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Career and education choice as central elements of long-term financial planning

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Abstract

Career and education choice play a central role in individual's long-term financial planning. In defining individual's overall wealth, we not only consider the financial wealth (net worth), but also incorporate individual's human capital (expressed as the present value of future earnings) as a component of the wealth function. We demonstrate that human capital accounts for the majority of an individual's wealth portfolio in most cases for most of individual's life. By including human capital in the traditional theoretical portfolio choice framework, we show that the choice of career and education level has a significant effect on the Sharpe ratio of an individual's overall wealth portfolio. We conclude by providing several examples of the computations of the present values of future average earnings streams for individuals of various education levels from several different occupations. The calculations are meant to illustrate how an individual can perform a simple NPV-like analysis when in the process of career planning.

1. Introduction and motivation

While the conventional approach to measuring individual wealth is through an estimation of the dollar value of financial assets (cash, stocks, bonds, etc.) and real assets (real estate, private business, etc.), such a view deemphasizes human capital.[1] Yet, human capital rather than financial capital is responsible for the bulk of the wealth for most individuals during many stages of their lives, especially during their younger years. Using a small sample from

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the mid-1980s U.S. Survey of Consumer Finances, Lee and Hanna (1995) find that financial assets represent only two percentage of the total wealth of most households.[2] Furthermore, the value of individual's financial and real asset portfolio often reflect the human capital value possessed by the individual in the past because there exists a strong relationship between the value of human capital and an individual's long-term financial wealth. For example, Budria, Diaz-Gimenez, Quadrini and Rios-Rull (2002) and Dıaz-Gimenez, Quadrini, and Rios-Rull (1997) show high correlations between the level of individual household's earnings (defined as wages and salaries from labor) and household wealth. We build on the existing literature on the relationship between education, career choice, and the individual's lifelong wealth profile by proposing a new approach that incorporates the value of human capital in the wealth function.

Despite the financial importance of the topic for an average individual, there is not much research in financial planning that focused on the optimization of lifetime earnings. This is understandable given that financial planners do not have much input into the career paths or education levels of their clients. Traditionally, by the time one becomes a financial planner's client, they are already in the asset (financial and real) accumulation or decumulation phase. At that point, the goal of the financial planner is to maximize the value of the existing assets and/or cash flows.

In general, as people get older, the value of their financial and real assets increases, while human capital decreases, which results in a gradual shift of the individual's planning focus from earning maximization to efficient investments in financial and real assets that, in time, would provide sufficient cash flows in retirement. Earnings maximization does not imply that an individual will always seek the highest paid career (job). Rather, it implies that, everything else held constant, an individual will choose a career (job) that provides greater financial remuneration.

Given the apparent shift in the financial planning industry[3] such as the attempt to work with younger and less affluent clients and the emergence of a new type of planner (one who seeks to work with the younger population), planners who compete for the business of younger clients and who strive to help clients through the entire life span should first prioritize on development of their clients' human capital along with value-maximization of clients' financial capital.

The value of human capital is primarily driven by an individual's skills, which, in turn, results from (1) education level, (2) career choice, and (3) experience. Thus, examining the impact of education and career choice should be an integral step in maximizing the individual's total wealth. Financial planners can help their clients decide what to study and where to study.[4] By developing a framework that will incorporate *human capital*, the biggest asset an average younger client can bring to a planner's attention, into the conversation of overall wealth maximization, advisors can help their clients achieve financial goals more effectively and more efficiently.

A holistic view of an individual's wealth portfolio as a combination of human capital as well as financial and real assets shows that, for most of an average individual's working life, human capital is responsible for most or nearly all of the individual's wealth. As one ages, the proportion of human capital in the value of overall wealth drops while the value of financial and real assets in the portfolio grows (see Fig. 1). The objective of long-term financial

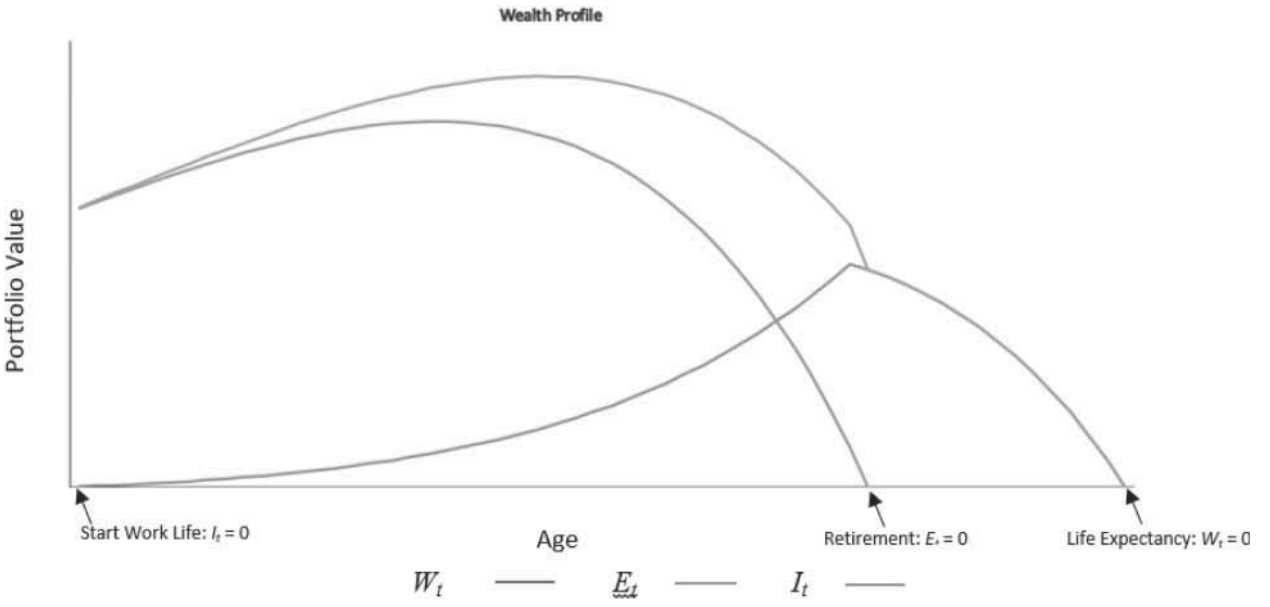

Fig. 1. Wealth profile.

planning is to ensure that, at some point in time, the return from the financial and real asset portfolio fully substitutes for the need to produce financial return on the possessed human capital (retirement). There exists a clear and, arguably, nonlinear relationship between the value of human capital and the long-term value of one's financial and real asset portfolio.

In this study we develop a model that incorporates the value of human capital into the framework of overall financial wealth for an average individual. By looking at total wealth, including human capital, we aim to expand the current real and financial asset-centric view on investments. We show that, despite one's preferences for academic majors and career paths, one can still make optimal financial decisions within the chosen career path by examining the lifetime earnings across several subdimensions within the career of interest. Our contribution to the current literature is in presenting a model that can be used to maximize the individual's wealth portfolio through an emphasis on the financial implications of a given education level and career path. The model also demonstrates that inclusion of human capital in the individual's portfolio choice problem maximizes the value of the Sharpe ratio, thereby optimizing the relationship between the expected return and the risk of the wealth portfolio.

Additionally, we provide several useful examples of the computation of the present value of the lifelong earnings for different education-occupation combinations. These calculations serve as a guide in making education and career choice decisions. Finally, we calculate the net present value of the difference between the average age-earnings profiles in given education with various education levels beyond high school and with high school education. The net present value represents a maximum expenditure one should be willing incur for education beyond high school if her goal is to increase her overall wealth as the result of achieving the given level of education. In other words, the net present value represents the maximum tuition one should pay for the given education level beyond high school. The sample calculations are performed by occupation and are meant to aid in establishing an optimal education level for a given occupation.[5]

The study proceeds as follows: Section 2 provides a brief overview of related literature; Section 3 discusses the proposed model of total wealth; Section 4 illustrates the application of the proposed model to portfolio theory; Section 5 provides several applied examples of the impact of education and career choice on the overall wealth; and Section 6 presents the implications and limitations of the model.

2. Literature review

2.1. Human capital and the financial planning profession

Despite very limited academic research in financial planning on the topic of incorporating human capital into a traditional investment model, some practitioners are attempting to broach the topic with their clients. This is not surprising, as the decision to pursue a specific career path, change careers, or pursue advanced education within a career track could add more return to one's overall investment portfolio and lifetime earnings than many of the typical decisions on which financial planners spend much of their time. Even when the intention is present, the lack of easily accessible resources and, at times, lack of training and knowledge about the subject makes it difficult for financial planners to provide advice as to the optimal amount of education and career choice to their clients. Some financial planners have identified this as a problem and are trying to incorporate the human capital aspect into their planning practices. For example, Haubrich (2013) argues that the client's most important asset is the human capital equity and that career choice is a new asset class that needs to be factored into the financial planning process. As such, clients are encouraged to keep separate working capital funds for education, career sabbaticals and changing jobs. This idea, however, has not gained significant traction and planners who focus on it are hard to find.

While the incorporation of human capital in financial planning is relatively new, the broader literature in economics, management and finance addresses the question of human capital optimization. In the "People Equity" framework, Schiemann (2006) looks at talent optimization and the factors that influence it. Caballe and Santos (1993) explore the importance of human capital in the context of growth by using a generalized Lucas-Uzawa model of endogenous growth that includes both physical and human capital, concluding that human capital is at the core of economic growth.

2.2. The value of education

In an academic setting, Milevsky has focused on the role of human capital on the personal balance sheet. The investment in human capital may depend on several factors, one of which, according to Hanna et al. (2001) is the individual's risk tolerance. Other factors include income, net worth, work history and specific job skills. Despite all these controls, education is still seen as a primary factor in attainment of human capital maximization. Although generalized theoretical models that incorporate human capital are hard to find, the importance and central place of human capital in planning out one's financial life has been discussed in specific contexts in the past. For example, Bridges, De'Armond, and Dean

(2013) examine the human capital of divorced women, concluding that women who do not invest in their human capital through education and work experience end up being negatively exposed to financial shocks. Similarly, Britt-Lutter et al. (2018) apply the human capital framework to argue for increased levels of education (with higher knowledge and positive behavior) and as a result, higher well-being in college students.

As noted earlier, the path to maximization of human and, therefore, total capital is through maximization of the return from one's career choice at an optimal level of education. There is a significant body of existing research about the economic benefit of education. Increased investment in education has several economic benefits, among which the most directly measured is increased earning capacity (Morgan & David, 1963). In addition to overall higher earnings, more education also translates into steadier jobs.[6] Studies on the differential in pay between different levels of education have been conducted since the 1960s. Over time, the gap in pay and arguments in favor of education shifted but the central theme is still the same: more education translates into more lifetime earnings. In the later part of the 1990s and in developed countries, the gap between more and less educated workers widened. A Canadian study shows that this trend resulted in higher demand and higher income for more educated individuals, and increased the returns on investment in education (Chung, 2006). In the early 2000s, though, the highest job growth has shifted to skilled labor such as gas extraction, construction, and real estate. This, however, may be more of a consequence of a strong job market in general than a sign of decline in the economic payoff of education.

The value of education is also dependent on the condition of the economy. Chakrabarti, Jiang, and Nober (2019) look at the graduates of four year colleges during boom and bust conditions and conclude that on average, students who enter college in bad economic times are on average going to have earnings about 10% lower than the students who enter college in boom times, but the earnings differential is dependent on the choice of major. Again, this points to the idea that human capital cannot be viewed in a uniform way and that financial planners can enhance their services by advising on career and education choices to their clients.

On average, most studies conclude that increased education results in higher earnings independent of career choice. While it is easy to identify outliers who, despite the lack of a degree, became financially successful, our goal is to study average individuals and the education and career choices they face with limited information availability. Brown et al. (2012) estimated that the average return of a college education over high school is $300,000. However, the degree, the choice of college and the occupation choice add significant variability to this number.

2.3. The value of career choice

In an early article on the topic, theoretically, Riley (1976) addresses the marginal cost of education across different individuals in the context of productivity. If the marginal earnings increase is positive, individuals will stay in school and acquire additional education. By presenting a human capital model of education screening, he argues that there exists a weak equilibrium at specific wages. He concludes that there is a specific wage at which individuals are hired based on their education level and paid based on their productivity.

Oreopoulos and Petronijevic (2013) argue that, to make the best decision about the investment in college education, students need to estimate the cost of schooling, their major and their anticipated occupation. Some of the newest research shows that the relationship between income inequality and number of years spent on education is still positive; additional years of schooling result in higher income, on average, and that this relationship is stronger in emerging and developing countries (IMF, 2017).

Overall, it is hard to argue with the fact that, on average, the decision to continue education results in higher economic returns as well as lower unemployment rates.[7] A 2011 Pew Research Center study conducted by Taylor et al. (2011) finds that 86% of respondents believe their college experience was a good investment. Adults who graduated from a four-year college earned on average $20k more per year than adults who did not receive a degree beyond high school. According to Leonhardt (2014), in 2013 the gap in pay reached a new high: Americans with a college degree made 98% more per hour than people with no degrees. This was five percentage more than five years earlier and 35% more since 1980.

Furthermore, some studies demonstrate that the level of education has a significant impact on the work life expectancy of an individual. As such, Skoog, Ciecka, and Krueger (2011 and 2019) show that individuals with higher education levels consistently have longer work life expectancies, everything else held constant. For example, a 25-year-old female who is initially active in the labor market and holds a high school diploma has a work life expectancy of 28.68 years, a female with the same characteristics, but with a bachelor's degree has a 33.20-year work life expectancy (data obtained from Skoog et al., 2011). The work life expectancy increases by another 2.7 years for a master's degree and jumps by almost three more years if this individual is to have a terminal degree. These differences in the work life expectancy inevitably have a very significant impact on long-term financial planning as they increase the lifelong earning potential and decrease the need for additional retirement funding. The importance of increased work life expectancy is particularly important in the context of increasing longevity.[8] As Bajtelsmit and Wang (2018) find, the "top third of households by longevity need approximately 20% more retirement wealth" than average longevity households.

However, as already mentioned, education alone is not sufficient. Career choice is also essential in lifelong wealth maximization. The major, career path and subsequent specialization within that path influence the economic benefits of the decision to pursue advanced degrees. A recent study from the Georgetown University Center on Education and the Workforce examines how the payoff is related to the field of study. It concludes that some majors, for example engineering, have a strong financial advantage that results in an extra $1.1 million in lifetime income. Similar conclusions were reached about graduate school.

Compared with the research on education choices, the research on the optimal financial payout of career choice is sparse. Kyrychenko (2008) uses a comprehensive mean-variance model to incorporate non-financial aspects of one's life into the optimal asset allocation model. By examining factors such as human capital, the author derives optimal portfolios for workers in different industries and locations. Bernardo et al. (2017) examine the payoff for different university majors in Chile, concluding that, although some majors are more desirable than others, overall higher education is still an attractive option. Similar results were found by Mun and Wong (1999) in Singapore. Although such studies are generally

informative, they are hard to implement for the average student as they are limited and circumstantial to the sample environment.

In a more generalized setting, Davies and Guppy (1997) use a longitudinal study in the United States to examine the characteristics of students who pursue financially lucrative careers. They find that, on average, males are more likely to enter fields with financially higher expected outcomes than females, but socio-economic factors do not affect this decision net of other background factors. Roksa and Levey (2010) sum up the state of research on the relationship between education and income by stating that "while income inequality between college graduates is documented, inequality in occupational status remains largely unexplored."

In this article we combine the literature on the optimal education level and optimal career choice by developing a theoretical model that incorporates the two decisions. Our goal is to present a model that would help an individual to arrive at the best combination of education and career choice to maximize her overall wealth portfolio, a portfolio that includes human capital along with financial and real capital It is important to mention that there are a number of additional factors that might influence lifetime earnings such as change in jobs, continuous education required of specific degrees, the stability of the job, mortality risk and longevity risk. Although these factors are all important in determining the optimal lifetime earnings of a specific individual, our goal is to look at the data on average. The scope of this paper is to introduce a model that optimizes the level of education given a chosen career path.

3. The wealth model

For simplicity, assume that individuals do not possess any financial or real assets at time zero. Time zero is assumed to be the time when an individual first enters the labor market.

Denote overall individual's total wealth at time t as W_t,[9] therefore:

$$W_t = E_t + I_t$$

where E_t is the present value of the sum of the future earnings (wages and salaries from labor) of an individual and I_t is the current value of the investment portfolio of an individual.

E_t can be expressed as:

$$E_t = \sum_{t=1}^{T} \left(\frac{e_t (1 + g_{t+1})^T}{(1 + r_t)^t} \right)$$

where e_t is the earnings in a given year t with the first year being the first year of individual's employment, e_t is the function of education, occupation and experience and can be presented in a following form:

$$e_t = f(S_t, O_t, X_t)$$

where S is the level of individual's education; O is the individual's occupation; X is the individual's level of experience, or

$$\begin{pmatrix} e_1 \\ \dots \\ e_t \end{pmatrix} = \begin{pmatrix} S_1 & O_1 & X_1 \\ \dots & \dots & \dots \\ S_t & O_t & X_t \end{pmatrix}$$

T is the remaining time that the individual has in the labor force (earnings span); g is the expected rate of growth of earnings that is due to gained experience and inflation adjustment; and r is the rate of return on assets, which need not be constant over time. The rate r therefore can be presented as follows:

$$r_t = w_\alpha R_f + w_{(e_t - \alpha)} R_{SOA}$$

where $w_\alpha = \frac{\alpha}{e_t}$ is the weight of a risk-free wage and $w_{(e_t - \alpha)} = 1 - w_\alpha$ is the weight of the wage that stems from the educational and occupational choice an individual makes. R_f is the risk-free rate of return and R_{SOA} is the individual-specific required rate of return on the investment in education and career choice, which can also vary with age. The assumption of the model is that the individual can secure a full-time position (40 hours a week) with wage α, which is a risk-free wage. This wage does not require any training or experience and, in an empirical setting, can be assumed as the minimum wage. Because wage α is assumed to be risk free, it is discounted at the risk-free rate R_f.

Note that the earnings growth rate g does not need to be constant over time and can take both positive and negative values; g also incorporates both experience related earnings growth and inflation adjustment.

The current value of the individual's investment portfolio, I_t, can be expressed as:

$$I_t = \sum_{t=1}^{N} \beta_t \mathrm{e}_t (1 + i)^n$$

where β_t is a percentage of earnings e_t that an individual contributes to her portfolio of financial and real assets in time t; n is the number of periods between the first time the assets have been allocated to the investment portfolio and time t; and i is the average annual investment return achieved during period n. Note that β does not need to be constant over time and can take both positive and negative values. A negative β implies a voluntary withdraw of funds from the investment portfolio.

Fig. 1 provides an illustration of a typical Age-Wealth profile of an individual. For the purposes of this illustration, the initial value of the investment portfolio equals 0, the work-life expectancy of the individual is assumed to precede the individual's life expectancy and it is assumed that the individual does not return to employment after retirement. The illustration in the figure also assumes that the value of the investment portfolio at the time of an individual's life expectancy is depleted to 0 (no inheritance is left to the heirs from the investment portfolio). Both the rate of contributions to the retirement portfolio and the rate of return on the retirement portfolio are assumed to be constant.

Fig. 1 presents the gradual substitution effect of the value of the human capital portfolio in the total wealth profile by the value of investments. What is notable is that the value of human capital is overwhelmingly the main component of the overall wealth of this

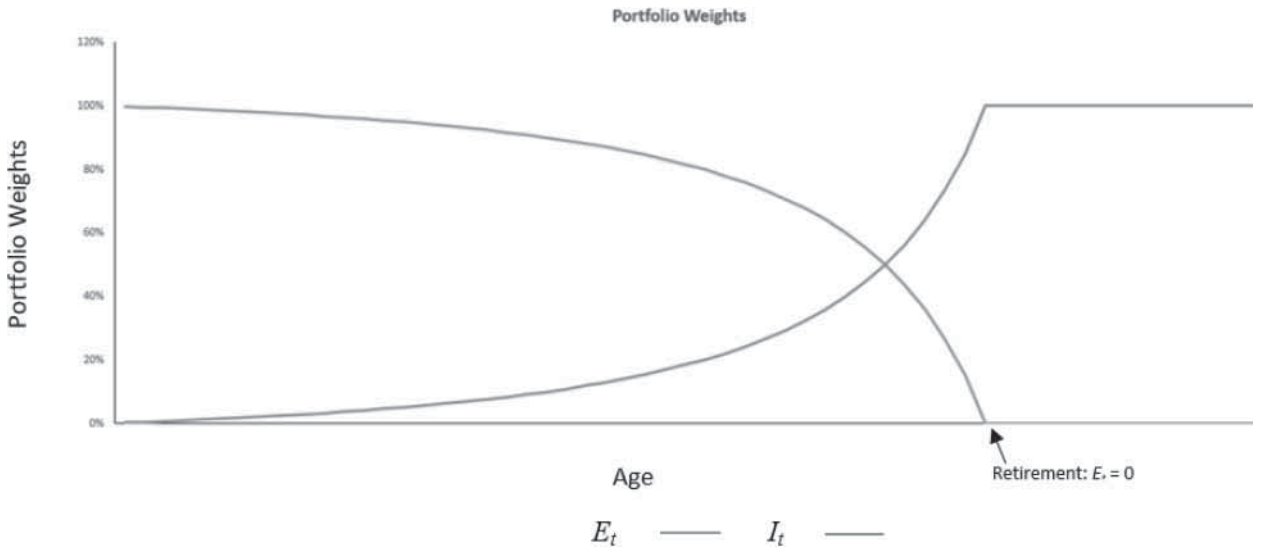

Fig. 2. Portfolio weights.

individual for the majority of her work life expectancy (see total wealth portfolio weights in Fig. 2). While the magnitude of the allocation of capital to the investment portfolio (retirement savings) would affect the weights of human and investment capital in the overall wealth portfolio, human capital will still dominate in the weights for the majority of one's life.

4. Application of the wealth model to portfolio theory

The traditional mean-variance model proposed by Markowitz (1952) suggests that a rational investor should choose a portfolio that provides the highest possible return. This investor is also risk averse; therefore, she chooses an investment with the lowest possible risk. The assumption of risk-free lending and borrowing leads to the conclusion that a rational risk averse investor should invest in an optimal portfolio and adjust for her level of risk aversion by either borrowing to increase the investment into the optimal portfolio or lending at the risk-free rate to reduce the overall portfolio risk. Sharpe (1966) introduced the widely accepted Sharpe ratio that presents a relationship between the excess return on a portfolio of assets and the risk of such portfolio. It is now regarded as conventional wisdom that the objective of a portfolio manager is to maximize the Sharpe ratio of the managed portfolio.

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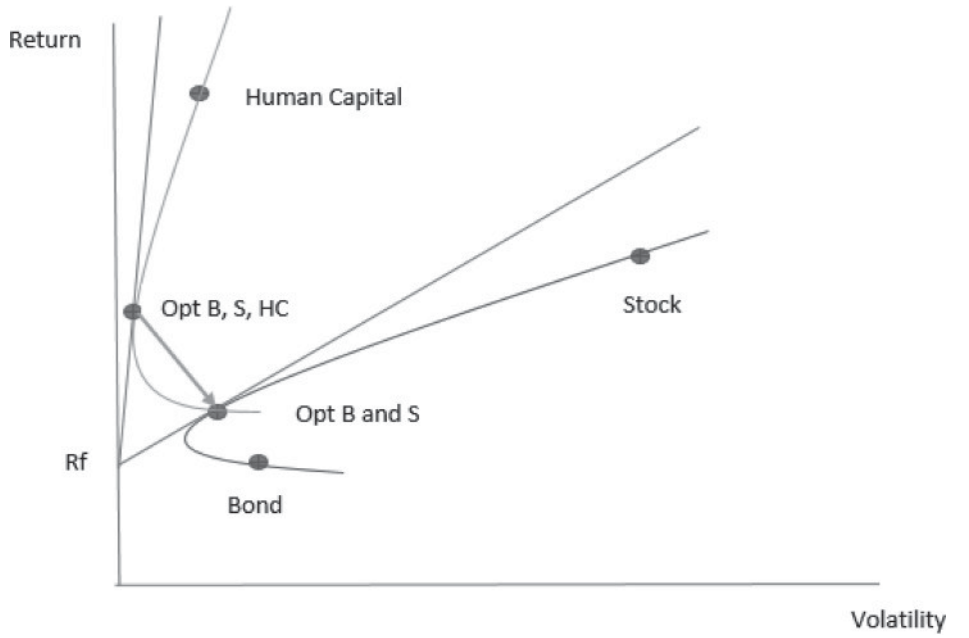

Fig. 3. Human capital as part of investment portfolio. where B stands for bonds, S is stock, and HC for human capital.

Champagne and Kurmann (2013) demonstrate that while the volatility of wages has increased substantially between the 1950s and the 2000s, it is still very low relative to any other risky assets available to investors. According to their findings, the volatility of wages is below 1.02%. Furthermore, because wage changes do not behave identically to stock returns, one can also view volatility of wages as the probability of temporary unemployment. Given the relatively low historic unemployment rates and availability of alternative employment options in the labor markets, the wage volatility viewed through the prism of unemployment is also rather low. As we illustrate further in this study, the expected return of making a certain education or occupational decision often provides a rather significant return. Thus, inclusion of human capital in the calculation of the optimal portfolio results in a significantly higher (and a more complete) Sharpe Ratio (see Fig. 3). This relationship is particularly evident for individuals who are in the first half of their careers, as the present value of human capital (E_t) profile for most occupations is concave and eventually reaches zero at the time of permanent retirement for all individuals. The depletion of the human capital in one's overall wealth portfolio is exemplified by the orange arrow in Fig. 3 As the individual ages, the weight of the human capital in the optimal portfolio drops gradually only to reach zero (retirement), resulting in a clockwise rotation of the efficient frontier of the individual (green curve on Fig. 3) and thus a gradual decrease in the slope of individual's wealth portfolio Sharpe ratio. At the point when the weight of human capital in the wealth portfolio reaches zero, the efficient frontier from Fig. 3 is made up of the bond and the stock investment (assuming that the investment assets that an individual possesses consist of an investment into bonds and stocks) only (blue line on Fig. 3).

We argue that, similarly to a portfolio manager, an individual should be concerned with maximizing the Sharpe ratio of her individual overall wealth portfolio, which would in turn

maximize the value of the portfolio (W_t) at all times. Since the central component of W_t is E_t, which is a function of age, education, and occupation and I_t is largely a function of e_t, one's optimal return stems from an investment in human capital, particularly so at younger ages. In practical terms, this means choosing the optimal level of education for a given career is imperative to achieving such optimality.

5. Applied illustrations

In this section we provide several examples intended to demonstrate the principle discussed above. We are not suggesting that everyone should become a lawyer, doctor or any other highly paid profession, but rather our examples serve to demonstrate how an individual's career and education level choice, even within a specific area of interest, can have a significant impact on the overall wealth W_t maximization.

To provide meaningful results, we use the Bureau of Labor and Statistics American Community Survey (ACS) for the recent period of 2012 through 2016. We identify individuals who are working full-time by including only the observations for individuals who indicated that they were employed at least 50 weeks in the last 12 months and that worked at least 35 hours per week.[10]

We then perform quintile regressions of the following form:

$$WAGE_i = \alpha + \beta_1 Age + \beta_2 Age^2 + e_i$$

where *WAGE* is the reported wage of the individual and *Age* is her reported age. The *WAGE* variable is adjusted for inflation to reflect 2019 dollars. The adjustment is based on the actual inflation rate for the years 2013 through 2017 and the Congressional Budget Office's outlook for inflation for years 2018 and 2019.[11] *Age* is the age of the individual at the time of the ACS data. The Age^2 term is added to control for the nonlinearity of earnings over the life span of an individual. We run these regressions by the Standard Occupational Classification (SOC) code and by specific education level simultaneously. We output the fit of the model (median) by age, given a specific level of education. The result is an Age Earnings Profile (EAP) for an individual who possesses a specific education level and is employed in a specific occupation as defined by SOC.[12]

We assume the earliest an individual can secure full-time employment is age 18 and allow one year of no employment for individuals who reported that they have one or fewer years of college experience, two years of no employment for individuals who reported one or more years of college, two years for those who reported that they possess an Associate's degree, four years for those with Bachelor's degrees, six years for Master's degree holders, and nine years for individuals who responded that they have either Professional or Doctorate degrees (the fitted earnings for these individuals are set to zero until the assumed graduation and commencement of employment). We then compute the present value of the future earnings of these individuals (SOC – Education sorted Age Earnings Profiles [AEP]) on the 18th birthday using a five percentage discount rate. Since age earnings profiles are all expressed in today's dollars, the five percentage discount rate implies a real discount rate applied to future earnings.[13] For illustration purposes, below are two examples of the present value of

the generated AEPs: (1) for all sales related occupations and (2) for all business-related occupations, as defined by SOC.[14]

5.1. Sales and related occupations

Table 1 displays the present values of future earnings of individuals in a specific occupation within the Sales and Related Occupations SOC category at different levels of education.

The absence of a number implies that there were not enough observations to output an age-earnings profile for a specific SOC-education combination.[15] It is notable that education levels of one or fewer years of college, one or more years of college experience, and an associate's degree result in almost identical earnings for the vast majority of occupations within this category. It is also remarkable that bachelor's degrees result in a very significant increase in the present value of earnings for all occupations reported in Table 1. As can be seen in Table 1, attainment of a bachelor's degree or higher results in more income over the working lifetime of an individual in most of the subcategories of the sales profession.

In Table 2 we compute the difference between the present value of the earnings of an individual with a high school diploma and an education level that is greater than a high school diploma. The motivation for this calculation is that a high school diploma generally does not require a financial investment by the individual while any higher level of education does require a financial investment (tuition, opportunity cost of not working full-time while working on a degree). Thus, the difference in the present value of the age earnings profiles of a higher than high-school educated individual and an individual who has a high school diploma represents a maximum cost that one can pay for a given level of education to have the same financial outcome as if she would have stayed with a high school education, holding the occupation constant (i.e., net present value of obtaining the given level of education). Note that the maximum education cost is also computed at age 18, a presumable age at which the education level choice is being made.

A negative number in Table 2 implies that an individual is better off by not investing in her education beyond high school. The numbers for any given education level are the maximum cost one should incur for all degrees above the high school degree, implying that a dollar figure displayed in the master's column includes the cost of both bachelor's and master's degrees. Thus, an individual who wants to pursue a career of a cashier has up to $35,435 dollars (in present value terms at age 18) to complete her bachelor's degree to end up as well or better off than if she would have earned only a high school education; at the same time, she has only $8,668 to complete both bachelor's and master's degrees if she wants to remain indifferent to just a high school diploma. Thus, an individual who wants to become a cashier should only earn a bachelor's degree at a program that costs less than $35,435 over the entire course of study; furthermore, this individual should not consider a master's degree regardless of its cost as the bachelor's degree results in higher present value of future earnings than does the master's degree for this occupation. Parts salespersons appear to maximize their wealth by earning only a high school education and not investing in additional schooling. Retail sales persons do not benefit from a degree beyond a bachelor's. These results are not surprising as cashier and parts sales person positions do not normally require specialized

Table 1 Sales and related occupations - Present value of the age-earnings profiles

	0-12	12th - No diploma	HS	GED	<1 year college	>= 1 year college	Associates	Bachelors	Masters	Professional	Doctorate
First-line supervisors of retail sales workers	$528,535	$557,884	$588,109	$567,641	$620,601	$612,815	$610,159	$719,277	$785,224	$858,011	$1,223,902
First-line supervisors of non-retail sales workers	$655,509	$718,812	$728,156	$741,548	$769,235	$772,488	$795,739	$1,048,222	$1,222,262	$1,169,055	$1,313,409
Cashiers	$369,731	$374,143	$397,092	$388,383	$393,663	$382,020	$385,753	$432,527	$405,759	—	—
Counter and rental clerks	$417,790	—	$480,226	—	$545,773	$528,155	$573,957	$616,752	—	—	—
Parts salespersons	$496,084	$532,843	$584,291	$569,864	$583,785	$545,827	$569,050	$542,403	—	—	—
Retail salespersons	$446,795	$483,802	$515,179	$515,469	$548,319	$545,687	$545,556	$689,781	$680,473	$505,333	$548,966
Advertising sales agents	—	—	$711,319	—	$668,925	$700,516	$705,770	$1,023,933	$1,033,034	—	—
Insurance sales agents	$581,024	—	$609,788	$620,049	$652,691	$630,264	$624,082	$896,753	$954,199	$1,004,293	—
Securities, commodities, and fin serv sales agents	—	—	$719,413	$765,888	$743,362	$759,479	$765,894	$1,380,625	$1,843,812	$2,033,226	$1,901,361
Travel agents	—	—	$623,900	—	$616,025	$561,359	$539,212	$612,749	$785,740	—	—
Sales representatives, services, all other	$698,233	$616,544	$708,074	$718,605	$764,339	$768,604	$758,025	$1,103,939	$1,256,921	$977,604	—
Sales representatives, whsl and mnfg	$656,773	$670,137	$735,346	$714,129	$768,396	$767,605	$780,243	$1,095,911	$1,207,591	$1,009,316	$1,177,193
Models, demonstrators, and product promoters	—	—	$450,135	—	—	$542,386	—	$848,091	—	—	—
Real estate brokers and sales agents	$665,103	—	$642,636	$617,268	$673,276	$700,136	$683,680	$930,842	$989,259	$901,494	$949,767
Sales engineers	—	—	—	—	—	$1,290,037	$1,061,241	$1,376,667	$1,424,423	—	—
Telemarketers	—	—	$475,549	—	$453,503	$422,112	$483,599	$559,863	—	—	—
Door-to-door sales wrks, news and str vendors	$474,566	—	$503,632	—	$486,902	$547,175	$542,240	$582,964	—	—	—
Sales and related workers, all other	$520,132	—	$609,642	$726,461	$694,810	$685,709	$671,780	$994,333	$1,098,490	—	—

Table 2 Maximum education cost at age 18 for sales related occupations

	<1 year college	>= 1 year college	Associates	Bachelors	Masters	Professional	Doctorate
First-line supervisors of retail sales workers	$32,492	$24,705	$22,049	$131,168	$197,115	$269,902	$635,793
First-line supervisors of non-retail sales workers	$41,079	$44,332	$67,583	$320,066	$494,106	$440,899	$585,253
Cashiers	($3,429)	($15,072)	($11,339)	$35,435	$8,668	—	—
Counter and rental clerks	$65,547	$47,929	$93,730	$136,525	—	—	—
Parts salespersons	($505)	($38,464)	($15,240)	($41,888)	—	—	—
Retail salespersons	$33,140	$30,508	$30,378	$174,602	$165,294	($9,846)	$33,787
Advertising sales agents	($42,393)	($10,803)	($5,549)	$312,614	$321,715	—	—
Insurance sales agents	$42,903	$20,476	$14,294	$286,964	$344,411	$394,504	—
Securities, commodities, and fin serv sales agents	$23,948	$40,065	$46,481	$661,212	$1,124,398	$1,313,812	$1,181,948
Travel agents	($7,875)	($62,540)	($84,688)	($11,150)	$161,840	—	—
Sales representatives, services, all other	$56,265	$60,530	$49,951	$395,865	$548,847	$269,530	—
Sales representatives, whsl and mnfg	$33,051	$32,259	$44,897	$360,565	$472,245	$273,970	$441,848
Models, demonstrators, and product promoters	—	$92,251	—	$397,956	—	—	—
Real estate brokers and sales agents	$30,641	$57,500	$41,045	$288,206	$346,623	$258,859	$307,131
Sales engineers	—	—	—	—	—	—	—
Telemarketers	($22,046)	($53,437)	$8,049	$84,313	—	—	—
Door-to-door sales wrks, news and str vendors	($16,730)	$43,543	$38,608	$79,332	—	—	—
Sales and related workers, all other	$85,169	$76,067	$62,139	$384,692	$488,849	—	—

skills beyond a basic level. As a result, they should not be rewarded for the extra level of education pursued and the cost incurred for obtaining such education.

By comparison, insurance agents can spend up to $286,964 on bachelor's degrees and nearly additional $57,000 on their master's degrees to be better off than insurance agents with only a high school diploma. Securities, commodities, and financial services sales agents can spend up to $1,124,398 on their bachelor's and master's degree and still be financially better off than someone who decided not to go to college. The master's degree appears very beneficial in this position as it adds over $450,000 in value. A professional degree adds almost another $200,000 in value to an individual involved in this occupation, while a Ph.D. degree appears to be less valuable than a master's degree in present value terms. As expected, the more specialized the skills required, the more the pursuit of additional education pays off. The appeal of presenting the information this way is that is gives consumers a way to evaluate whether pursuing a specific level of education or major is worth the overall investment.

5.2. Business and financial occupations

Table 3 displays the present value of the future earnings for all business-related occupations as defined by SOC. Similar to the previous tables, Table 3 presents the present value of future earnings for all business-related occupations using a five percentage real discount rate. As with the sales related occupations, there is a noticeable homogeneity of values across individuals with less than a high school diploma. There is also a very noticeable jump in the present value of earnings at the bachelor's degree level for all occupations without exceptions. The marginal benefit of a degree beyond a bachelor's degree though varies. As such, agents and business managers of artists, claims adjusters, event planners, appraisers and financial examiners appear to be better off by earning only a bachelor's degree and not considering a master's degree. On the contrary, logisticians, credit analysts, tax preparers, and market research analysts appear to benefit the most from a master's degree.

Furthermore, when looking at the human resource workers, a marginal benefit from pursuing a bachelor's degree is observed to the magnitude of about $164,000 in present value terms over one's working lifetime. A master's degree brings, on average, an additional $63,500 above and beyond a bachelor's degree (the difference in the present value of the bachelor's and master's level lifetime earnings). By comparing these numbers to those reported in Table 4, one can see the maximum amount that the level of education beyond high school is worth on average. An individual who wants to become a human resource worker should not spend more than $164,000 on his bachelor's degree. His maximum expenditure on both the bachelor's and the master's degree should not exceed $228,000. It is relatively safe to conclude that finding educational programs to fit these costs is relatively simple, and most people would be better off by pursuing a higher degree in the field of human resources.

By comparison, when looking at the lifelong earnings for meeting and convention or event planners, we conclude the opposite. On average, an event planner is better off finishing a bachelor's degree (as long as the total cost does not exceed $78,000) and not pursuing further education since a maximum combined expenditure on both a bachelor's and a master's

Table 3 Business related occupations - Present value of the age-earnings profiles

	0–12	12th - No diploma	HS	GED	<1 year college	>= 1 year college	Associates	Bachelors	Masters	Professional	Doctorate
Agents and bus mngrs of artists, performers, and athletes	—	—	$696,667	—	—	$682,432	—	$959,911	$877,665	—	—
Buyers and purchasing agents, farm products	—	—	$657,218	—	—	—	—	$984,830	—	—	—
Wholesale and retail buyers, except farm products	$495,700	$544,909	$625,266	$694,350	$638,128	$591,205	$609,255	$798,175	$808,307	—	—
Purch agents, except whls, retail, and farm products	$726,012	—	$689,452	—	$672,366	$687,580	$723,744	$828,577	$935,252	$861,342	—
Claims adjusters, appraisers, examiners, and investigators	—	—	$684,757	$649,766	$701,032	$670,229	$693,661	$809,191	$798,214	$829,494	—
Compliance officers	—	—	$760,645	$820,837	$678,873	$766,097	$733,515	$915,722	$998,413	$1,131,987	$1,087,374
Cost estimators	$827,276	—	$831,934	$731,904	$808,092	$820,475	$784,436	$943,313	$971,830	—	—
Human resources workers	$701,303	$776,561	$716,064	$745,837	$737,368	$739,451	$712,714	$880,573	$944,065	$957,354	$1,039,110
Compensation, benefits, and job analysis specialists	—	—	$714,390	—	$664,888	$664,579	$662,986	$772,634	$877,756	—	—
Training and development specialists	—	—	$728,636	$611,936	$740,122	$725,193	$740,378	$812,856	$885,449	—	—
Logisticians	—	—	$705,200	$591,761	$686,441	$733,109	$739,107	$857,923	$1,028,878	—	—
Management analysts	$941,426	—	$877,901	$1,050,859	$891,492	$870,262	$848,916	$1,149,793	$1,278,423	$1,221,674	$1,257,658
Meeting, convention, and event planners	—	—	$679,607	—	$673,144	$695,705	$646,198	$758,464	$700,742	—	—
Fundraisers	—	—	—	—	—	$661,740	$671,099	$868,540	$886,630	$883,904	—
Market research analysts and marketing specialists	—	—	$777,035	—	$728,277	$798,861	$801,941	$1,047,699	$1,221,109	—	—
Business operations specialists, all other	$712,450	—	$697,117	$651,094	$688,456	$716,684	$697,771	$885,602	$1,023,453	$1,025,639	$1,102,034

(continued on next page)

Table 3 (Continued)

	0–12	12th - No diploma	HS	GED	<1 year college	>= 1 year college	Associates	Bachelors	Masters	Professional	Doctorate
Accountants and auditors	—	—	$646,550	$677,327	$641,643	$647,907	$637,792	$912,745	$1,043,851	$980,915	$867,008
Appraisers and assessors of real estate	—	—	$600,780	—	$793,566	$660,187	$639,936	$833,948	$820,014	—	—
Budget analysts	—	—	$976,208	—	$964,721	$880,067	$860,423	$999,609	$1,055,728	—	—
Credit analysts	—	—	$654,129	—	-	$726,476	$707,007	$829,250	$1,030,965	—	—
Financial analysts	—	—	$1,020,425	—	$836,953	$835,621	$839,263	$1,165,952	$1,300,219	$1,455,551	$1,804,033
Personal financial advisors	—	—	$745,870	—	$743,491	$859,119	$812,937	$1,262,421	$1,364,081	$1,468,004	$1,401,729
Insurance underwriters	—	—	$746,866	—	$729,867	$734,349	$723,797	$950,709	$986,869	—	—
Financial examiners	—	—	—	—	—	—	—	$1,186,300	$1,132,039	—	—
Credit counselors and loan officers	$721,200	—	$700,105	$716,829	$723,474	$713,891	$701,606	$892,577	$1,016,189	$876,802	—
Tax examiners and col lectors, and revenue agents	—	—	$669,391	-—	$649,872	$646,617	$658,001	$796,277	$870,269	—	—
Tax preparers	—	—	$640,168	—	$643,897	$631,808	$558,969	$865,302	$1,278,545	$1,506,903	—
Financial specialists, all other	—	—	$715,937	—	$667,536	$676,142	$631,982	$916,814	$1,218,788	—	—

Table 4 Maximum education cost at age 18 for business related occupations

	<1 year college	>= 1 year college	Associates	Bachelors	Masters	Professional	Doctorate
Agents and bus mngrs of artists, performers, and athletes	—	($14,235)	—	$263,244	$180,997	—	—
Buyers and purchasing agents, farm products	—	—	—	$327,612	—	—	—
Wholesale and retail buyers, except farm products	$12,862	($34,060)	($16,011)	$172,909	$183,041	—	—
Purch agents, except whls, retail, and farm products	($17,086)	($1,872)	$34,293	$139,125	$245,800	$171,890	—
Claims adjusters, appraisers, examiners, and investigators	$16,275	($14,528)	$8,904	$124,434	$113,456	$144,736	—
Compliance officers	($81,772)	$5,452	($27,130)	$155,077	$237,768	$371,342	$326,729
Cost estimators	($23,842)	($11,459)	($47,498)	$111,379	$139,896	—	—
Human resources workers	$21,304	$23,387	($3,350)	$164,509	$228,001	$241,290	$323,046
Compensation, benefits, and job analysis specialists	($49,502)	($49,811)	($51,403)	$58,244	$163,367	—	—
Training and development specialists	$11,486	($3,443)	$11,742	$84,220	$156,813	—	—
Logisticians	($18,760)	$27,909	$33,907	$152,723	$323,678	—	—
Management analysts	$13,591	($7,640)	($28,986)	$271,892	$400,521	$343,773	$379,757
Meeting, convention, and event planners	($6,463)	$16,099	($33,409)	$78,858	$21,136	—	—
Fundraisers	—	—	—	—	—	—	—
Market research analysts and marketing specialists	($48,758)	$21,826	$24,906	$270,664	$444,074	—	—
Business operations specialists, all other	($8,661)	$19,567	$654	$188,485	$326,336	$328,521	$404,917
Accountants and auditors	($4,907)	$1,357	($8,758)	$266,195	$397,302	$334,365	$220,458
Appraisers and assessors of real estate	$192,786	$59,407	$39,156	$233,168	$219,234	—	—
Budget analysts	($11,487)	($96,141)	($115,785)	$23,401	$79,520	—	—
Credit analysts	—	$72,347	$52,878	$175,121	$376,835	—	—
Financial analysts	($183,472)	($184,804)	($181,162)	$145,528	$279,794	$435,127	$783,608
Personal financial advisors	($2,379)	$113,250	$67,067	$516,551	$618,211	$722,134	$655,860
Insurance underwriters	($16,999)	($12,517)	($23,069)	$203,843	$240,003	—	—
Financial examiners	—	—	—	—	—	—	—
Credit counselors and loan officers	$23,369	$13,785	$1,501	$192,471	$316,083	$176,696	—
Tax examiners and collectors, and revenue agents	($19,518)	($22,774)	($11,390)	$126,886	$200,878	—	—
Tax preparers	$3,729	($8,360)	($81,199)	$225,135	$638,377	$866,735	—
Financial specialists, all other	($48,401)	($39,795)	($83,955)	$200,877	$502,852	—	—

degree that is sound from a financial standpoint is only $21,000. Similarly, several other occupations see diminishing returns from obtaining professional and doctorate degrees.

A very noticeable and important observation that relates to the analysis of both sales and business-related occupational groups is that dropping out of college at any time or getting an associate degree is not a value adding proposition for any of the occupations examined.

6. Implications, limitations, and conclusion

The different estimates in lifetime earnings given a specific education will most likely change as real wages change/increase for future workers (Morgan and David, 1963). It is also possible that the differential will change as more/less students decide to attend college. However, as Miller (1960) points out in a very early study, despite the increased rate of college graduates the differential effect persists. Newer research confirms this inference.

Another assumption of examining lifelong earnings is that the benefit derived from a college education will likely be similar for the future generations as it was for the people who are already working. Some articles in popular press argue that the gap in pay in the United States has been decreasing and education will no longer have an advantage at one point in the future. These declines are normally juxtaposed against the increased cost and increased student loan debt of college graduates. As mentioned earlier, when the economy is strong the economic advantage of advanced education tends to be lower. The analysis needs to be performed over the entire career span to be meaningful.

In this article, we combine the benefits of additional schooling and specific career paths available. This is a valuable tool for financial planners who aim to work with younger, career-changing, or education-pursuing clients. They can now frame the decision of obtaining more education in a more specific career path by analyzing the benefits of any additional degree or career option. By applying the theoretical model to specific occupations and levels of education, financial planners can talk to their clients about the lifetime benefit of obtaining such education and the maximum costs to obtain a degree.

As mentioned in the introduction, we understand the limitations of applying a theoretical model for a practitioner, and, as such, our next step is to develop a practical tool that financial planners can use in their work with clients. In the interim, the results from our study can be used to help frame the education planning conversations that financial planners have with their clients. Specifically, the results can be used to enhance financial planner and client dialog around the value of higher education and the financial outcomes associated with investing in a particular degree program.

Notes

1 Stiglitz (2015) provides the following definitions of wealth and capital: “wealth and capital are two distinct concepts; the former reflects control over resources, the latter is a key input into production processes.” While we acknowledge the subtle differences in the definitions, we often use the words interchangeably as human capital

element of overall individual's wealth represents both control over resources and an input into the production process.

2 The data is based on a random sample of 3,824 US households and a supplemental sample of 438 higher income households that are more representative of the upper tail of wealth distribution.

3 See, for example, https://thefinancialbrand.com/71459/millennial-wealth-management-banking-digital-cx-trends/, https://www.financial-planning.com/opinion/the-richest-advisors-are-targeting-millennials-now or https://www.thinkadvisor.com/2017/07/18/these-millennial-advisors-are-killing-it-with-youn/?slreturn=20181013183259.

4 The Center on Education and the Workforce at Georgetown University has recently developed a ranking system of colleges in the United States by the return on investment in education (see https://cew.georgetown.edu/cew-reports/CollegeROI/). While such a tool can certainly help in selecting a college to attend, it does not provide insight into the career and appropriate (from a financial standpoint) education level selection.

5 To further explore age-earnings profiles for different education-occupation combinations, one can refer to www.alignme.app.

6 Based on the data provided by the Bureau of Labor and Statistics (www.bls.gov), there is a consistent inverse relation between the level of education and the unemployment rates in the United States. This inverse relation spans back for decades.

7 "Education and Unemployment," Washington Post, February 27, 2012 (www.washingtonpost.com/politics/education-and-unemployment/2012/02/27/gIQARNmzeR_graphic.html); and Caralee Adams, "New Study Tracks Lifetime Income Based on College Major," College Bound(Education Week blog), March 24, 2011 (http://blogs.edweek.org/edweek/college_bound/2011/05/new_study_tracks_lifetime_income_based_on_college_major.html?qs=lifetime+college+earning

8 While the average life expectancy of the U.S. population dropped ever so slightly over the last three years (mainly due to increasing suicide rates and the opioid consumption), the general longevity trend is upward.

9 Note that the model ignores personal consumption and assumes that there are no social welfare programs that, in some circumstances, may substitute or outweigh the value of individual's human capital.

10 The only exceptions are teachers and librarians, who are assumed to be working full time if they indicate that they worked 35 or more weeks in the last 12 months.

11 An Update to the Budget and Economic Outlook: 2018 to 2028, Table A-1, The Congress of the United States, Congressional Budget Office, August 2018. http://www.cbo.gov/

12 One can run an unlimited number of age-earnings profiles by going to www.alignme.app.

13 While seemingly arbitrary, the choice of a five percentage real rate of return is predicated by the fact that it roughly proxies for the investment returns in a diversified market portfolio, which, depending on the methodology and the time frame used is shown to generate a return that is about 5 to 7 percent above the rate of inflation.

14 Note that the calculations presented below assume that all individuals retire the age of 67, which is the age of full eligibility for Social Security benefits. Thus, the general finding of a positive relation between the level of education and the work life expectancy is omitted in this calculation. If the work life expectancy differentials were to be incorporated into the calculations, the positive effects of additional education on the present value of the AEPs would be even more pronounced.

15 We require a minimum of 75 observations to run an AEP using our quintile regression method.

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