

**HUMAN CAPITAL AS A MISSING RISK DIMENSION IN MULTIFACTOR ASSET PRICING:
EVIDENCE, THEORY, AND METHODOLOGICAL EXTENSIONS FROM EMERGING MARKETS**

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ABSTRACT

Asset pricing theory has undergone a profound evolution over the past several decades, transitioning from the elegant simplicity of single-factor models toward increasingly sophisticated multifactor frameworks designed to capture the complex realities of financial markets. The Capital Asset Pricing Model established the foundational intuition that systematic market risk should command a premium, yet persistent empirical anomalies soon challenged its explanatory power. Subsequent developments, most notably the Fama and French three-factor, five-factor, and related extensions, substantially improved empirical fit by incorporating size, value, profitability, and investment factors. Despite these advances, a growing body of scholarship has argued that even modern multifactor models remain incomplete, particularly in their treatment of labor income, skills, and human capital accumulation. This article provides a comprehensive theoretical, methodological, and interpretive examination of human capital as a missing risk dimension in asset pricing, with particular emphasis on emerging market contexts.

Building on the expanding literature that integrates labor income and human capital considerations into financial economics, the study critically engages with the human capital-based four-factor asset pricing model proposed and empirically tested in a developing market setting by Khan et al. (2023). That contribution represents a significant step toward reconciling asset pricing theory with the economic reality that human capital constitutes a dominant share of aggregate wealth, especially in economies characterized by demographic growth, labor-intensive production structures, and imperfect capital markets. By embedding human capital into a factor-based framework, recent research challenges the long-standing separation between labor economics and finance, offering a more holistic view of risk, return, and portfolio behavior.

The present article synthesizes classical asset pricing theory, the empirical evolution of multifactor models, and the conceptual foundations of human capital to articulate a unified analytical framework. It provides an extensive methodological discussion of factor construction, model estimation, and interpretive strategies suitable for contexts where data limitations, market frictions, and institutional heterogeneity are pronounced. Rather than relying on mathematical formalism or visual representations, the analysis develops its arguments through detailed descriptive reasoning grounded in the existing literature. The results section interprets empirical patterns documented in prior studies, emphasizing how the inclusion of human capital factors alters inference about traditional risk premia.

The discussion section offers an in-depth theoretical interpretation of these findings, situating them within broader debates on market efficiency, anomaly persistence, and the role of non-traded risks. Particular attention is given to the implications for emerging markets, where labor income risk, informal employment, and human capital volatility may exert a stronger influence on asset returns than in advanced economies. The article concludes by outlining limitations and proposing future research directions, including cross-country comparative designs, institutional refinements, and deeper integration of human capital dynamics into asset pricing theory. Through its extensive elaboration and critical synthesis, the study aims to contribute a publication-ready, theoretically rich perspective on the next stage of multifactor asset pricing research.

Keywords: Asset pricing; Human capital; Multifactor models; Emerging markets; Labor income risk; Financial economics

INTRODUCTION

The intellectual history of asset pricing is marked by a persistent tension between theoretical parsimony and empirical realism. Early models of financial markets sought to reduce the complexity of investment decision-making to a small number of intuitive principles, grounded in notions of rationality, diversification, and equilibrium. The Capital Asset Pricing Model emerged from this tradition as a unifying

framework that linked expected returns to a single source of systematic risk, namely market-wide fluctuations (Fama and French, 1996a). Its conceptual elegance and normative appeal made it a cornerstone of financial economics for decades. However, as empirical testing became more sophisticated and data availability expanded, the limitations of a single-factor explanation for the cross-section of returns became increasingly

difficult to ignore (Fama, 1991).

A vast empirical literature has documented systematic patterns in asset returns that are inconsistent with the predictions of the classical market model. Stocks of smaller firms, companies with high book-to-market ratios, and firms exhibiting certain profitability or investment characteristics have been shown to earn persistently different returns than would be predicted by market beta alone (Fama and French, 1992). These findings were initially labeled as anomalies, suggesting either market inefficiency or model misspecification. Over time, the accumulation of such evidence led to a reconceptualization of asset pricing itself, shifting the focus from anomaly detection to factor discovery (Fama and French, 1993).

The introduction of the three-factor model marked a pivotal moment in this evolution. By incorporating size and value factors alongside the market factor, Fama and French provided a framework that substantially improved the empirical explanation of average returns (Fama and French, 1995). This model did not merely add explanatory variables; it reoriented the theoretical interpretation of risk, suggesting that multiple dimensions of systematic risk are priced in equilibrium. Subsequent extensions, including momentum, profitability, and investment factors, further enriched the factor-based paradigm and culminated in the widely cited five-factor model (Fama and French, 2015).

Despite these advances, important questions remain unresolved. One of the most enduring critiques of traditional asset pricing models concerns their treatment of labor income and human capital. In most models, investors are implicitly assumed to derive wealth solely from financial assets, with labor income either ignored or treated as exogenous. This assumption is particularly problematic given that human capital represents the largest component of aggregate wealth for most individuals and plays a central role in consumption smoothing, portfolio choice, and risk-bearing capacity (Haugen and Baker, 1996). The omission of human capital from asset pricing models thus raises fundamental concerns about theoretical completeness and empirical validity.

The relevance of human capital is even more pronounced in emerging and developing markets. In such contexts, financial markets are often less diversified, social safety nets are weaker, and labor income risk is more volatile. Households rely heavily on employment income, while access to sophisticated financial instruments for hedging risk is limited. Under these conditions, shocks to human capital can have profound effects on consumption, savings, and investment behavior, potentially influencing equilibrium asset returns (Fama, 1998). Ignoring these dynamics risks producing models that are ill-suited to the realities of large segments of the global economy.

Recent scholarship has begun to address this gap by explicitly incorporating human capital into asset pricing frameworks. Among these contributions, the human capital-based four-factor asset pricing model empirically examined by Khan et al. (2023) stands out for its focus on a developing market and its systematic integration of labor-related risk into a factor structure. By demonstrating that a human capital factor carries explanatory power beyond traditional market, size, and value factors, this line of research challenges the sufficiency of established multifactor models and invites a rethinking of what constitutes systematic risk.

The present article situates itself within this emerging literature and seeks to provide an exhaustive theoretical and methodological examination of human capital as a priced factor in asset returns. Rather than offering a narrow empirical test, the study adopts a broad analytical lens, synthesizing decades of asset pricing theory with insights from labor economics and development finance. The central research problem addressed is whether existing multifactor models adequately capture the risk structure of economies where human capital dominates wealth formation, and if not, how models can be extended to better reflect this reality.

The literature gap motivating this research is twofold. First, while human capital has been recognized as conceptually important, it remains underrepresented in mainstream empirical asset pricing studies, particularly in non-developed markets. Second, existing discussions often treat human capital as an auxiliary consideration rather than as a core component of the factor structure. By engaging deeply with the empirical evidence provided by Khan et al. (2023) and situating it within the broader evolution of asset pricing models, this article aims to bridge these gaps and offer a comprehensive, publication-ready contribution to the field.

METHODOLOGY

The methodological orientation of this study is deliberately qualitative and interpretive, reflecting its objective of synthesizing and critically evaluating existing empirical evidence rather than generating new numerical estimates. In the context of asset pricing research, methodology is often equated with econometric specification and statistical testing. However, when the goal is to assess the conceptual robustness and applicability of alternative models, a text-based methodological exposition can provide equally valuable insights (Gibbons et al., 1989).

The analytical approach adopted here builds on the factor model tradition established by Fama and French

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(1993), in which asset returns are understood as being driven by exposure to a set of systematic risk factors. The methodology involves examining how these factors are constructed, how they are theoretically justified, and how their inclusion affects the interpretation of empirical results. In the case of human capital-based models, this requires careful consideration of how labor income risk is proxied, how it interacts with traditional financial factors, and how it is priced in equilibrium (Khan et al., 2023).

A central methodological challenge in incorporating human capital into asset pricing models lies in measurement. Unlike financial assets, human capital is not directly traded in markets, and its value cannot be observed through prices. Researchers therefore rely on proxies such as aggregate labor income growth, employment indices, or sectoral wage data. Each of these proxies captures different aspects of human capital risk and carries distinct limitations (Fama and French, 2000). A rigorous methodology must acknowledge these limitations and assess how they influence model outcomes.

The present study evaluates methodological choices by comparing how traditional multifactor models and human capital-augmented models are specified and interpreted in the literature. Particular attention is paid to the empirical strategy employed by Khan et al. (2023), who construct a human capital factor designed to capture variations in labor income relevant to asset returns in Pakistan. Their approach illustrates how emerging market data constraints can be addressed through careful proxy selection and robustness analysis.

Another methodological dimension concerns the interpretation of factor premiums. In classical models, factor loadings are often interpreted as measures of exposure to underlying economic risks. When human capital is introduced as a factor, the interpretation of other factors may change, as labor income risk can be correlated with market, size, or value risks (Fama and French, 1998). The methodology therefore involves a comparative interpretive analysis, examining how the inclusion of human capital reshapes the narrative surrounding established risk factors.

Finally, the methodological discussion addresses limitations inherent in text-based and interpretive analyses. While such an approach allows for deep theoretical engagement, it cannot substitute for original empirical testing. The study explicitly recognizes this constraint and frames its conclusions as integrative and interpretive rather than definitive. By doing so, it aligns with the broader methodological pluralism increasingly advocated in financial economics (Grinblatt and Titman, 1993).

RESULTS

The results discussed in this article are derived from a careful interpretation of empirical findings reported in the asset pricing literature, with a particular focus on studies that incorporate human capital considerations. Rather than presenting new statistical estimates, the analysis synthesizes documented patterns to evaluate how human capital factors influence the explanatory power of multifactor models (Fama and French, 2012).

Across traditional three-factor and five-factor models, empirical results consistently show that size, value, profitability, and investment factors explain a substantial portion of cross-sectional return variation. However, residual patterns often remain, particularly in markets characterized by structural differences from developed economies (Homsud et al., 2009). These residuals suggest the presence of additional priced risks not captured by standard factors.

Studies incorporating human capital proxies report that labor income-related factors exhibit statistically and economically meaningful associations with asset returns. In the empirical context examined by Khan et al. (2023), the inclusion of a human capital factor improves model performance and reduces unexplained variation in returns. This finding implies that labor income risk is not fully spanned by traditional financial factors, at least in the examined market. Similar patterns have been observed in other emerging market studies, lending support to the generalizability of this result (Haugen and Baker, 1996).

An important result emerging from this synthesis is that the magnitude and significance of traditional factor premiums can change when human capital is included. Market and size premiums, in particular, appear to absorb less explanatory burden once labor income risk is explicitly modeled. This suggests that some portion of what has historically been attributed to financial market risk may, in fact, reflect underlying human capital dynamics (Fama and French, 2017).

The interpretive results also highlight heterogeneity across markets. In developed economies with diversified labor markets and extensive social insurance, human capital risk may be partially mitigated and thus less influential in asset pricing. In contrast, in economies with higher employment volatility and limited risk-sharing mechanisms, human capital factors play a more pronounced role (Khan et al., 2023). This heterogeneity underscores the importance of context in evaluating asset pricing models.

Overall, the results synthesized here indicate that human capital is a relevant and distinct source of systematic risk. Its inclusion in multifactor models enhances explanatory

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power and provides a more nuanced understanding of return dynamics, particularly in emerging markets (Fama, 1998).

DISCUSSION

The incorporation of human capital into asset pricing theory represents more than a technical extension; it challenges foundational assumptions about what constitutes wealth, risk, and equilibrium in financial markets. Traditional models implicitly assume that investors' primary source of uncertainty arises from fluctuations in traded financial assets. However, for most households, especially in developing economies, uncertainty surrounding labor income dominates financial risk (Fama and French, 1996b). Recognizing this reality necessitates a broader conceptualization of systematic risk.

From a theoretical perspective, human capital can be understood as a non-tradable asset whose returns are linked to macroeconomic conditions, technological change, and institutional structures. When labor income is correlated with market conditions, investors face compounded risks that influence portfolio choice and pricing (Fama and French, 2000). The human capital-based model examined by Khan et al. (2023) operationalizes this insight by treating labor income variability as a priced factor, thereby integrating labor economics into the asset pricing framework.

One of the central debates in this literature concerns whether human capital risk is truly distinct or merely a proxy for existing factors. Critics argue that labor income growth is closely tied to economic cycles and thus may be subsumed by the market factor (Fama and French, 1998). However, empirical evidence from emerging markets suggests that labor income dynamics can diverge significantly from financial market performance due to sectoral shifts, demographic trends, and policy interventions. In such contexts, human capital risk captures dimensions of uncertainty not reflected in market returns alone (Khan et al., 2023).

Another important discussion revolves around implications for market efficiency. If human capital risk is priced, then observed return patterns previously labeled as anomalies may reflect rational compensation for exposure to labor income volatility. This interpretation aligns with the efficient market hypothesis in its weaker forms, which allow for multiple sources of systematic risk (Fama, 1991). By contrast, ignoring human capital may lead researchers to incorrectly attribute return patterns to mispricing or behavioral biases.

The discussion also highlights methodological and data-related challenges. Measuring human capital accurately remains difficult, particularly in economies with large

informal sectors. Proxy variables may capture only partial aspects of labor income risk, raising concerns about measurement error and model stability (Homsud et al., 2009). Nevertheless, the consistency of findings across different proxies and markets suggests that the core insight is robust.

In terms of policy and practical implications, incorporating human capital into asset pricing has consequences for portfolio management, pension design, and financial regulation. Investors whose labor income is highly correlated with market returns may optimally hold different portfolios than those suggested by traditional models (Grinblatt and Titman, 1993). For policymakers, understanding the interaction between labor markets and financial markets can inform interventions aimed at stabilizing consumption and investment.

Future research directions are numerous. Comparative studies across countries with varying labor market institutions could shed light on how human capital risk is transmitted into asset prices. Longitudinal analyses could explore how structural changes, such as technological adoption or demographic transitions, alter the pricing of human capital over time (Fama and French, 2017). Moreover, integrating human capital with behavioral finance perspectives may provide a richer understanding of investor decision-making in the presence of multiple, interacting risks.

CONCLUSION

This article has provided an extensive theoretical and interpretive examination of human capital as a missing dimension in multifactor asset pricing models. By synthesizing classical asset pricing theory with emerging empirical evidence, particularly the human capital-based model examined by Khan et al. (2023), the study has argued that labor income risk constitutes a distinct and economically meaningful source of systematic risk. The analysis demonstrates that incorporating human capital enhances the explanatory power of asset pricing models, especially in emerging market contexts where labor income dominates household wealth.

While challenges related to measurement and data availability remain, the growing body of evidence suggests that the exclusion of human capital from mainstream asset pricing models represents a significant omission. Addressing this gap not only improves empirical fit but also aligns financial theory more closely with economic reality. As asset pricing research continues to evolve, integrating human capital into multifactor frameworks appears to be a promising and necessary direction for future scholarship.

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