germany, and Russia, along with the overall trend. These three groups were included in the graph because they had systematic data across the longest stretch of time, however, for data on elite education for other countries, see Appendix 2. Broadly, the U.S. was above average (2002: 43.6%, 2016: 43%) and the pattern was stable over time, whereas Russia (2004: 12%, 2016: 23.4%) and Germany (2002: 28.6%, 2016: 11.7%) were below average but showed more variability than the U.S. across time, probably due to smaller sample sizes.

Figure 3 shows the male-female (M/F) ratio of billionaires across time. This ratio appears to have dropped from 2002 to 2005 (12.6 to 1 to 9

to 1 for the world) but has remained fairly stable across the last decade (about 9 to 1 for the world). Overall, the U.S. male-female ratio is lower than the world male-female ratio (about 7 to 1 for the last decade). The population of billionaires has increased over time (see Appendix 1), which means the raw number of women attaining billionaire status have increased, but the raw number of men have also proportionately increased.

Figure 4 shows elite education as a function of self-made vs. non-self-made status for the world and U.S. over time. Self-made is defined by *Forbes* "as someone who built a company or established a fortune on her own, rather than inheriting some or all of it" (Dolan, 2018). For the world, non-self-made billionaires tended to

have higher elite education levels across the last 15 years. However, for the U.S., at least since 2008, there appears to have been a sharp convergence between these two groups, with both trends stable up through 2016.

Figure 5 shows elite education as a function of net worth at the median and above and below the median across time. For the U.S. elite education appears to be consistently higher for the group with a higher net worth whereas for the world elite education does not. Tables 2 and 3 show statistical tests indicating that for the world only four recent comparisons were significant (2011, 2013, 2014, and 2016) whereas for the U.S. only two older comparisons were significant (2003 and 2004). This suggests that the link between elite education and net worth is not particularly strong within billionaires, which is a very select group.
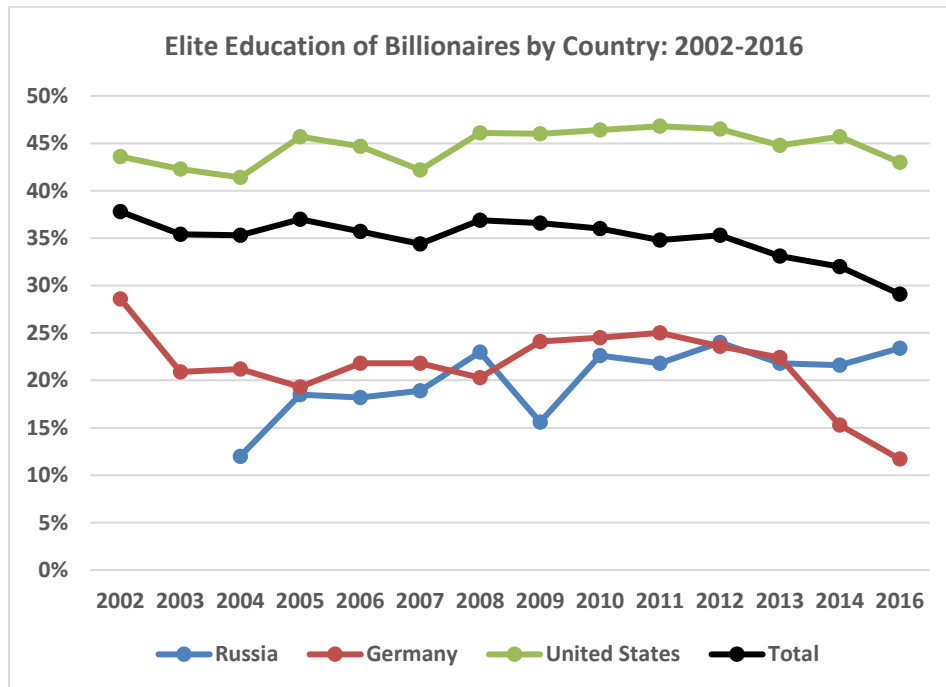

Figure 2. Elite education by country
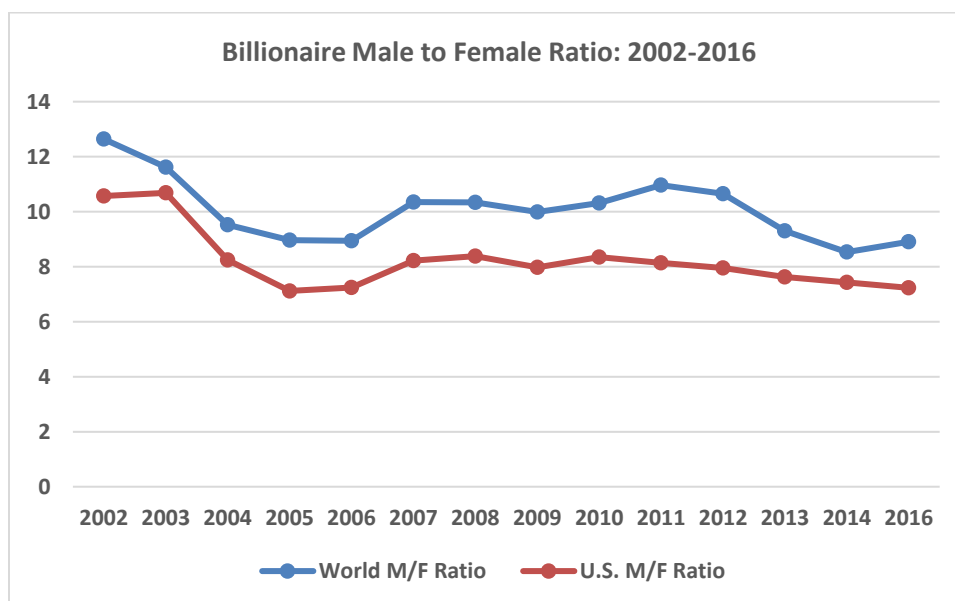
Figure 3. Male to female ratio: World and U.S.

**Elite Education of Billionaires by Self-made Status:
2002-2016 (World)**

**Elite Education of Billionaires by Self-made Status:
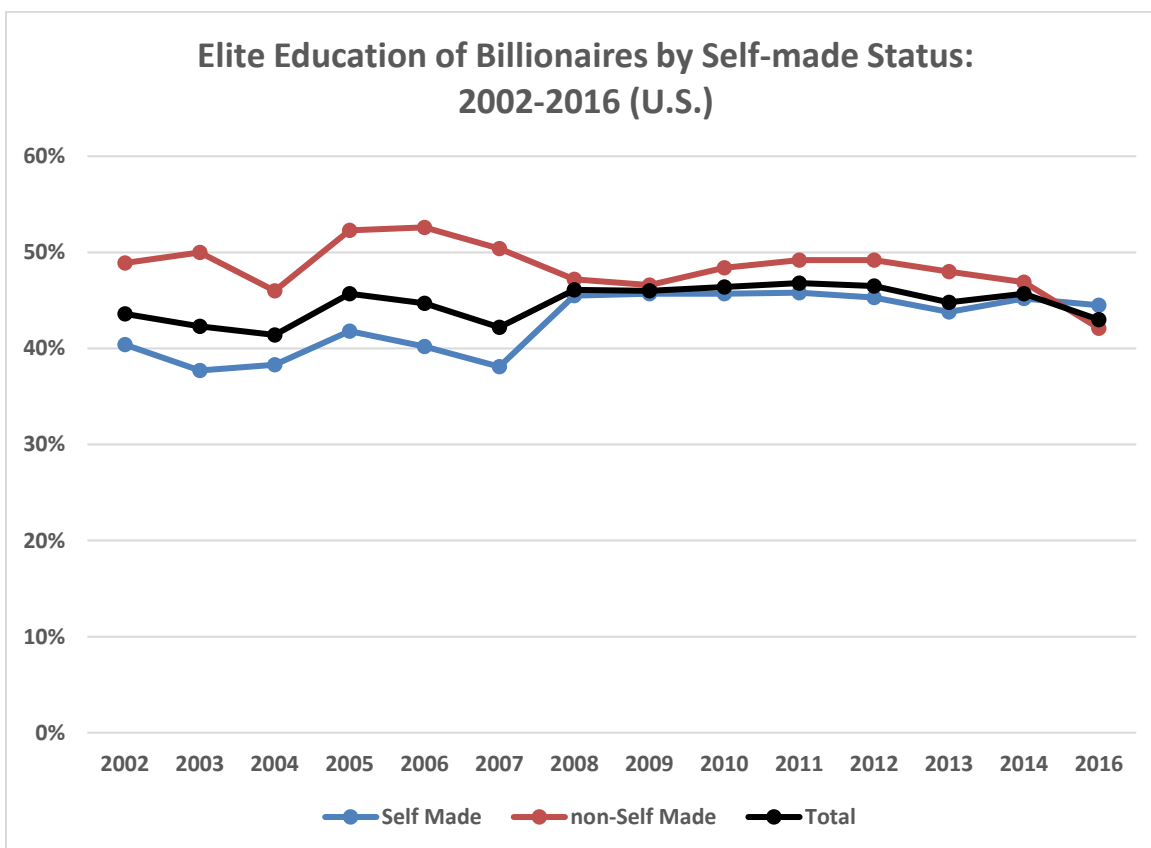2002-2016 (U.S.)**
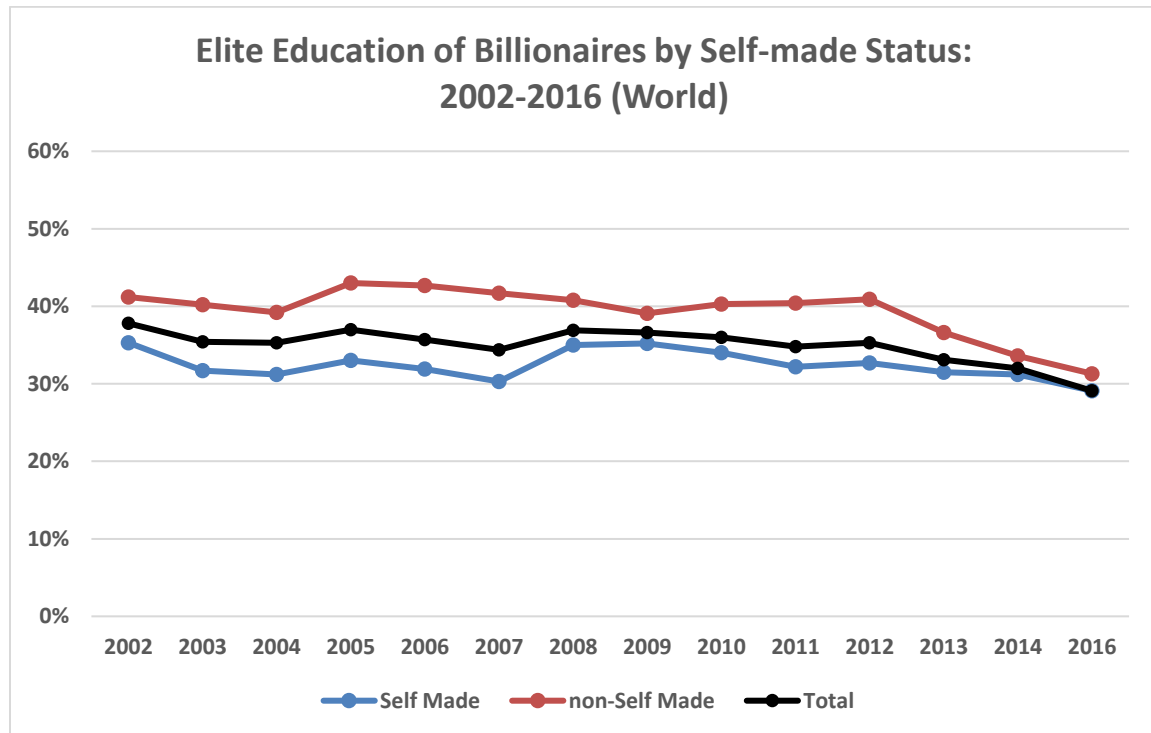
Figure 4. Elite education by self-made versus non self-made status: World and U.S.

**Elite Education and Billionaire Net Worth:
2002-2016 (World)**

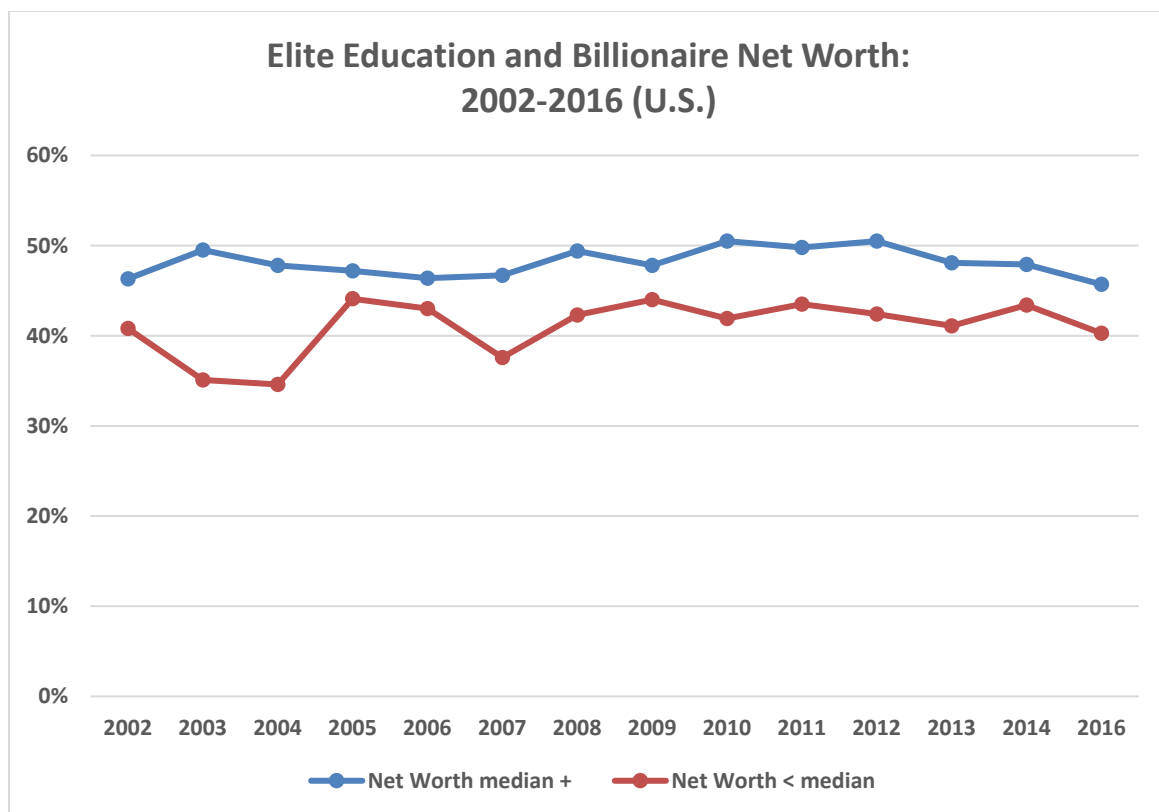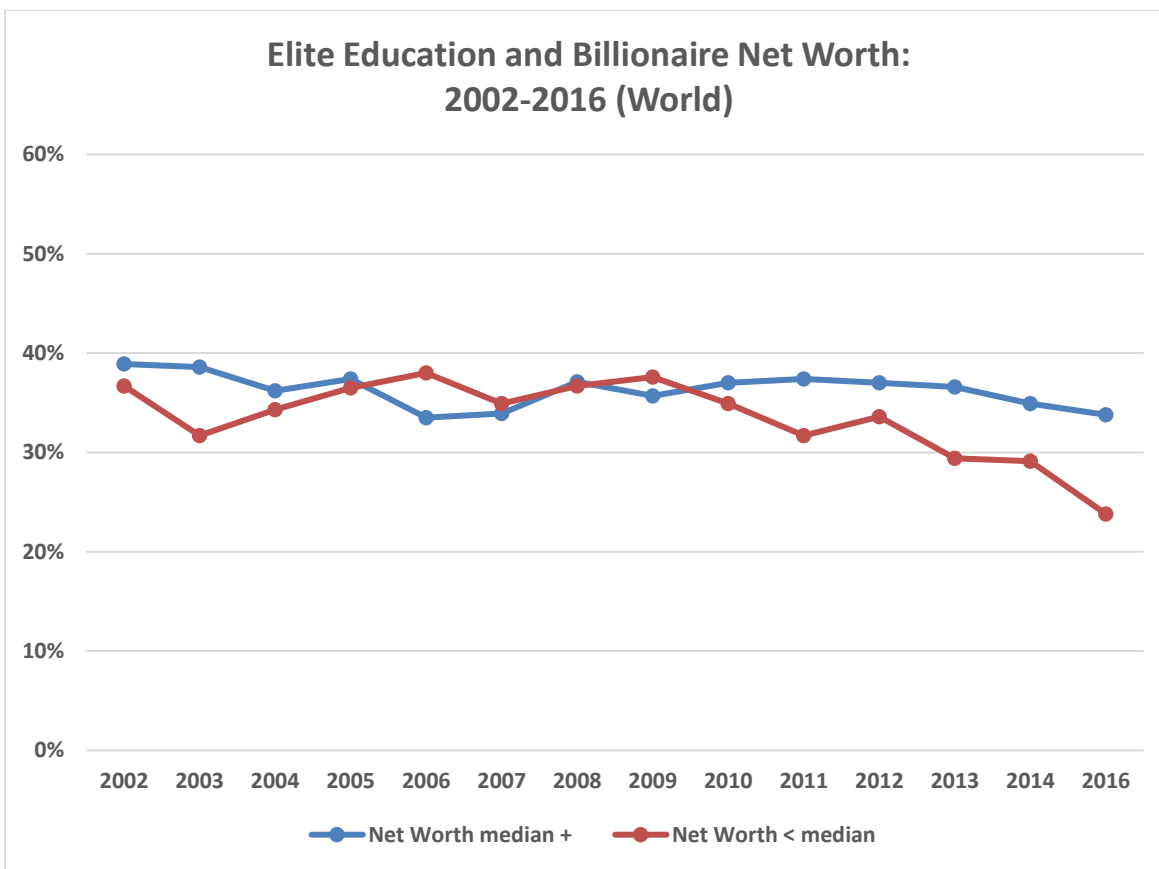**Elite Education and Billionaire Net Worth:
2002-2016 (U.S.)**

Figure 5. Elite education and net worth: World and U.S.

Table 2. Elite education by net worth: World

Year	Net Worth	Sample Size (N)	Elite School	Statistical Test
2002	median +	257	38.9%	Z = 0.515, *p* = 0.6066
	< median	240	36.7%	
2003	median +	254	38.6%	Z = 1.571, *p* = 0.1162
	< median	221	31.7%	
2004	median +	309	36.2%	Z = 0.493, *p* = 0.622
	< median	277	34.3%	
2005	median +	353	37.4%	Z = 0.244, *p* = 0.8072
	< median	337	36.5%	
2006	median +	409	33.5%	Z = -1.329, *p* = 0.1838
	< median	384	38.0%	
2007	median +	487	33.9%	Z = -0.316, *p* = 0.752
	< median	459	34.9%	
2008	median +	572	37.1%	Z = 0.123, *p* = 0.9021
	< median	553	36.7%	
2009	median +	429	35.7%	Z = -0.575, *p* = 0.5653
	< median	364	37.6%	
2010	median +	535	37.0%	Z = 0.706, *p* = 0.4802
	< median	476	34.9%	
2011	median +	650	37.4%	**Z = 2.061, *p* = 0.0393**
	< median	564	31.7%	
2012	median +	633	37.0%	Z = 1.248, *p* = 0.212
	< median	593	33.6%	
2013	median +	735	36.6%	**Z = 2.896, *p* = 0.0038**
	< median	691	29.4%	
2014	median +	827	34.9%	**Z = 2.542, *p* = 0.011**
	< median	818	29.1%	
2016	median +	955	33.8%	**Z = 4.669, *p* < 0.0002**
	< median	852	23.8%	

 Note: Comparisons in bold are statistically significant.

Table 3. Elite education by net worth: U.S.

Year	Net Worth	Sample Size (N)	Elite School	Statistical Test
2002	median +	123	46.3%	Z = 0.866, *p* = 0.3865
	< median	120	40.8%	
2003	median +	111	49.5%	**Z = 2.173, *p* = 0.0298**
	< median	111	35.1%	
2004	median +	138	47.8%	**Z = 2.194, *p* = 0.0282**
	< median	130	34.6%	
2005	median +	180	47.2%	Z = 0.578, *p* = 0.5633
	< median	161	44.1%	
2006	median +	192	46.4%	Z = 0.646, *p* = 0.5183
	< median	179	43.0%	
2007	median +	210	46.7%	Z = 1.878, *p* = 0.0604
	< median	205	37.6%	
2008	median +	249	49.4%	Z = 1.545, *p* = 0.1223
	< median	220	42.3%	
2009	median +	184	47.8%	Z = 0.727, *p* = 0.4672
	< median	175	44.0%	
2010	median +	212	50.5%	Z = 1.726, *p* = 0.0843
	< median	191	41.9%	
2011	median +	219	49.8%	Z = 1.268, *p* = 0.2048
	< median	193	43.5%	
2012	median +	214	50.5%	Z = 1.669, *p* = 0.0951
	< median	210	42.4%	
2013	median +	233	48.1%	Z = 1.461, *p* = 0.144
	< median	209	41.1%	
2014	median +	257	47.9%	Z = 0.991, *p* = 0.3217
	< median	235	43.4%	
2016	median +	276	45.7%	Z = 1.253, *p* = 0.2102
	< median	263	40.3%	

 Note: Comparisons in bold are statistically significant.

Discussion

Conceptualizing and Thinking about Wealth Generation as a Form of Expertise

This investigation leveraged billionaire status as a way to empirically conceptualize wealth generation as a form of expertise and to examine how specific occupations required elite education and cognitive abilities to achieve wealth expertise. There was great variation in the industries in which the billionaires earned their wealth, with general intelligence and elite education having much less of a premium in real estate, food and beverage, and fashion and retail and much more of a premium in technology and finance and investments. Overall, elite education and cognitive ability still mattered, just to different degrees for each subdomain. In particular, within the U.S., billionaires making their money in the technology and finance and investment sectors tended to be much more elite educated and cognitively able, perhaps choosing to develop expertise in a technology and/or finance and investment sector as a stepping stone towards the broader development of wealth expertise. This aligns with an analysis by industry within a group of 30-millionaires (Wai & Lincoln, 2016).

The development of wealth expertise may have underlying skills that in fact also transcend any particular field. First, seeking to use one's cognitive ability towards certain occupations with potential for wealth expertise requires a value placed on generating and accumulating wealth (this would be in sharp contrast to academics who are also often cognitively advanced, but value academic and intellectual freedom over wealth). Generating an idea that can result in wealth generation likely requires utilizing one's individual profile of abilities, personality, and other traits but also leveraging one's cultural resources, context, and connections in historical place and time. Some examples include, but are not limited to, the ability to recognize an opportunity across many areas in which one might develop highly specific occupational expertise, the ability to persuade or pitch one's ideas to funders and potential donors, and the ability to tolerate extreme risks. Additionally, based on the data across industries presented in this paper, having a high cognitive ability, attending an elite school, and leveraging

those resources towards turning an idea into a successful money generating enterprise are also important components. Industriousness or being willing to work long hours or put in 10,000 or more hours of practice, even in the face of a certain number of failures, is also likely important in developing wealth expertise as it is for other forms of expertise, as is luck. Broadly, high cognitive ability, attending a highly selective institution, and choosing to pursue wealth through the technology or finance and investments sectors appears to be more important in recent years for the development of wealth expertise.

Findings Across Time: 2002-2016

Prior work demonstrated a significant link between education/intellectual capacity and net worth, even within this highly select sample with restricted variability (Wai, 2013, 2014b), however, that was only for more recent years. A full analysis across a recent span of 15 years suggests that broadly, the link between education/cognitive ability and net worth is not strong. This matches with findings on 30-millioniares, which indicated that after controlling for many confounders, the link between education/cognitive ability and net worth became quite small (Wai & Lincoln, 2016). However, this does not mean that education/cognitive ability is not important for attaining great wealth because people in the top 1% of ability are likely overrepresented among billionaires. For example, given top 1% cognitive ability people should be represented at the base rate of 1%, this means globally top 1% people are overrepresented among billionaires by a factor of about 32 to 38, and within the U.S. top 1% people are overrepresented by a factor of about 41 to 47 (see Figure 1, total trends across time). This means that within this highly select sample, other factors may play a larger role in differentiating the person with only 1 billion from multiple billions. Future research might focus on investigating these differentiating factors that contribute to or take away from the development of wealth expertise even within this highly select sample across time.

The Gender Gap

Across the period 2002-2016, sex differences did drop in the initial 3 to 5 years but have been relatively stable in the last decade at about 9 to 1. Overall, sex differences are larger in the world than in the U.S. Broadly this suggests that for whatever reason, more men tend to end up as billionaires and that increasing the number of women billionaires may take some time. Given that among 30-millionaires the male-female ratio was 9.27 to 1 (Wai & Lincoln, 2016), and because newer billionaires may often come from multi-millionaires who increase their wealth, sex differences may shift slowly. These findings should be taken into account when considering ways to increase the numbers of women among billionaires and in the boardroom, among other sectors.

Are Elite Educated and Talented People Increasingly Choosing to Pursue Occupational Expertise That Leads to Wealth?

For the world, most of the elite educated and cognitively advanced people have tended towards the technology sector, and secondarily the finance and investments sector. For the U.S., a similar percentage of elite educated and cognitively advanced people have tended towards both the finance and investments and technology sectors and this percentage has grown over time. Since 2012, the elite education of the finance and investments sector has slightly increased, whereas the technology sector has appeared to level off. The overall pattern in the U.S. may indicate that elite educated people are increasingly choosing to pursue occupational expertise that leads to wealth, namely finance and investments and technology, in recent years. This trend further suggests that some of the increase in income or wealth inequality within the U.S. may be that cognitively advanced people are entering these highly lucrative occupations. Billionaire Mark Cuban, for example has declared that "the world's first trillionaires are going to come from somebody who masters AI [artificial intelligence] and all its derivatives and applies it in ways we never thought of" (Clifford, 2017). It also means that if you want to develop expertise as a billionaire,

and especially if you want to enter the technology, investments, or finance sectors, an elite education and corresponding cognitive ability needed for admission may be important in your path (see Rivera, 2015, for sociological mechanisms through which elite students get elite jobs in these industries). Tracking the role of education and ability in each of these sectors, especially technology, finance, and investments, will be of interest to uncover the role that education and ability plays in making enormous sums of money in the future.

Limitations and Future Directions

Consistent with previous research (e.g., Wai, 2014; Wai & Perina, 2018), attendance at American higher education institutions with average SAT (math + verbal) scores (or the ACT equivalent) of 1400 or higher according to *U.S. News & World Report* (America's Best Colleges, 2013) as well attendance at a top college or university worldwide according to *QS World University Rankings* (2012) were used as an approximation for ability level. Because individual test scores were not publicly available, attending these institutions were reasonable approximations for individuals within the top 1% of ability (e.g., Frey & Detterman, 2004; Koenig et al. 2008; Wai, 2014). At an international level, admission to the very top schools was considered representative of at least a good portion of the top cognitive potential within each country. While this method cannot separate education from cognitive ability, it may give an underestimate in some cases as extremely cognitively advanced people may not have attended a highly ranked school for multiple reasons (e.g., financial limitations). It may give an overestimate in some cases due to individuals who gained entry with significantly sub-average test scores (e.g., legacy admissions; Espenshade & Radford, 2009; Golden, 2006; Sander, 2004). Specifically for billionaires, the fluctuations of the percentages of elite education and ability, through the proxy of typical test scores, may be influenced more from the wealth of parents and other corresponding advantages granted such as access to elite institutions and other networks, rather than individual ability. It

is reasonable, however, that both of these Type I and Type II errors counterbalance one another, while they may lower the reliability of the method.

One limitation of the billionaires sample over 2002-2016 is that although there was some change, many of the people at the top of the list have remained on this list across time. Therefore, the shift in composition in education over time is largely driven by the nature of who loses and who gains wealth in a way that moves them across this billionaire cut point. As the samples have increased in recent years globally, it was harder to find background educational information on new people in different countries due to a lack of systematic public profiles (hence the high NR/NC percentage for the most recent years). This appeared to be less of a problem within the U.S. Future research might be directed at determining the qualities not only of those who join, but those who leave, the billionaire ranks over time. And because a degree from an elite institution likely opens doors and provides opportunities that would not otherwise be available, future research might investigate the extent to which high ability students who attend state institutions or less selective institutions may fare in attaining billionaire or wealth expertise status.

Another important limitation of using billionaire status as an indicator of wealth expertise is that there may not necessarily be a set of unifying factors underlying this extreme wealth indicator. We fully recognize this as a possibility, but believe it is worthy to explore the role of abilities and educational selectivity across multiple paths within the billionaire sample to examine whether there are commonalities. Additionally, there are likely elements in wealth generation that do transcend field, such as generating an idea, recognizing an opportunity, or convincing others to invest in that idea, among others.

Conclusions

Across a recent span of the last 15 years, the elite education and cognitive ability of billionaires has remained relatively stable, suggesting the billionaire filtering structure has remained relatively unchanged. Additionally, at least within the U.S., the percentage of elite educated and cognitively talented billionaires entering the technology and especially the finance and investment sectors has increased over time. This suggests that one factor to consider in increasing inequality in the U.S. may be the role of human capital or talent in selecting areas of occupational expertise that have amplified an individual's ability to generate wealth.

These findings add to the expertise literature by broadening the definition of expertise to include wealth generation and historically exploring the role of elite education and cognitive ability in this area of expertise, in part through the industries or pathways through which such expertise is developed. Even across time (from 2002-2016), elite education and cognitive ability appear to be an important factor in developing wealth expertise, suggesting that deliberate practice cannot be the full explanation of performance and that expertise in wealth generation is likely influenced by many interlocking factors, especially elite education and ability, in addition to factors such as luck. Of course, the importance of elite education and ability within billionaires varies, and billionaires as a whole also differ in the importance of elite education and ability in relation to other areas of expertise. For example, House members tend to have a lower level, whereas the most powerful men and women tend to have a higher level of elite education and ability. This suggests a multidisciplinary perspective is important to test the strength and generality of expertise theories, that more comprehensive models of expertise should account for abilities and education, and that investigation of expertise models should account for historical changes.

Footnotes

1. According to Murray (2012, p. 366): "In 2010, a combined score of 1400 put a student at about the 97th percentile of all students who took the SAT (based on the distribution produced by the known means and standard deviations for the two tests and a correlation of +0.7 between them). But the

number of test-takers in 2010 represented only 36 percent of the seventeen-year-olds in the country. Any plausible assumptions about the proportion of the 62 percent of seventeen-year-olds who didn't take the SAT who could have gotten a combined score of 1400 or more puts a student who actually does score 1400 well into the 99th [per]centile of the seventeen-year-old population."

2. For example, similar to the U.S., in order to gain admission to China's elite colleges, students are required to take the national college entrance examination (the CEE or gaokao). The total score is the main criteria for college admission. Li, Meng, Shi, and Wu (2012, p. 80) note that "CEE scores are essentially good measures of student ability or IQ. In Chinese society, CEE scores are well accepted as direct measures of intelligence."

Acknowledgement

Authors' Declarations

The authors declare that there are no personal or financial conflicts of interest regarding the research in this article.

The authors declare that they conducted the research reported in this article in accordance with the Ethical Principles of the Journal of Expertise.

The authors declare that they are not able to make the dataset publicly available but are able to provide it upon request.

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Appendix 1. All education data: World and U.S.

World						
Year	Elite School	Graduate School	College	NR/NC	Harvard	N
2002	37.8%	7.6%	30.2%	24.3%	6.6%	497
2003	35.4%	7.8%	30.1%	26.7%	6.1%	475
2004	35.3%	7.8%	29.5%	27.5%	6.3%	586
2005	37.0%	8.1%	29.3%	25.7%	6.4%	690
2006	35.7%	9.6%	29.1%	25.6%	6.3%	793
2007	34.4%	10.0%	29.4%	26.1%	6.2%	946
2008	36.9%	10.1%	28.7%	24.3%	6.1%	1125
2009	36.6%	9.5%	28.0%	25.9%	7.1%	793
2010	36.0%	10.2%	28.5%	25.3%	6.6%	1011
2011	34.8%	10.6%	28.7%	25.9%	5.8%	1214
2012	35.3%	10.7%	27.7%	26.2%	6.0%	1226
2013	33.1%	11.2%	27.3%	28.5%	5.8%	1426
2014	32.0%	10.5%	27.2%	30.2%	5.4%	1645
2016	29.1%	10.0%	22.9%	37.7%	5.0%	1808
U.S.						
Year	Elite School	Graduate School	College	NR/NC	Harvard	N
2002	43.6%	9.5%	36.6%	10.3%	10.7%	243
2003	42.3%	10.4%	37.4%	9.9%	11.3%	222
2004	41.4%	11.2%	35.1%	12.7%	9.3%	268
2005	45.7%	9.1%	33.4%	11.7%	10.0%	341
2006	44.7%	10.8%	31.5%	12.9%	10.2%	371
2007	42.2%	12.3%	33.5%	12.0%	10.1%	415
2008	46.1%	11.5%	32.2%	10.2%	11.3%	469
2009	46.0%	12.3%	32.3%	9.5%	11.7%	359
2010	46.4%	11.2%	32.5%	9.9%	11.9%	403
2011	46.8%	11.2%	31.8%	10.4%	12.1%	412
2012	46.5%	12.0%	31.1%	10.1%	12.0%	424
2013	44.8%	12.4%	32.4%	10.4%	12.2%	442
2014	45.7%	11.4%	31.9%	11.0%	11.8%	492
2016	43.0%	10.6%	30.6%	15.4%	10.9%	539

Note: "Elite School" indicates the percentage that attended an elite school as defined in this paper. "Graduate School" indicates the percentage that attended graduate school independent of the elite school category. "College" indicates the percentage that attended college but not graduate school or an elite school. "NR/NC" indicates the percentage that did not report (NR) any education or had no college (NC). These four categories are independent of one another and sum to 100%. "Harvard" indicates the percentage that attended Harvard, independent of these four categories.

Appendix 2. Elite education by country

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2016
Taiwan										12.0%	16.7%	15.4%	10.7%	12.0%
Russia			12.0%	18.5%	18.2%	18.9%	23.0%	15.6%	22.6%	21.8%	24.0%	21.8%	21.6%	23.4%
China							26.2%	25.0%	15.6%	19.7%	17.9%	18.0%	16.4%	12.0%
Germany	28.6%	20.9%	21.2%	19.3%	21.8%	21.8%	20.3%	24.1%	24.5%	25.0%	23.6%	22.4%	15.3%	11.7%
Indonesia												24.0%		
Hong Kong							30.8%	36.8%	28.0%	19.4%	23.7%	25.6%	24.4%	18.8%
United Kingdom						13.8%	17.1%	12.0%	17.2%	21.9%	22.2%	24.3%	25.5%	22.4%
Turkey						32.0%	31.4%		28.6%	26.3%	26.5%	27.9%		26.7%
Brazil										40.0%	40.5%	30.4%	30.8%	29.0%
India						47.2%	49.1%		49.0%	47.3%	47.9%	43.6%	39.3%	39.3%
United States	43.6%	42.3%	41.4%	45.7%	44.7%	42.2%	46.1%	46.0%	46.4%	46.8%	46.5%	44.8%	45.7%	43.0%
Canada							68.0%				57.7%	48.3%	43.8%	42.4%
Total	37.8%	35.4%	35.3%	37.0%	35.7%	34.4%	36.9%	36.6%	36.0%	34.8%	35.3%	33.1%	32.0%	29.1%