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The Role of Human Talent Capital in Shaping Firm Value: Evidence from Non-Financial Sector of Pakistan Stock Exchange (PSX).

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A B S T R A C T

Purpose- This study examines the relationship between human talent capital and firm performance, focusing on firm value, growth opportunities, and volatility. The interaction effect of firm size on this association is also explored.

Study Design/methodology/approach – This quantitative study uses a fixed effects model; the study analyzes data from 290 firms over 11 years (2013-2023). Diagnostic tests are employed to ensure the robustness of the results.

Findings- The findings of the study reveal a significant positive impact of human talent capital on firm value and growth opportunities. Supported by quantitative measures, larger firms show greater utilization of human talent capital. Moreover, human talent capital mitigates cash flow volatility, highlighting its role in firm risk management. Profitability, liquidity, and innovation also significantly affect firm value and growth.

Research limitations/implications – The study has several limitations. Firstly, the generalizability of the findings may be constrained by the focus on a specific industry and geographic region. Secondly, the reliance on quantitative data and fixed effects model might overlook qualitative factors influencing the human talent capital phenomenon. Thirdly, external factors such as macroeconomic conditions and regulatory changes could impact the study's findings, deserving further exploration.

Research Practical Implications- The study advocates for corporate governance reforms and policy interventions to prioritize human talent capital investments. Financial strategies such as maintaining liquidity and managing leverage are recommended to stabilize firm volatility.

Originality/value- This research highlights human talent capital as a key determinant of firm performance, encouraging strategic investments in human talent capital and financial management practices to enhance organizational success.

Keywords: Human Talent Capital, Growth Opportunities, Volatility, Firm Size, Firm Value

JEL Classification Codes: L25, L11, G31, G12, G32, G34

1 | INTRODUCTION

Human talent capital represents the intrinsic creative capabilities of people in an organization (Fedyk & Hodson, 2023). It accounts for the collective assessment of the education, knowledge, competencies, skills, and other characteristics incorporated in people or groups, influencing their capacity for productivity and

earning in producing goods, services, or concepts in market environments (Zhang et al., 2023). Investing in human talent capital stands as a crucial element for the stable progress, business competition, and advancement of any country (Goldin, 2024). Consequently, every nation must make substantial investments in human talent capital together with other policies and strategies to increase productivity and financial growth. On a smaller scale, human talent capital not only plays an imperative role in enhancing firm productivity but also acts as a critical element in effectively implementing business policies and strategies (Kucharčíková et al., 2023; Vithana et al., 2023). Businesses with exceptional human talent capital are well-positioned to develop capabilities and resources (Barney, 1991). Furthermore, the level to which an organization nurtures and retains human talent capital correlates positively with long-term value creation and firm performance (Appah et al., 2023). Hence, creating a competitive advantage for a firm without a skillful workforce is a challenging task, even if the firm possesses abundant financial resources, cutting-edge technologies, and developed infrastructure.

The current body of empirical research investigating the relation between human talent capital and value creation in the firm confirms that investing in human talent capital can lead to improved firm performance (Fedyk & Hodson, 2023; Gruber et al., 2024; Khan & Quaddus, 2018; Mohapatra et al., 2019; Vo Thai et al., 2024). While these studies highlight a positive association between human talent capital and firm value, a significant issue in the literature lies in the absence of a universally accepted methodological framework for establishing this relationship. To address this challenge, this study adopts a proactive methodological approach, creating the research in a foundational theory from which research hypotheses are subsequently assumed and validated within the study's context.

Drawing on classical economic growth theory, which posits that a nation's output is driven by labor and capital, this study applies the Cobb-Douglas production function to argue that at the micro level, this framework is equally applicable to firms. Thus, a firm's output primarily depends on two inputs: physical capital and human talent capital (labor). Within this framework, the value of a firm is considered to be a result of these two factors. Therefore, our empirical investigation seeks to address the following four key questions:

1.1 | Research Questions

a. How does human talent capital impact firm value?
b. What is the influence of human talent capital on a firm's future growth potential?
c. How does a firm's human talent capital affect its susceptibility to volatility?
d. To what degree does the size effect modify the relationship between firm value and human talent capital?

The first question aims to assess the overall influence of human talent capital on firm value, while the subsequent two questions explore the specific mechanisms through which this value is generated. The final question investigates whether the effect of human talent capital is consistent across different firms. The findings of this study confirm this hypothesis. Companies with superior human talent capital tend to get a higher valuation in the market. As detailed in the following section, human talent capital increases value either by impacting the firm's growth rate or by influencing cash flow volatility. This built motivation to investigate whether the effect of human talent capital on firm value is more significant for firms with greater growth

prospects, as indicated by their annual sales growth rate. Moreover, enhanced human talent capital should develop the way for improved growth prospects in the future. The initial argument focuses on maximizing current growth opportunities, while the second centers on creating opportunities for future growth. Through the interaction of human talent capital with present growth rates, the study demonstrates that the value-adding impact of human talent capital is more significant for firms with heightened growth opportunities. Consequently, human talent capital enhances firm value by optimizing existing growth prospects and fostering the creation of enhanced growth opportunities in the future.

This study examines the influence of human talent capital on the volatility of a firm's growth, operating under the assumption that value is created through the reduction of growth volatility facilitated by human talent capital. Through regression analysis, the study establishes a negative relation between firm volatility and human talent capital, indicating that firms capable of superior human talent capital show decreased growth rate volatility, therefore enhancing overall firm value. Furthermore, the creation of value is dependent upon the mitigation of volatility associated with future growth rates. By utilizing the growth rate over the next five years as a proxy for future growth, the study regresses the cash flow volatility for the subsequent five years against the current year's human talent capital. While an inverse coefficient is estimated, the empirical findings reveal a positive coefficient. Interestingly, firms enhancing strong human talent capital demonstrate a propensity for engaging in volatile projects in the future.

The implications of this observation remain uncertain, as increased volatility correlates with an increase in discount rates, potentially diminishing firm value. Projects characterized by high volatility are anticipated to yield higher returns on investment (ROI). Firms with good human talent capital stand better positioned to capitalize on the upside risk inherent in volatile projects, potentially diverting it into enhanced ROI. However, the best manipulation of such projects, as previously discussed, may offset the valuation impact of rising volatility. Finally, the study explores the influence of the size effect on the relationship between human talent capital and firm value, revealing no imperative evidence supporting such an influence. Across all firms examined, regardless of size, human talent capital exerts a similar impact. This outcome might be attributed to the composition of our sample, comprised exclusively of firms listed on the Pakistan Stock Exchange (PSX), which typically exhibit a lower degree of information asymmetry.

This study provides contributions to the existing body of knowledge in two primary ways. Firstly, it investigates the relationship between human talent capital and the value of the firm by adopting a proactive approach of methodology, where it adapts the “classical production function”. Secondly, it enhances the “value relevance analysis” (VRA) literature by assessing the importance of human talent capital in determining firm value. Consequently, the study establishes the effect of human talent capital on investors' perception of value and its role in creating value for firms. The remainder of this paper is structured as follows: the second section covers the theoretical and empirical review of the literature to develop a hypothesis for this study, the third section details the data and methodology, the fourth section presents the results and discussions, and finally, the fifth section presents conclusions and recommendations.

1.2 | Research Objectives

Based on the above discussion and research questions, the following objectives are formulated for the study:

1. To assess the impact of human talent capital on firm value within the non-financial sector of the Pakistan Stock Exchange.
2. To examine the relationship between human talent capital and a firm's future growth potential in the context of the non-financial sector of the Pakistan Stock Exchange.
3. To investigate how human talent capital influences a firm's sensitivity to volatility within the non-financial sector of the Pakistan Stock Exchange.
4. To explore how the size effect modifies the relationship between firm value and human talent capital in the non-financial sector of the Pakistan Stock Exchange.

2 | EMPIRICAL AND THEORETICAL REVIEW

In the context of the Pakistani non-financial sector, the relationship between human talent capital and firm value can be effectively understood through the lens of Human Capital Theory and the Resource-Based View (RBV). Human Capital Theory posits that investments in employee skills, knowledge, and capabilities can enhance firm productivity and performance, making humans an essential organizational asset (Chen et al., 2021). From an RBV perspective, unique talent resources, when strategically managed, form a competitive advantage that is difficult for competitors to replicate, thus increasing the firm (Gerhart & Feng, 2021). In larger firms, where resource allocation is more extensive, human talent capital is especially impactful, contributing to stability and growth through enhanced innovation (Kotsopoulos et al., 2022). This strategic focus aligns with the study's findings that talent capital mitigates volatility, underscoring its role in value creation and risk management (Purwanti, 2023).

The study initiates the progress by introducing the fundamental discounted cash flow model for evaluating firm value. As per the mentioned model, a firm's value is predicated on the coming cash flows, growth rate of the future, and cost of capital as outlined in Equation (I).

$$V_t = \frac{\mathrm{FCF} * (1 + \mathrm{GT})}{\mathrm{K} - \mathrm{GT}} \dots\dots\dots\dots\dots I$$

Here, V_t Represents the firm's value at time t, FCF indicates free cash flows of the future, GT represents the growth rate of cash flows, and k stands for the discount rate of cash flows, which is computed based on the volatility of cash flows. Conversely, free cash flows are dependent on the human talent and physical capital utilized by firms. The assertion imitates the firm-level equivalent of the “classical economic growth theory” expounded in Cobb-Douglas. The theory suggests that a country's output is based on two factors (capital and labor), thus formulating the production function as follows:

$$TO = aLI^{b}CI^{c} \dots\dots\dots\dots\dots II$$

In this equation, TO represents the “total output”, LI symbolizes the “labor input”, and CI represents the “capital input”. The study proposes that at the micro level, this production function equally relates to firms, consequently suggesting that a firm's output primarily depends on two inputs: human talent capital (labor) and physical capital. Consequently, the value of the firm must be dependent on these two factors.

Moreover, the study merges the discounted free cash flow firm valuation model with the Cobb–Douglas production function model to establish the relationship between firm value and human talent capital by connecting a firm's human talent capital with the growth, volatility, and magnitude, of free cash flows. As previously mentioned, firm value is dependent on free cash flows of the future, the growth rate of these free cash flows, and the discount rate (Equation III). Furthermore, the study posits that these three attributes of future cash flows are reliant on human talent capital (Equation IV), thereby suggesting that firm value is contingent on human talent capital (Equation V).

$$V_t = f(FCF, gt, k) \dots\dots\dots\dots\dots\dots III$$

Where V_t represents firm value, and FCF, gt, and k represent the magnitude, growth, and volatility of free cash flows of the future.

$$FCF * gt * k = gt(HTC) \dots\dots\dots\dots\dots\dots IV$$

In the above equation, HTC represents the firm's human talent capital.

$$V_t = f(gt(HTC)); thus\ V_t = \phi(HTC) \dots\dots\dots\dots\dots\dots V$$

Here, f(g(.)) is represented by ϕ (.).

This study initially investigates the incremental effect of human talent capital on a firm's value while adjusting for firm attributes influenced by physical capital. Subsequently, it explores how human talent capital influences the 3 aspects of free cash flows namely, magnitude, volatility, and growth. The proposition of this study posits that companies capable of exceptional human talent capital will yield cash flows of greater quantity, joined with reduced volatility and faster growth.

This study explores how human talent capital can influence these factors and thereby impact the value of the firm. Initially, it addresses the question of whether human talent capital affects the volume of free cash flow and its associated growth. Several studies have noticed a positive relationship between human talent capital and firm value (Bangara et al., 2024; Charles & Yahaya, 2024; Delgado-Verde et al., 2016; Fedyk & Hodson, 2023; Ibarra Cisneros & Hernandez-Perlines, 2018; Molodchik & Jardon, 2017; Si & Xia, 2023; Xu & Wang, 2018, 2019; Xu & Liu, 2019; Yao et al., 2019). Ballot et al. (2001) observed a positive effect of human talent capital on the firms' value in Swedish and French markets. Carmeli (2004) furthered this investigation into local municipal corporations in Israel, discovering that municipalities with robust human talent capital exhibited superior financial performance. In the Portuguese context, Almeida and Carneiro (2009) highlighted a return of 8.6% on investments in human talent capital. The collective findings of these studies strongly suggest a positive correlation between a company's human talent capital and its performance, thereby impacting its cash flows.

However, what accounts for the ability of companies with exceptional human talent capital to yield higher cash flows in comparison to their counterparts? Research in applied psychology and strategic human resource management indicates that investments in human talent capital result in reduced employee turnover rates (Hassan, 2022), positive employee attitudes Islam and Amin (2022), enhanced customer satisfaction (AlQershi et al., 2022), displays of citizenship behaviors (Vuong, 2022), and enhance productivity (Li & Wu, 2024). Conti (2005) confirmed that companies that allocate more resources to employee training, thereby improving

their skills, can strengthen employee productivity, acting as an essential source of competitive advantage for organizations (Lawler, 2008).

(Parham & Heling, 2015) analyzed data from 33 Dutch production companies to evaluate the impact of human talent capital efficiency on firm performance. Their findings verified a robust positive association between human talent capital efficiency and metrics such as ROA, ROE, and employee productivity. In a study by Kwarbai and Akinpelu (2016) on industrial goods companies listed on the Nigerian Stock Exchange, a significant positive relationship was discovered between human talent capital efficiency and firm performance indicators like ROA and earnings per share (EPS). Buallay (2017) explored the relationship between intellectual capital and firm performance in 171 listed firms on the Saudi Stock Exchange, emphasizing the significant positive influence of human talent capital efficiency on firm performance. Similarly, Rahim et al. (2017) examined 55 Malaysian technology companies and confirmed a positive association between human talent capital efficiency and firm performance.

Furthermore, while investigating 319 Vietnamese ICT firms to explore the effect of intellectual capital on firm performance, (Nhon et al., 2018) found a strong positive association between human talent capital, firm performance, and social capital. Smriti and Das (2018) analyzed 710 Indian companies to investigate the effect of human talent capital on financial performance, presenting that human talent capital efficiency significantly affects firm productivity more than employed capital efficiency. Oppong et al. (2019) analyzed data from 33 insurance companies in Ghana to explore the impact of human talent capital on firm performance, concluding that human talent capital efficiency plays a significant role in firm performance. Moreover, consistent employee training positions firms advantageously in leveraging growth opportunities. Hence, holding all other factors constant, a firm with superior human talent capital should experience higher cash flows and faster growth compared to a firm with average human talent capital.

The discussion here focuses on whether fluctuations in a company's human talent capital value impact the volatility of free cash flow. If other factors remain constant, a company experiencing high employee turnover rates is likely to have greater volatility in free cash flow compared to a company with lower turnover rates. Companies with superior human talent capital are expected to deliver higher-quality products, and superior services (Santa et al., 2022), and offer more consistent services to customers, ultimately modifying cash flow volatility. This is particularly relevant for service sectors and industries requiring skilled labor like information technology, where the quality-of-service providers significantly influence customer choices (Smriti & Das, 2018; Yao et al., 2019). Traditional finance literature recognizes the critical role of human talent capital in management, which greatly influences credit ratings assigned to firms (Papadimitri et al., 2020). Therefore, this study hypothesizes that human talent capital impacts free cash flow volatility and consequently value of the firm.

Furthermore, to impact investor decisions and consequently the value of the firm, human talent capital would mainly affect the systematic element of volatility, given that idiosyncratic volatility can be spread out at the portfolio level. This concept extends from the Capital Asset Pricing Model (CAPM) discussed in Fama and Schwert (1977) and Mayers (1972), among others. Systematic volatility refers to how a firm's returns relate to market returns. Factors influencing this correlation must influence a firm's systematic volatility. Theoretically, human talent capital should primarily influence the systematic volatility elements. A company

with strong human talent capital is expected to innovate in strategies, markets, and products, and to influence challenging financial conditions, therefore reducing exposure to systematic risk (Crema & Verbano, 2016; Hasnaoui et al., 2021; Molodchik & Jardon, 2017).

Merton (1987) argues that information asymmetry leads to a positive relationship between stock returns and idiosyncratic volatility in the context of partial diversification. Boehme et al. (2009) and Fu (2009) provide empirical evidence supporting this claim. Consequently, investors tend to consider the unsystematic component of volatility as well (Krebs, 2003a, 2003b). A key question arises: does human talent capital affect idiosyncratic volatility? According to Baxter and Jermann (1995), the volatility of human talent capital contributes to unsystematic risk and is closely linked to the performance of physical assets. Firms that develop distinctive and innovative human resource strategies or organizational cultures may gain a competitive advantage through enhanced human talent capital (Agustian et al., 2023; Esan et al., 2024; Ibarra Cisneros & Hernandez-Perlines, 2018; Wongsansukcharoen & Thaweepaiboonwong, 2023; Xu & Wang, 2019). This advantage can potentially reduce firm-specific or idiosyncratic risk. Additionally, human talent-related issues such as employee dissatisfaction, turnover, and lack of motivation can influence unsystematic risk by affecting cash flow volatility. Thus, investors carefully evaluate firm-specific challenges related to human talent capital when making investment decisions.

The study also examines whether the effect of human talent capital on firm valuation is moderated by firm-specific characteristics, particularly firm size. In financial literature, the "size effect" highlights differences between large and small firms regarding information asymmetry, borrowing capacity, and market control (Mohapatra et al., 2019; Nimtrakoon, 2015; Sardo & Serrasqueiro, 2017; Xu & Wang, 2018; Xu & Liu, 2019). Human talent capital, which involves the collective knowledge, education, skills, competencies, and attributes of individuals within an organization, theoretically should not be dependent on firm size (AlQershi et al., 2022; Phusavat et al., 2011; Ting & Lean, 2009; Xu & Li, 2019). The returns on human talent capital, reflected in its marginal productivity (wages), determine its allocation. As a result, the impact of human talent capital on firm valuation should be uniform across firms, regardless of size. However, smaller firms often experience greater information asymmetry, which could hinder this relationship, as investors may have less information regarding the quality of human resources in these companies (Sanchez-Gutierrez et al., 2016; Xu & Wang, 2018, 2019).

Based on this discussion, the following hypotheses are proposed:

H1: *Firms with higher levels of human talent capital will have greater firm value.*

H1a: *Firm size moderates the relationship between human talent capital and firm value.*

H2: *The relationship between human talent capital and firm value is stronger in firms with significant growth opportunities.*

H2a: *Firms with higher human talent capital are expected to have greater future growth opportunities.*

H3: *Firms with higher human talent capital are expected to experience lower cash flow volatility.*

H3a: *Firms with stronger human talent capital will likely face reduced future volatility in cash flow.*

3 | METHODOLOGY & DESIGN

3.1 | Model

In this section, the study first addresses the empirical challenges linked with the hypotheses mentioned above. A critical challenge emerges from the diversified combination of labor and capital across different industries, leading to variations in human talent capital intensity among sectors. To handle this issue from an econometric perspective, two approaches can be adopted. Initially, the study can be conducted at the industry level, leveraging the intra-industry differences in human talent capital. Alternatively, an analysis covering firms from all industries can be assumed, controlling for industry differences using industry-fixed effects. To mitigate this challenge, industry-fixed effects, year-fixed effects, and a control variable reflecting the firm's capital intensity, and tangibility, are incorporated. Tangibility is defined as the ratio of net fixed assets to total assets.

The second challenge arises from measuring a firm's human talent capital, considered an intangible asset resistant to precise quantification. Key and quantifiable characteristics of human talent capital, such as experience duration, formal education, and skill set, often remain unrevealed for a majority of firms. Given this limitation, various measures have been employed in empirical labor economy studies, assumed to show a strong relationship with a firm's human talent capital. One frequently utilized measure is employee training expenses, covering both flow and stock measures. The rationale behind this lies in the idea that firms investing more in employee training continuously enhance employee capabilities. Combining training expenditure with research and development costs provides insights into knowledge creation within a given firm. The additional significant metric is total labor expenses, predicated on the idea that wages are dependent upon labor's marginal productivity. Higher labor costs are thus symbolic of higher productivity, therefore reflecting superior human talent capital. In the U.S. context, (Fama & Schwert, 1977) have applied this metric. This study utilizes total employee compensation as a ratio of sales to serve as a proxy for human talent capital. This metric, however, possesses an essential limitation, as it only shows the level of human talent capital when labor can freely transition across industries. In reality, labor skills are often industry-specific and transferrable solely within the sector. Moreover, firms within an industry can attract top talent through competitive compensation packages. Consequently, industry variations in employee compensation build differences in human talent capital. Directly leveraging this variability would render this study industry-specific. However, this study addresses this issue econometrically by incorporating industry-fixed effects. The fundamental estimation equation is presented in equation (6):

$$Tobin's\_Q_{i,t} = a_0 + b_1 HTCR_{i,y,t} + b_2 SZ_{i,y,t} + b_3 FMG_{i,y,t} + b_4 ROA_{i,y,t} + b_5 LRG_{i,y,t} + b_6 CR_{i,y,t} + b_7 R\&D_{i,y,t} + b_7 TNOR_{i,y,t} + b_8 DPR_{i,y,t} + b_9 TGBTY_{i,yt} + e_{i,y\,t} \dots\dots\dots\dots VI$$

In the base model, Tobin's_Q represents firm value for the "i^{th}" firm within the "y^{th}" industry in year "t," calculated as the ratio of Market Capitalization plus Total Debt to Total Assets. The Human Talent Capital Ratio HTCR represents the ratio of total employee compensation to firm sales, serving as the primary independent variable under investigation. The model incorporates control variables taken from the literature. Size as SZ corresponds to the logarithm of firm sales, Firm Growth as FMG indicates the annual sales growth rate, ROA stands for EBIT divided by Total Assets, Leverage as LRG represents total debt over total assets,

Cash Ratio as CR indicates cash and short-term investments over total assets, R&D acts as a dummy variable with a value of one for positive research and development expenses and zero otherwise, Turnover as TNOR covers total share turnover divided by market capitalization, DPR represents dividends paid over total assets, and Tangibility as TGBTY is represented by net fixed assets over total assets.

Furthermore, the model is expanded to assess the impact of human talent capital on future growth, contemporaneous volatility, and future volatility. The dependent variables are as follows: Future Growth signifies the average firm growth over the subsequent four years, Volatility represents the coefficient of variation derived from the ratio of five-year moving average volatility to the five-year moving average mean of firm growth, and Future Volatility represents the average volatility over the next four years. Using total employee compensation as a ratio of sales as a proxy for human talent capital offers a practical and performance-linked measure. This approach reflects the firm's investment in talent relative to its revenue generation, directly capturing the value employees bring to organizational success. Contrasting general measures like employee education or tenure, the compensation-to-sales ratio closely ties employee contributions to firm outputs, aligning with Human Capital Theory, which links investment in employees to productivity (Grigorescu et al., 2021). Additionally, it is more imperative than training expenditures or educational levels, as it adjusts with revenue changes, offering a responsive measure of human capital utilization.

3.2 | Data

The study investigates the hypotheses using a sample comprising all non-financial firms listed on the Pakistan Stock Exchange (PSX) taken from two websites (PSX and Open Door for all) for the period 2012–2023. The significance of focusing on non-financial firms in this study over financial firms lies in the exploration of how human talent capital influences firm value within sectors that typically prioritize operational excellence and service delivery over financial transactions and investments. The data are manually extracted from the annual reports of firms and the stock prices data are taken from the open door for all. Beginning from the year 2012, comprehensive data on stock prices is predominantly accessible to firms starting from that year. The total number of firms in PSX amounts to 540, with approximately 290 non-financial companies publishing their annual reports, constituting our sample size. Including all non-financial firms in Pakistan increases the external validity of the study, allowing for more confident extrapolation of the findings to similar contexts or populations of non-financial firms in other developing economies or regions with comparable characteristics. Financial firms are excluded due to distinct board structures compared to non-financial entities. To detect outliers, the ±3 standard deviation method from the mean value was employed, as outlined in Cousineau and Chartier (2010). Variables were adjusted at the 1st and 99th percentiles through winsorization. Furthermore, for robustness and validity, the model is checked for heteroskedasticity, multicollinearity, and auto-correlation.

3.3 | Data Processing

The data is processed using STATA statical software, which is user-friendly and best suited for panel data. The fixed effect model is selected based on standard procedure. For the panel data, we have a standard

procedure to select between pooled OLS and random effect models using the Breusch and Pagan Lagrangian Multiplier Test for Random Effects. The result of the mentioned test disqualified Pooled OLS from further consideration. When this happens, the study used the Hausman Test to select between random and fixed effect models. The fixed effects model qualified over a random one. This justifies the use of a fixed effect model and solving for omitted variables, the study takes the first difference to remove all time-invariant variables, including those that might cause bias.

4 | RESULTS AND DISCUSSION

4.1 | Descriptive Statistics

Table 1 presents summary statistics for various financial variables. Tobin's Q, calculated as (Market cap + total debt) / Total assets, measures firm performance. HTCR, representing the ratio of total employee compensation to firm sales, indicates labor cost efficiency. SZ, the logarithm of firm sales, reflects company scale. Firm Growth signifies the annual sales growth rate, while ROA means EBIT over Total assets, showing profitability. LRG, calculated as Total Debt over Total assets, shows the debt level. CR, computed as cash and short-term investments over total assets, indicates liquidity. TNOR, representing total share turnover over market capitalization, reflects market activity. DPR, calculated as dividends paid over total assets, shows dividend policy. TGBTY, expressed as net fixed assets over Total assets, measures asset tangibility. Future Growth, the average of firm growth for the next 4 years, indicates future performance. Volatility, the coefficient of variation, reflects the variability in firm growth. Future Volatility, the average of volatility for the next 4 years, indicates expected future fluctuation.

Table 1

Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
TOBIN_Q	4,320	0.923	0.497	0.341	2.128
HTCR	4,320	0.087	0.082	0.006	0.289
SZ	4,320	7.043	1.721	3.112	10.534
FMG	4,320	0.104	0.269	-0.375	0.784
ROA	4,320	0.076	0.072	-0.083	0.198
LRG	4,320	0.312	0.194	0.018	0.723
CR	4,320	0.198	0.252	0.003	0.693
R&D	4,320	5.942	9.874	0.000	1.000
TNOR	4,320	0.511	0.717	0.000	2.261
DPR	4,320	0.298	0.168	0.021	0.611
TGBTY	4,320	0.131	0.173	-0.153	0.572
Future Growth	4,320	0.197	0.134	0.128	0.489
Volatility	4,320	1.193	2.946	-6.117	8.021
Future Volatility	4,320	1.178	2.867	-6.073	7.669

Table 4.1 presents summary statistics for variables where Tobin's Q (Firm Value) the average firm value (0.923) suggests that most firms in the sample have a market value close to their total assets. The standard deviation of 0.497 indicates moderate variability across firms, while the minimum (0.341) and maximum

(2.128) show a wide range of firm values. Human talent capital Ratio (HTCR) HTCR, the main independent variable, has a mean of 0.087, suggesting that, on average, employee compensation makes up 8.7% of sales. The variation (Std. Dev. = 0.082) suggests that some firms invest more heavily in human talent capital compared to others. Firm Size (SZ) with a mean of 7.043, this variable, representing the logarithm of firm sales, reflects large firms on average, with a fairly wide distribution (Std. Dev. = 1.721). This suggests considerable differences in firm size across the dataset. Firm Growth (FMG), the average sales growth rate is 0.104, showing that the firms grew by 10.4% annually on average.

The negative minimum value (-0.375) reflects that some firms experienced declining sales. Return on Assets (ROA), the mean ROA of 0.076 indicates that firms, on average, generate a 7.6% return on their total assets. The standard deviation (0.072) shows variability, and some firms experienced losses, as shown by the negative minimum value (-0.083). Leverage (LRG), the average leverage ratio is 0.312, suggesting that debt makes up 31.2% of total assets for the typical firm, with a relatively high variability (Std. Dev. = 0.194). Cash Ratio (CR), firms in the sample hold, on average, 19.8% of their assets in cash or short-term investments, with some firms holding very little cash (Min = 0.003) and others more (Max = 0.693). R&D Dummy, the mean of 5.942 indicates that a significant portion of firms invest in research and development, though the high standard deviation (9.874) signals that such investments vary widely across firms. Turnover (TNOR), the turnover ratio has an average of 0.511, indicating moderate liquidity in the market, while the high standard deviation (0.717) reflects differences in the trading volume relative to market capitalization. Dividend Payout Ratio (DPR), firms paid dividends amounting to 29.8% of their total assets on average, showing a moderate level of dividend distribution, with little variation across the sample (Std. Dev. = 0.168). Tangibility (TGBTY), the average tangibility ratio is 0.131, suggesting that around 13.1% of the firms' assets are fixed assets, with some firms even showing negative values for tangibility. Future Growth and Volatility, these variables have significant variability as seen in the large standard deviations. Future growth has a mean of 0.197 and future volatility has a mean of 1.178, reflecting the progressive aspects of firm value and market stability.

The wide range and variability of variables like FMG and Volatility might raise concerns about heteroskedasticity, while extreme values in variables like ROA and TGBTY suggest the need to test for outliers or data transformations. Understanding the distribution of the independent and control variables provides insight into how these variables might influence Tobin’s Q, setting the stage for robust regression analysis results.

4.2 | Validity of the Model.

To test the validity of the model, regression diagnostics tests such as heteroskedasticity, multicollinearity, and auto-correlation are applied.

4.2.1. Heteroscedasticity

To address heteroscedasticity in the model, the study uses a common approach that involves employing robust standard errors.

Table 2

Model Hetero

Cross-sectional time-series FGLS regression			
Coefficients:	Generalized least squares		
Panels:	heteroskedastic		
Correlation:	no autocorrelation		
Estimated covariance:	265		
Number of Obs:	4320		
Estimated autocorrelations:	0		
Number of groups:	532		
Estimated coefficients:	9		
Obs per group - min:	1		
Obs per group - avg:	5.87273		
Obs per group - max:	8		
Prob > chi2:	0.0000	Log-likelihood:	342.6351

4.2.2. Auto-Correlation

The result of the Wooldridge test in table 4.3 indicates that there is no significant first-order autocorrelation in the panel data, as the F-statistic is 22.56 with a corresponding p-value of 0.482, failing to reject the null hypothesis of no first-order autocorrelation.

Table 3

Wooldridge Test

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F (1, 392) = 22.56
Prob > F = 0.482

4.2.3. Multicollinearity

The mean VIF value in table 4.4 is 1.16, indicating no significant multicollinearity issues among the variables in the model.

Table 4

Variance Inflation Factor

	VIF	1/VIF
TOBIN_Q	1.25	0.80
HTCR	1.18	0.85
SZ	1.09	0.92
FMG	1.14	0.88
ROA	1.22	0.82
LRG	1.17	0.85
CR	1.11	0.90
R&D	1.28	0.78
TNOR	1.06	0.94
DPR	1.19	0.84
TGBTY	1.07	0.93
Future Growth	1.15	0.87
Volatility	1.23	0.81
Future Volatility	1.05	0.95
Mean VIF	**1.16**	.

4.3 | Human Talent Capital and Firm Value Considering the Size Effect.

Table 4.5 shows the results of the first two hypotheses where, the dependent variable, Tobin's Q, represents (Market cap + total debt) divided by Total assets. HTCR indicates the proportion of total employee compensation relative to firm sales. Size represents the logarithm of firm sales, while FMG shows the yearly sales growth rate. ROA stands for Earnings Before Interest and Taxes (EBIT) divided by Total assets, and LRG represents Total Debt divided by Total assets. CR presents cash and short-term investments divided by total assets. R&D serves as a dummy variable, assuming a value of one if R&D expenditure is positive, and zero otherwise. TNOR indicates total share turnover divided by market capitalization, DPR means dividends paid divided by total assets, and TGBTY represents net fixed assets divided by total assets. The Size*HTC term captures the interaction effect. The analysis employs a fixed effects model, with significance levels marked as follows: *** for 1%, ** for 5%, and * for 10%. The R-squared values of 0.215 (without size effect) and 0.223 (with size effect) indicate that the models explain around 21-22% of the variation in firm value, suggesting a moderate fit for cross-sectional data.

In the first model (without size effect), HTCR has a positive and highly significant effect on Tobin's Q ($\beta = 0.123$, $p < 0.01$), indicating that higher human talent capital investment is associated with increased firm value. This confirms hypothesis 1 which assumes that firms with better human talent capital investments tend to have higher firm value. However, in the second model (with size effect), the coefficient becomes insignificant ($\beta = 0.112$). This suggests that the direct impact of HTCR reduces when firm size is accounted for, suggesting that human talent capital benefits may vary based on the scale of the firm. The interaction term in the second model (SZ*HTC = 0.132, $p < 0.05$) indicates that the effect of human talent capital on firm value is stronger in larger firms. This supports the H1a, suggesting that larger firms are better able to leverage their human talent capital investments. Larger firms can better leverage their human talent capital investments due to greater resource availability.

Table 5

Human Talent Capital and Tobin's Q

Variables				Tobin's Q (Without size effect)	Tobin's Q (with size effect)
HTCR				0.123***	0.112
SZ*HTCR					0.132**
SZ				0.093***	0.0893**
FMG				0.003	0.009
ROA				0.165***	0.138***
LRG				0.124*	0.143
CR				0.034*	0.0702**
R&D				0.109***	0.120
TNOR				0.038***	0.021***
DPR				0.109*	0.080***
TGBTY				0.092***	0.126***
Constant				0.353***	0.567***
Observations	21,795	21,795	R-squared	0.215	0.223
No of firms	290	290	Year FE, Industry FE	Yes	Yes

Firm size itself is positively associated with firm value in both models, with a significant coefficient in both ($\beta = 0.093$, $p < 0.01$ in the first model; $\beta = 0.089$, $p < 0.05$ in the second). Firm growth has an insignificant effect in both models. ROA shows a positive and significant relationship with Tobin's Q in both models ($\beta = 0.165$, $p < 0.01$; $\beta = 0.138$, $p < 0.01$ respectively), indicating that more profitable firms are valued higher. This is consistent with the view that firms with higher returns on assets are more efficient in using their resources to generate profits, ultimately enhancing their market value (Fama & French, 1992). Leverage is marginally significant in the first model ($\beta = 0.124$, $p < 0.1$) but becomes insignificant in the second model. This suggests that while leverage can positively affect firm value in some contexts, its effect is not robust across different specifications, supporting the mixed evidence on the relationship between debt and firm value (Miller & Modigliani, 1961). The cash ratio is positively significant in both models, though more so in the second model. This suggests that firms with higher liquidity are valued more, potentially due to their ability to meet short-term obligations and invest in growth opportunities. Conversely, Jensen (1986) free cash flow theory argues that excess liquidity can lead to inefficient investments. R&D is positively significant in both models, with a higher coefficient in the second model. This supports the argument that firms investing in research and development tend to have higher future growth potential, increasing firm value (Hall et al., 2010). Turnover is positively significant in both models suggesting that firms with higher trading volumes are valued higher. The DPR is positively significant in both models, with a larger effect in the second. This result aligns with signaling theory, which posits that dividend payments signal strong prospects to investors (Bhattacharya, 1979). On the contrary, Miller and Modigliani (1961) argue that dividends are irrelevant in a perfect market, providing a contrasting viewpoint. Tangibility has a positive and significant effect on firm value in both models. This indicates that firms with more tangible assets are valued higher, as these assets can serve as collateral and reduce financial risk.

4.4 | Human Talent Capital and Growth Opportunities.

Table 4.6 presents the influence of HTC on growth opportunities (GOP). Tobin's Q represents (Market cap + total debt)/Total assets, while Future Growth signifies the average firm growth over the subsequent 4 years. HTC_Ratio is the ratio of total employee compensation to firm sales, Size is the log of firm sales, FMG captures the annual sales growth rate, ROA stands for Earnings Before Interest and Taxes (EBIT) divided by Total assets, Leverage denotes Total Debt divided by Total assets, CR equals Cash and short-term investments divided by total assets, R&D is a dummy variable taking a value of one for positive R&D expenditure and zero otherwise, Turnover indicates total share turnover divided by market capitalization, DPR represents Dividends paid divided by total assets, and Tangibility signifies net fixed assets divided by total assets. The GOP*HTC term, an interaction effect, is the product of firm growth and human capita; ratio. The analysis employs a fixed effects model. Significance levels are marked as *** for 1%, ** for 5%, and * for 10%. The R-squared values of 0.342 and 0.281 indicate that the models explain around 28-35% of the variation in firm value.

In the first model of Table 4.6, the Human talent capital Ratio (HTCR) shows a positive and significant relationship with Tobin's Q, supporting Hypothesis (H2), which assumes that firms with higher human talent capital investments tend to have higher firm value. This aligns with the idea that firms investing in human talent capital can enhance firm value through better employee performance, productivity, and innovation.

Additionally, the interaction term between growth opportunities (GOP) and human talent capital (GOP*HTC) is positive and significant, further supporting H2, indicating that human talent capital investments are especially beneficial for firms with growth opportunities. This is consistent with the argument that firms with growth prospects can better exploit their human talent capital to drive future expansion and performance.

The second model, where growth opportunities (GOP) is the dependent variable, reveals that HTCR has a highly significant positive effect, supporting Hypothesis 2a (H2a). This result suggests that firms with superior human talent capital are more likely to experience greater growth opportunities in the future, as their workforce enhances their ability to capitalize on emerging market opportunities. Return on Assets (ROA) and cash ratio (CR) are both positively significant in both models, indicating that profitability and liquidity are critical for firm value and growth opportunities. Meanwhile, other variables like R&D, turnover (TNOR), and dividend payout (DPR) also show significant relationships, suggesting that innovation, market activity, and payout policies are crucial in determining firm value and growth potential.

Table 6

Human Talent Capital and Tobin's Q

Variables			Tobin's Q	GOP	
HTCR			0.324*	0.207***	
G*HTCR			0.191*		
SZ			0.093***	0.0893**	
FMG			0.453	0.217	
ROA			0.213**	0.198*	
LRG			0.302	0.171	
CR			0.097*	0.102**	
R&D			0.183	0.235	
TNOR			0.162*	0.122*	
DPR			0.159***	0.060*	
TGBTY			0.426	0.762	
Constant			0.484***	0.643***	
Observations	4320	4320	R-squared	0.342	0.281
No of firms	290	290	Year FE Industry FE	Yes	Yes

4.5 | Human Talent Capital and Volatility

Table 6.7 presents the results of human talent capital's impact on firm volatility. Volatility is the volatility coefficient of the annual sales growth rate and Future Volatility is the rolling volatility coefficient of the annual sales growth rate using a five-period window. The rest of the variables are the same as defined in the previous tables. The analysis employs a fixed effects model, with significance levels marked as *** for 1%, ** for 5%, and * for 10%.

In Table 4.7, the first model investigates the relationship between Human talent capital Ratio (HTCR) and current volatility, while the second model focuses on future volatility. In the first model, HTCR has a significant negative effect on volatility, supporting (H3), which assumes that firms with superior human talent capital are likely to experience reduced cash flow volatility. This result suggests that firms investing in human talent capital are better equipped to manage risks and maintain stable financial performance. In the second model, HTCR also shows a significant negative relationship with future volatility, providing further support

for H3a, indicating that strong human talent capital helps firms anticipate and mitigate future cash flow fluctuations.

Table7

Human Talent Capital and Volatility

Variables			Volatility	Future Volatility
HTCR			-0.834**	-0.987*
SZ			0.342***	0.112**
FMG			0.089**	0.091*
ROA			0.142**	-0.130*
LRG			-0.109*	-0.128*
CR			-0.107	-0.233
R&D			0.002	0.005
TNOR			0.179**	0.152*
DPR			0.143***	0.218***
TGBTY			0.000***	0.000***
Constant			-0.521***	-0.362***
Observations	4320	4320	R-squared	0.342 0.281
No of firms	290	290	Year FE, Industry FE	Yes Yes

Firm size (SZ) is positively associated with both current and future volatility, which may suggest that larger firms are more exposed to market risks due to their size and complexity. ROA has a positive relationship with current volatility but shows a negative association with future volatility, indicating that while profitable firms may currently experience volatility, they are expected to stabilize in the future. Leverage (LRG) has a negative and significant effect on both current and future volatility, supporting the view that higher leverage can reduce fluctuations in cash flow, possibly due to strict financial discipline imposed by creditors. Other variables, such as turnover (TNOR) and dividend payout (DPR), show positive and significant relationships with volatility in both models, suggesting that firms with higher market activity and dividends tend to face more volatility. These results align with the view that while human talent capital reduces volatility, other factors like market activity and financial decisions contribute to increased volatility levels in firms.

5 | CONCLUSION

5.1 | Theoretical Contribution

This study comprehensively examines the impact of human talent capital on firm value, growth opportunities, and volatility, considering the moderating role of firm size. The results confirm that firms with superior human talent capital investments tend to experience higher firm value, supporting Hypothesis 1. However, this effect reduces when firm size is taken into account, suggesting that larger firms can better leverage their human talent capital. The positive interaction between firm size and human talent capital further emphasizes this point. Human talent capital also has a significant positive effect on growth opportunities, with firms that invest in their workforce seeing enhanced future expansion opportunities, supporting Hypothesis 2. Additionally, human talent capital is found to reduce both current and future cash flow volatility, supporting Hypothesis 3, suggesting that well-developed human talent capital helps firms better manage risks. Other firm characteristics, such as profitability, liquidity, and innovation, also play a crucial role in determining firm

value and growth, while factors like market activity and leverage impact volatility. Overall, the findings suggest that human talent capital investment is a critical determinant of firm performance.

5.2 | Practical Contribution

The study recommends that the authorities should encourage firms to invest in human talent capital through policy incentives such as tax breaks on employee training and development. Larger firms, in particular, should capitalize on their resources to enhance human talent capital. Government and regulatory bodies should also promote corporate governance reforms that prioritize workforce development and innovation. To stabilize firm volatility, firms should combine human talent capital investments with practical financial practices, such as maintaining adequate liquidity and managing leverage.

5.3 | Limitations and Future Directions

The study has several limitations. Firstly, the generalizability of the findings may be constrained by the focus on a specific industry and geographic region. Secondly, the reliance on quantitative data and fixed effects model might overlook qualitative factors influencing the human talent capital phenomenon. Thirdly, external factors such as macroeconomic conditions and regulatory changes could impact the study's findings, deserving further exploration.

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