Dissecting anomalies and dynamic human capital: The global evidence

Rahul Roy, Santhakumar Shijin

Available online at www.sciencedirect.com

Borsa İstanbul Review

Borsa İstanbul Review xx (2017) 1–32

http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

Dissecting anomalies and dynamic human capital: The global evidence

Rahul Roy*, Santhakumar Shijin

Department of Commerce, SOM, Pondicherry University, Pondicherry, 605014, India

Received 27 April 2017; revised 25 July 2017; accepted 17 August 2017
Available online ■ ■ ■

Abstract

We argue that the risk of an asset is measured by the covariance of an asset's return with the return on the aggregate market and human capital. The intertemporal and consumption-based CAPM, along with an extended version of CAPM framework examines the excess return on Fama and French portfolios sorted on size- BE/ME and momentum across the economies. The frequently used priced factors in anomaly literature include, Fama and French factors, momentum, dividend yield, bond market factors, saving, along with aggregate market and human capital component. Using unique panel data sets of emerging and developed economies, the panel regression, IV-GMM with random effects and PCA, finds the aggregate market and human capital are the strongest predictors of asset returns across the economies. Furthermore, the aggregate market and saving are strong predictors of asset return in emerging economies, whereas aggregate market and human capital emerge the best predictors of asset return in developed economies. Interestingly, human capital subsumes the predictive ability of Fama and French factors and becomes redundant along with momentum, dividend yield, and bond market factors.

JEL classification: E21; G12; J24

Keywords: Anomalies; Asset pricing; CCAPM; Human capital; ICAPM; Random effects

1. Introduction

Asset pricing literature in financial economics advocates that the substantial portion of aggregate wealth is non-tradable assets, primarily human capital wealth. The intertemporal models built on time additive utility of consumption functions extensively model the asset return predictability. Rational investors maximize the expected utility of their lifetime consumption to form the optimal portfolio. Owing to the investment opportunities in tradable assets, such as stocks and bonds, part of their wealth is tied in the form of non-tradable assets. Certainly, the human capital component owns the major chunk of wealth for almost entire investors. Heaton and Lucas (2000) and Lustig, Nieuwerburgh, and Verdelhan (2013) found that the human capital component owes approximately 90% of the aggregate wealth, whereas only 10% consists of capitalized financial assets.

The asset pricing literature has witnessed the series of anomalies posing challenge to the capital asset pricing model (CAPM) to price the variation in return predictability. Harvey, Liu, and Zhu (2016) identified 316 factors and Hou, Xue, and Zhang (2015) traced 80 firm level anomalies are instrumental in explaining the expected stock returns. The role of value and size factors of Fama and French (1993) in asset return predictability is well established in anomalies literature and evident equally in developed and emerging economies. Successively, Jegadeesh and Titman (1993) introduced momentum strategy based on the prediction from three to twelve months past returns. Griffin, Ji, and Martin (2003) extend the momentum strategy across many economies to provide the international evidence. Carhart (1997) argues that the sensitivity towards momentum strategy is priced separately from the risk factors of Fama and French (1993). Lately, Kim, Kim, and

* Corresponding author.
E-mail addresses: rahulroy819@gmail.com, rroypu.res@pondiuni.edu.in (R. Roy), shijin.s@gmail.com, shijin.com@pondiuni.edu.in (S. Shijin).
Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

http://dx.doi.org/10.1016/j.bir.2017.08.005

Min (2011) opine that the revisions in future labor income dethrone the predictability of FF (Fama and French) value and size factors in U.S. Campbell (1996) attribute that the presence of human capital component along with aggregate market factor enhances the stock return predictability. Moreover, the fact that both the aggregate market and human capital captures the variability in return is economically justifiable in developed economies. However, there exists little empirical evidence in emerging economies, whether the dynamics in aggregate market factor and human capital component perform such a function to measure the variability in return predictability.

Building on the theoretical assumption Campbell (1996), measures the risk of an asset by the covariance of asset's return with the return on the aggregate market and human capital wealth. The present study has the wider scope since primarily it examines the excess returns of the assets by its covariance with the returns on the aggregate market and human capital component in developed and emerging economies. The value weighted index proxies the aggregate market while to proxy the human capital component we construct dual aggregates and one firm-level measure. The labor income growth rate (herewith LBR) and the wealth-to-consumption ratio (herewith WCR) represents aggregate, and Hansson Index (HI) signify firm level measurement of the human capital component. The intertemporal capital asset pricing (ICAPM) framework of Campbell (1993) was built on aggregate market factor along with the innovation in market return which proxies news about the future market return to assess the risk premium. However, we introduce saving in asset pricing framework as the proxy for expected future labor income growth that measures the innovation in the human capital component. By doing so the economic significance is that the representative agents save for the rainy day and thus saving must be the best predictor of declines in labor income (Deaton, 1992). We argue that the representative agents in emerging economies comparatively save today more than the agents do in developed economies to smooth their future consumption. In this regard, it is expected that saving should play an important role to capture the variability in asset return predictability in emerging economies. Primarily, we establish an ICAPM framework, consisting of the time variant component representing the present value of labor income growth, for testing the presumptions developed in the study. Alternatively, we employ the consumption-based CAPM, where the risk premium is measured by the asset's return with the covariance of returns on the aggregate market and wages-to-consumption ratio that proxy human capital component.

The size and value strategies occasionally relate to the human capital component in the asset pricing literature and proclaim that the dynamics in human capital component subsumes the predictive power of size and value effects (Kim et al., 2011). Campbell (1996) proposed adding FF factors in his intertemporal framework would be interesting. With this virtue, we introduce the size and value strategies along with the momentum strategy in an ICAPM and CCAPM framework by controlling the effects of dividend yield, term spread, and the relative Treasury bill. We employ twelve sets of portfolios formed at the intersection of size-BE/ME and size-momentum return as test assets to examine empirically the proposition developed in the study. We used three sets of panel data of emerging and developed economies and the Aggregate in the ICAPM and CCAPM framework to quantify the presumptions developed in the study. To the best of our knowledge, the present study is first of its kind to quantify the presumptions by employing panel data sets in an intertemporal and consumption-based CAPM framework. Moreover, testing the crafted presumptions of the study in the intertemporal and consumption-based CAPM framework on country-specific data sets requires the country-specific component to be time variant. Thus, we rely on the panel data regression methodology with random and fixed effects. Further to deal with the endogeneity and derive the required parameters of interest in line with the objectivity of the study, we employ the instrumental variable-generalized method of moments (IV-GMM) and principal component analysis.

The Hausman's specification test accepts the null hypothesis that the panel regression with random effect better estimates the parameters of interest and the preliminary result show that ICAPM fits the data better than CCAPM. Further, the result is persistent in most of the FF portfolios across the emerging and developed economies. The estimation results show that both the aggregate market and human capital component are strong predictors of return on FF portfolios in developed economies. Interestingly, on the contrary, the aggregate market along with saving appears strong predictor of return on FF portfolios in the emerging economies. The IV-GMM result reveals that the FF factors, momentum, dividend yield, term spread, and relative Treasury bill are instrumental in capturing the variations in return predictability of FF portfolios for both emerging and developed economies. Our major contribution includes the methodological approach we used to fit the country-specific data that handles the statistical issues diligently in the ICAPM and CCAPM framework in line with the economic relationship built in the study. Moreover, it is empirically confirmed that the presence of the human capital component in the asset pricing framework subsequently absorb the predictive ability of FF factors, dividend yield, term spread, and relative Treasury bill, and becomes redundant. Furthermore, the aggregate market and the human capital priced the risk of FF portfolios in developed economies are well known in the asset pricing literature. Though the most intriguing finding indicates that the aggregate market along with the innovation in the human capital component, i.e., present value of future labor income, price the risk of the FF portfolios in emerging economies. The core findings that, the country-specific dimensions drive the priced factors in determining asset return predictability further deepened our understanding.

2. Data and variable definitions

The study uses three sets of panel data to test the proposition in an intertemporal and consumption-based CAPM

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

framework. These are the monthly panel datasets of emerging and developed economies, and the monthly data set representing the Aggregate is an aggregation of all the economies. The country classification specification and its groupings reported in Table 1. Table 2 represents the variable definitions and the information related to its construction, which includes aggregate market, FF factors, momentum, term spread, relative Treasury bill and the FF portfolios. Table 1 shows the formation of human capital proxies at an aggregate level whereas the Hansson Index that proxy the firm level human capital component are discussed in successive section.

2.1. Valuation of the firm-based human capital component

We followed Hansson (2004) literature for computing the firm-based measure of the human capital component. The changes in the average wage and salaries weighted against the amount paid by the firm of the respective economy be expressed as

$$R_{jt}^{HC} = \frac{\sum W(i,t) \times \Delta \overline{W}(i,t+1)}{\sum W(i,t)}$$

Where, R_{jt}^{HC} is the return on human capital for the economy j at the month t, $\Delta \overline{W}(i,t+1) = \frac{\overline{W}(t+1) - \overline{W}(t)}{W(t)}$, $\overline{W}$ is the total wages paid divided by the number of employees, $\Delta \overline{W}$ is the average wage change in the firm i at the time $(t+1)$ and W is the total wages paid by the firm at the month t. The return on human capital thus changes in individual return $(\Delta \overline{W})$ weighted against the cost of the firm (W). The salaries and wages and the number of employee components retrieved from the firms registered with the stock exchanges of the respective economy. The Augmented-Dickey-Fuller and Phillips-Perron test of stationarity been performed on all the variables in the framework and subsequently follows IID at levels. However, saving, dividend yield, term spread, and relative Treasury bill follows IID at first difference.

Table 3 reports the data specifications of the variables that comprise data source, sample period, and data frequency. The data expressed in terms of the country-specific currency unit.

Table 1
Economy groupings.[1]

Sl. No.	Country Code[2]	Emerging economies	Developed economies	Aggregate	Global economies
1	CAN		Canada	Canada	Canada
2	FRA		France	France	France
3	DEU		Germany	Germany	Germany
4	HKG		Hong Kong	Hong Kong	Hong Kong
5	JPN		Japan	Japan	Japan
6	KOR		South Korea	South Korea	South Korea
7	CHE		Switzerland	Switzerland	Switzerland
8	GBR		United Kingdom	United Kingdom	United Kingdom
9	U.S.		United States	United States	United States
10	BRA	Brazil		Brazil	Brazil
11	CHN	China		China	China
12	IND	India		India	India
13	GBL				Global[3]

Note: [1] The economy(s) are grouped into four categories, namely, Emerging, developed, the Aggregate, and global economies, following IMF (2016) Country Data Documentation. [2] The Country Code is obtained from IMF (2016) Country Data Documentation. [3] Global economy represents the data pooled from Australia, Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, Norway, New Zealand, Portugal, Sweden, Singapore, and the U.S.

3. Econometric methodology

The primary presumption developed in the study is that the determining factors to measure the risk of an asset are the aggregate market and human capital component. However, the nexus among market risk factor and human capital gain prominence with strong empirical evidence in the U.S. Moreover, little empirical evidence exists in the rest of the developed economies whereas no evidence in the case of emerging economies. The study relies on intertemporal and consumption-based CAPM framework to test the risk and return relationship in the presence of pricing factors, namely, aggregate market, human capital component, and innovations, FF factors, momentum, dividend yield, term spread, and relative Treasury bill. The pricing factors in determining the risk of an asset depends on the country-specific dynamicity, thus we expect the better result when the country-specific component is time varying. In line with the objective of the study, we expect the parameter estimates derived from panel regression with random effects incur better result than the parameter estimates from panel regression with fixed effects. We use three broad longitudinal datasets of emerging and developed economies, and the Aggregate. McMillan (2013) and Racicot and Rentz (2017) used the country-specific panel regression in an asset-pricing framework to quantify the risk and return relationship. To estimate the parameter of interests the panel regression can take the form

$$y_{it} = X_{it}'\beta + Z_i'\alpha + \varepsilon_{it} \quad (1)$$

There are K regressors in $\mathbf{x_{it}}$, excluding constant term. The individual effect is $Z_i'\alpha$, where Z_i' contains a constant term and a set of individual or group specific variables either observable or unobservable are assumed to be constant over time t. If z_i is observed for all individuals, the whole model can be expressed as an ordinary linear model through least squares. Alternatively, rewritten as

$$\begin{aligned} r_{it}^{FF\,P/folio} = {} & \left(R_m - R_f\right)_{it}\beta_1 + HC_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 \\ & + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 \\ & + RTB_{it}\beta_9 + \varepsilon_{it} \end{aligned}$$

where $r_{it}^{FF\,P/folio}$ is the return on FF portfolios, SL, SM, SH, BL, BM, BH, SLo, SNe, SWi, BLo, BNe, and BWi of the economy i at the month t. R_m-R_f, HC, HML, SMB, WML, DIV, TRM, and RTB are the excess return, human capital, the return on-value, size, momentum, dividend yield, the term

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 2
Variable definitions.

Variable code	Variable	Variable definition
Formation of factors		
R_m-R_f	Aggregate market	The excess return on the equity aggregate market over 91 Days Treasury bill rate
SMB	Small Minus Big	Small minus Big, mimic the risk factor related to size
HML	High Minus Low	High minus Low, captures the risk factor related to book-to-market equity
WML	Winners Minus Losers	Winners minus Losers, proxy the risk factor related to momentum returns or known as momentum
DIV	Dividend yield	The dividend yield is measured by taking the one-year moving average of dividends divided by the closing stock price
TRM	Term Spread	Term spread of interest rates is the difference between ten-year and one-year government bonds
RTB	Relative Treasury Bill	Relative Treasury bill is measured as the difference between 91 days Treasury bill and its one-year moving average
LBR	Labor income growth rate	Aggregate of salaries and wages component from earnings report of the firms listed on the stock exchange of the respective economy
WCR	Wealth-to-Consumption Ratio	Dividing wages with the consumption of consumer goods, includes both durables and non-durables. The consumption data are collected from Bloomberg database for the respective economy
HI	Hansson Index	Firm-specific wage growth rate is calculated following Hansson (2004)
Formation of portfolios, FF's factors, and momentum		
SL	Small/Low	The portfolios are the intersections of two portfolios formed on size (Market equity; ME) and three portfolios formed on the book-to-market equity ratio (BE/ME). The ME breakpoint for year (t) is the median of market equity Index for developed economies whereas 10th percentile of market equity Index for emerging economies is at the end of June year (t). BE/ME for year (t) is the BE for the last fiscal year end in t-1 divided by ME for December t-1. The BE/ME breakpoints are the 30th and 70th Equity Index percentiles for developed and emerging economies respectively. Accordingly following Fama and French (1993) for developed and Agarwalla, Jacob, and Varma (2014) for emerging economies, the six portfolios namely, SL, SM, SH, BL, BM, and BH are formed based on the size and BE/ME.
SM	Small/Medium	
SH	Small/High	
BL	Big/Low	
BM	Big/Medium	
BH	Big/High	
SLo	Small/Loser	The portfolios are the intersections of two portfolios formed on size (Market equity; ME) and three portfolios formed on momentum (2-12) return. The ME breakpoint is the median market equity Index for developed economies whereas 10th percentile of market equity Index for emerging economies. The momentum (2-12) return breakpoints are the 30th and 70th Equity Index percentiles for both developed and emerging economies. Following Fama and French (2012) literature the six portfolios namely, SLo, SNe, SWi, BLo, BNe, and BWi are formed based on size and momentum returns for both developed and emerging economies.
SNe	Small/Neutral	
SWi	Small/Winner	
BLo	Big/Loser	
BNe	Big/Neutral	
BWi	Big/Winner	
SMB	Small Minus Big	SMB is the difference between the average returns on the three small-stock portfolios (SL, SM, and SH) and the average returns on the three big-stock portfolios (BL, BM, and BH)
HML	High Minus Low	HML is the difference between the average returns on the two value portfolios (SH and BH) and the average returns on the two growth portfolios (SL and BL)
WML	Winners Minus Losers	WML is the difference between the average returns on the two high momentum return portfolios (SWi and BWi) and the average returns on the two low momentum return portfolios (SLo and BLo)

Notes: [1] The major stock index of the respective economy is used as the aggregate market proxy. [2] The relative stock market indexes of the respective economy used for the construction of FF's portfolios and factors including momentum. [3] The detailed specification relating to the stock index used for aggregate market proxy and FF's portfolio and factors construction made available upon request. [4] Human capital denotes with HC.

spread, and the relative Treasury bill respectively, of the economy i at the month t, and ε_{it} is the white noise process.

If z_i consists of a constant term, then ordinary least squares (OLS) fetches, consistent and efficient estimates of the common α and the slope vector β.

3.1. Fixed effects

If z_i is unobserved, conversely correlated with $\mathbf{x_{it}}$, then the least squares estimator of β is biased and inconsistent. However, in this case, the model takes form

$$y_{it} = X'_{it}\beta + \alpha_i + \varepsilon_{it} \quad (2)$$

where $\alpha_i = Z'_i\alpha$, represents all the observable effects identified as an estimable conditional mean. This fixed effects method takes α_i to be group specific constant term in the regression model. The term 'fixed' used here denotes that the term is time invariant, albeit it is non-stochastic. Concurrently, rewritten as

$$r_{it}^{FF\,P/folio} = \left(R_m - R_f\right)_{it}\beta_1 + HC_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$$

whereas, α_i is the country (economy) specific idiosyncratic effect for the economy i.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 3
Data specification.

Sl. No.	Economy	FF portfolios		Variables					Sample period	Data frequency
		SL, SM, SH, BL, BM, BH	SLo, SNe, SWi, BLo, BNe, BWi	R_m-R_f	SMB	HML	WML	LBR, WCR, HI	DIV, TRM, RTB	
		Data source								
1	CAN	*French (2016)*	*French (2016)*	*Bloomberg*	*French (2016)*	*French (2016)*	*French (2016)*	*Datastream*	*Bloomberg*	July 1997–Dec 2015 Monthly
2	FRA	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 2006–Dec 2015 Monthly
3	DEU	*Stehle (2015)*	*Stehle (2015)*	*Bloomberg*	*Stehle (2015)*	*Stehle (2015)*	*Stehle (2015)*	*Datastream*	*Bloomberg*	July 1997–Dec 2015 Monthly
4	HKG	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 2002–Dec 2015 Monthly
5	JPN	*French (2016)*	*French (2016)*	*Bloomberg*	*French (2016)*	*French (2016)*	*French (2016)*	*Datastream*	*Bloomberg*	Jan 2001–Dec 2015 Monthly
6	KOR	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 2005–Dec 2015 Monthly
7	CHE	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 1994–Dec 2015 Monthly
8	GBR	*Gregory, Tharyan, and Christidis (2013)*	*Gregory et al. (2013)*	*Bloomberg*	*Gregory et al. (2013)*	*Gregory et al. (2013)*	*Gregory et al. (2013)*	*Datastream*	*Bloomberg*	Jan 2001–Dec 2015 Monthly
9	U.S.	*French (2016)*	*French (2016)*	*Bloomberg*	*French (2016)*	*French (2016)*	*French (2016)*	*Datastream*	*Bloomberg*	Jan 1986–Dec 2015 Monthly
10	BRA	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 2007–Dec 2015 Monthly
11	CHN	*Marmi (2012)*	*Marmi (2012)*	*Bloomberg*	*Marmi (2012)*	*Marmi (2012)*	*Marmi (2012)*	*Datastream*	*Bloomberg*	Jan 2006–Dec 2015 Monthly
12	IND	*Agarwalla et al. (2014)*	*Agarwalla et al. (2014)*	*Bloomberg*	*Agarwalla et al. (2014)*	*Agarwalla et al. (2014)*	*Agarwalla et al. (2014)*	*Datastream*	*Bloomberg*	Jan 1996–Dec 2015 Monthly
13	GBL	*French (2016)*	*French (2016)*	*Bloomberg*	*French (2016)*	*French (2016)*	*French (2016)*	*Datastream*	*Bloomberg*	Mar 1996–Dec 2015 Monthly

Notes: [1] Datastream -Thomson Reuters Database, [2] Data Source indicates with an Italic face.

3.2. Random effects

If the unobserved idiosyncratic heterogeneity is uncorrelated with the included regressors, then the model may take the form

$$y_{it} = X'_{it}\beta + \alpha + u_i + \varepsilon_{it}. \tag{3}$$

This random effect denotes that $\boldsymbol{u_i}$ is a group-specific random element, identical to $\boldsymbol{\varepsilon_{it}}$. Concurrently rewritten as

$$r_{it}^{FF\,P/folio} = \left(R_m - R_f\right)_{it}\beta_1 + HC_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$$

3.3. Hausman's specification test for the random effects model

The specification test coined by Hausman (1978) is employed to test for orthogonality of the random effects and the predictors. The test revolves on the assumption that ordinary least square (OLS) in the least square dummy variable (LSDV) model and generalized least square (GLS) are consistent, but OLS is inefficient, while under the alternative hypothesis, OLS is consistent, but GLS is not. Therefore, under the null hypothesis, the two estimates should not differ systematically, and a test can rely on the difference. Further, the important component of the test is the covariance of the difference vector, $[b - \widehat{\beta}]$:

$$Var\left[b - \widehat{\beta}\right] = Var[b] + Var\left[\widehat{\beta}\right] - Cov\left[b, \widehat{\beta}\right] - Cov\left[b, \widehat{\beta}\right] \tag{4}$$

Hausman test implies

$$Cov\left[\left(b, \widehat{\beta}\right), \widehat{\beta}\right] = Cov\left[b, \widehat{\beta}\right] - Var\left[\widehat{\beta}\right] = 0$$

or that

$$Cov\left[b, \widehat{\beta}\right] = Var\left[\widehat{\beta}\right]$$

Substituting this result in (4) yields the required covariance matrix for the test,

$$Var\left[b - \widehat{\beta}\right] = Var[b] + Var\left[\widehat{\beta}\right] = \Psi \tag{5}$$

The $\boldsymbol{\chi^2}$ test is based on the Wald criterion:

$$W = \chi^2[K-1] = \left[b - \widehat{\beta}\right]' \Psi^{-1} \left[b - \widehat{\beta}\right] \tag{6}$$

For $\widehat{\Psi}$, the estimated covariance matrices of the slope estimator is used in the LSDV model, excluding the constant term. Under the null hypothesis, $\boldsymbol{W}$ has limiting $\boldsymbol{\chi^2}$ distribution with $\boldsymbol{K\text{-}1}$ degrees of freedom.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

3.4. IV-GMM (Instrumental Variable-Generalized Method of Moments) estimators

The difference in the viewpoint in the asset pricing literature indicates that the pricing factor determines the risk of an asset varies from country-to-country. The parameter estimators of panel regression with random and fixed effects may cause the error in variables and orthogonality issues (Griliches & Hausman, 1986). Hence, to overcome these issues we further employ generalized methods of moments (GMM) with instrumental variables. Hence, following the presumptions developed in the study that the aggregate market and human capital component priced the risk of an asset in developed economies whereas aggregate market and innovations in human capital component price the risk of an asset in emerging economies. Moreover, we argue that FF factors, momentum, term spread, and relative Treasury bill may be instrumental in enhancing the asset return predictability. With this motivation, we closely follow and modify Griliches and Hausman (1986) so as to derive the parameter of interests. Griliches-Hausman specifies a static linear model,

$$\begin{aligned} y_{it} &= \xi_{it}\beta + \alpha_i + \eta_{it}, \\ X_{it} &= \xi_{it} + \upsilon_{it}, \end{aligned} \qquad t = 1, ..., T; i = 1, ..., N, \tag{7}$$

where $\boldsymbol{\beta}$ is a parameter of interest, $\boldsymbol{y_{it}}$ is the $\boldsymbol{t}$**th** observed the response from the $\boldsymbol{i}$**th** individual, ξ_{it} is an observed covariate associated with $\boldsymbol{y_{it}}$, η_{it} is a regression error, $\mathbf{x_{it}}$ is an observed proxy for ξ_{it} with unobserved measurement error υ_{it} and $\boldsymbol{\alpha_i}$ is an unobserved individual fixed effect or random effect that may be correlated with ξ_{it}.

For each $\boldsymbol{i}$, $y_i = (y_{i1}, ..., y_{iT})'$, $X_i = (X_{i1}, ..., X_{iT})'$, $\xi_i = (\ \xi_{i1}, ..., \xi_{iT})'$, $\eta_i = (\eta_{i1}, ..., \eta_{iT})'$, and $\upsilon_i = (\upsilon_{i1}, ..., \upsilon_{iT})'$. The covariance matrix of $(\xi_i', \eta_i', \upsilon_i')'$ is a block diagonal matrix with three $T \times T$ diagonal blocks, which are the covariance matrices of ξ_i, η_i,and υ_i. Replacing ξ_{it} by $\mathbf{x_i}$-$\mathbf{y_i}$ in (7), yield.

$$y_i = X_i\beta + l_T\alpha_i + \varepsilon_i \tag{8}$$

where $\varepsilon_i = \eta_i - \upsilon_i\beta$ and $\boldsymbol{l_T}$ is the $T \times 1$ vector of ones. To yield the consistent estimators, need to identify a set of instrumental variables estimators of the form

$$\widehat{\beta}_P = (w'X)^{-1}w'y, \qquad w = (I_N \otimes P)X,$$

whereas $\boldsymbol{I_N}$ is the identity matrix of order $\boldsymbol{N}$, $\mathbf{x}$ is the stacked column vector of all $X_i's$, $\otimes$ is the Kronecker product (Abadir & Magnus, 2005), and $\boldsymbol{P}$ is a $T \times T$ deterministically known matrix.

The moment conditions associated with $\boldsymbol{P_1, ..., P_K}$ are

$$E\left[X_i'P_k'(y_i - X_i\beta)\right] = 0, \qquad k = 1, ..., K.$$

Because $X_i'P_k'(y_i - X_i\beta) = vec(P_k)'[X_i \otimes (y_i - X_i\beta)]$ for each $\boldsymbol{k}$, these equations can be written as

$$HE[X_i \otimes (y_i - X_i\beta)] = 0, \tag{9}$$

Where $H = [vec(P_1), ..., vec(P_K)]'$. Since $\boldsymbol{P_1,...,P_K}$ are linearly independent, $\boldsymbol{H}$ is a matrix of full rank and the system of orthogonality conditions in (9). The efficient two-step GMM estimator can yield form (9). Explicitly,

$$\begin{aligned} A_i &= H(X_i \otimes y_i)\Big], \quad B_i = H\Big[X_i \otimes X_i\Big], \quad \overline{A} = \frac{1}{N}\sum_{i=1}^{N} A_i, \\ \overline{B} &= \frac{1}{N}\sum_{i=1}^{N} B_i \end{aligned} \tag{10}$$

A typical consistent first-step GMM estimator is the unweighted GMM estimator where $\boldsymbol{W}$ is taken as the identity matrix:

$$\widehat{\beta}_{GMM1} = \left(\overline{B}'\overline{B}\right)^{-1}\overline{B}'\overline{A}$$

Under assumption A, the matrix

$$\Gamma = E\left[(A_i - B_i\beta)(A_i - B_i\beta)'\right] \tag{11}$$

is well-defined and does not depend on $\boldsymbol{i}$. In terms of the asymptotic variance, $W = \Gamma^{-1}$, if it is known, is the optimal weighting matrix. Since Γ^{-1} is unknown, replace it by a consistent estimator

$$W = \left[\frac{1}{N}\sum_{i=1}^{N}(A_i - B_i\beta_{GMM1})(A_i - B_i\beta_{GMM1})'\right]^{-1} \tag{12}$$

A two-step GMM estimator is then

$$\widehat{\beta}_{GMM2} = \left(\overline{B}'W\widehat{B}\right)^{-1}\overline{B}'W\overline{A}. \tag{13}$$

Griliches-Hausman stated optimally weighting a complete set of instrumental variable estimates, do not provide an explicit weighting form. By defining the weighted instrumental variable estimator

$$\widehat{\beta}(\lambda) = \lambda_1\widehat{\beta}P_1 + ... + \lambda_K\widehat{\beta}P_K. \tag{14}$$

Since $\widehat{\beta}P_1, ..., \widehat{\beta}P_K$ are consistent for $\beta, \widehat{\beta}(\lambda) = \lambda_1\widehat{\beta}P_1 + ... + \lambda_K\widehat{\beta}P_K$ is consistent for $\boldsymbol{\beta}$. The following result shows for to find an optimally weighted instrumental estimator.

Under Griliches-Hausman's approach, the country specific effect $\boldsymbol{\alpha_i}$ under the model (7) is considered as bothersome effect, albeit under some assumptions its effect can be estimated. For instance, if the $\boldsymbol{\alpha_i}$'s are IID random effect, which is the matter of interest for the present study, then consistent estimator of $E(\alpha_i)$ $(as\ N \to \infty)$ is $N^{-1}\sum_{i-1}^{N}\widehat{\alpha}_i$, where $\widehat{\alpha}_i = T^{-1}\sum_{t=1}^{T}(y_{it} - X_{it}\widehat{\beta}_{GMM2}), i = 1, ..., N.$

3.5. Principal component analysis (PCA)

Successively principal component analysis been employed to calibrate the robustness of the priced factors determining

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

the risk of an asset. It dealt with the orthogonality issue. PCA as a linear combination of principal components, form

$$X_i = w_{i1}p_1 + w_{i2}p_2 + \ldots + w_{ik}p_k \quad (15)$$

where X_i is the principal components, $p_1, p_2, \ldots, p_k$ are the i^{th} variable in the k^{th} month, w_i is the factor loadings, and can be rewritten in the form

$$X_i = w_k(Rm - Rf)_k + w_k HC_k + w_k \Delta SAV_k + w_k HML_k + w_k SMB_k + w_k WML_k + w_k DIV_k + w_k TRM_k + w_k RTB_k$$

4. Empirics

Table A1 reports the summary statistics of FF portfolios, aggregate market, FF factors, momentum, dividend yield, term spread, relative Treasury bill, and human capital components. The economic relationship that the average returns on value stocks outgrowths the average returns on growth stocks are well established in the asset pricing literature (Hansson, 2004) for developed economies. Identical results are witnessed in Table A1 for developed economies. Contrarily, the average return on growth stocks (SL and BL) outweighs the average return on value stocks (SH and BH) in emerging economies. Table A1 reports that the small firms incur higher average return than bigger firms in emerging and developed economies, the Aggregate, and global are consistent with Roll (1981). The notion that the average return on winner portfolio sorted on size and momentum strategies outperform the average return on a loser portfolio (Jegadeesh & Titman, 1993) is consistent with the result in Table A1. Hence, it is evident that the average returns on winner stocks (SWi and BWi) outclass the average returns on losers stocks in emerging and developed economies, the Aggregate, and global. Table A1 indicates that the average return on the aggregate market (R_m-R_f) and volatility in emerging economies are relatively higher than the developed economies, the Aggregate, and global. The stocks characterizing value, size, and momentum strategies incur higher average returns in emerging economies than the developed economies, Aggregate, and global evident in Table A1. The value, size, and momentum patterns in average returns are highly persistent in emerging economies relative to developed economies, albeit the magnitude of average returns is quite high in emerging economies. Firms operating in the emerging economies announce very low dividends and retains the major portion of earnings to meet the frequent financial requirements because of diversification as shown in Table A1. Thus, the firms in emerging economies yield relatively lower average dividend per share than the firms in developed economies, Aggregate, and global.

The average term spread of interest rates (TRM) in government bond is higher in emerging economies because of its vulnerability to default risk than in developed economies (Neumeyer & Perri, 2005) reported in Table A1. The average return of relative Treasury bill (RTB) is positive in emerging economies whereas negative in developed economies may be due to the distinct governing monetary policies of the respective economies to regulate economic operations. The average wage growth (HI) in emerging economies is comparatively lower than the developed economies shown in Table 4. The labor force engaged by the firms in developed economies is mostly highly skilled with expertise in their respective fields. Hence, the labor force vested with bargaining power to fix rents on human capital and witness high average wage growth in developed economies. On the contrary, firms in emerging economies are labor-intensive experiencing lower wage increment. Moreover, the greater engagement of labor force tends to witness higher labor income at an aggregate level. Table A1 shows the similar evidence that the average labor income (LBR) in emerging economies outclasses the average labor income in developed economies at an aggregate level. The similar evidence of LBR are witnessed in the average wages-to-consumption ratio.

Panel A, B, C, and D of Table A2 reports the result of correlation and covariance coefficients among the variables in emerging and developed, the Aggregate, and global respectively. Table A2 evidenced approximately an average correlation of 86.283, 80.891, 81.833, and 83.908 between the FF portfolios sorted on size-BE/ME, size-momentum returns and aggregate market, in emerging and developed economies, the Aggregate, and global respectively. Value strategy (HML) negatively correlates with FF portfolios in emerging economies whereas positively in developed economies shown in panel A and B of Table A2. The size (SMB) positively correlates with the small and big stocks in emerging economies. Conversely, the size is positively correlated with small stocks and negatively with big stocks in developed economies as in panel A, B, C, and D of Table A2. The momentum strategy is positively correlated with the aggressive stocks (SWi and BWi) whereas negatively correlated with the defensive stocks (SNe and BNe) in emerging and developed economies, the Aggregate, and global as is evident in panel A, B, C, and D, respectively of Table A2. The dividend yield is positively correlated with FF portfolios in emerging and developed economies, and the Aggregate, whereas negatively correlated for global as shown in panel A, B, C, and D of Table A2, respectively.

Term spread (positively) and relative Treasury bill (negatively) correlated with FF portfolios. The magnitude of the correlation is very low implying the impact of the bond market in determining the return on FF portfolios are very less. The average wage growth and average return on FF portfolios are negatively correlated in emerging economies whereas positively correlated in developed economies. The WCR negatively correlates with FF portfolios in emerging and developed economies, the Aggregate and global as shown in panel A, B, C, and D of Table A2, respectively. The aggregate market witnessed negative correlation with HI and LBR in emerging economies whereas positive in developed economies. Concurrently, the aggregate market is negatively correlated with WCR for all the classifications as reported in panel A, B, C, and D of Table A2. The result is consistent with Lustig and Van Nieuwerburgh (2008). The LBR and WCR are positively

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 4
Fixed and Random Effects estimate with Human Capital.

Panel A: Fixed and random effects estimate with LBR

	Portfolio	Fixed effects estimates							Random effects estimates							Hausman's specification test
		Estimators							Estimators							H_0: *re* is consistent; H_1: fe is consistent
Emerging economies		**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	
	SL	4.17***	0.34	13.41**	0.75***	0.90***	0.03	0.91	4.41***	0.17	12.91**	0.72***	0.90***	0.01	0.91	*re is consistent*
	SM	4.71***	0.85	11.82**	0.25***	0.73***	0.03	0.80	4.89***	0.17	12.03**	0.21***	0.72***	−0.01	0.82	*re is consistent*
	SH	4.08***	0.18	15.26***	−0.06	0.79***	0.04	0.81	4.30***	0.31	14.50***	−0.08	0.79***	0.03	0.82	*re is consistent*
	BL	5.56***	1.01	9.79	0.58***	−0.47**	0.07	0.57	5.63***	0.87	9.75	0.57***	−0.47***	0.06	0.58	*re is consistent*
	BM	5.54***	0.96	15.29**	0.46***	−0.19	0.01	0.68	5.79***	0.46	15.11**	0.41***	−0.20	−0.03	0.69	*re is consistent*
	BH	3.19***	−0.01	11.97**	−0.13	0.02	0.04	0.75	3.36***	−0.22	11.74**	−0.15**	0.02	0.02	0.75	*re is consistent*
	SLo	4.82***	0.31	8.12	0.23**	0.78***	−0.47***	0.84	5.07***	0.47	7.22	0.20**	0.79***	−0.48***	0.84	*re is consistent*
	SNe	5.30***	0.87	17.16**	0.15	0.97***	0.20	0.91	5.32***	0.48	16.69**	0.14	0.97***	0.19	0.92	*re is consistent*
	SWi	4.60***	0.50	10.75**	0.15**	0.83***	0.24***	0.85	4.59***	0.29	11.02**	0.15**	0.82***	0.23***	0.85	*re is consistent*
	BLo	3.81***	−0.47	13.14	−0.01	−0.006	−0.79***	0.69	3.81***	0.27	12.33	0.005	0.007	−0.75***	0.70	*re is consistent*
	BNe	4.99***	0.43	11.08	−0.02	0.27**	0.19	0.84	5.02	−0.29	10.18	−0.06	0.26**	0.17	0.85	*re is consistent*
	BWi	3.67***	−0.34	14.79**	0.12	−0.06	0.55***	0.59	4.10***	0.43	12.71*	0.10	−0.04	0.55***	0.60	*re is consistent*
Developed economies		**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	Hausman's Specification Test
	SL	0.52***	−0.32	−1.38	−0.05	0.30***	−0.23	0.43	0.60***	0.075***	4.15	0.11	0.21***	−0.15	0.92	*re is consistent*
	SM	0.57***	−0.02	−1.36	0.06	0.22***	−0.03	0.93	0.61***	0.03	−1.92	0.11	0.20***	0.01	0.96	*re is consistent*
	SH	0.50***	0.01	5.31	0.07	0.27***	−0.12	0.94	0.47***	0.04**	5.33	0.03	0.31***	−0.07	0.95	*re is consistent*
	BL	0.74***	−0.18	−3.66	0.05	0.01	−0.26	0.23	0.62***	0.09***	5.48	0.24**	−0.09	−0.14	0.90	*re is consistent*
	BM	0.61***	0.26	−0.63	0.12	−0.09	0.21	0.86	0.56	0.03	0.71	0.11	−0.07	0.19	0.91	*re is consistent*
	BH	0.72***	−0.25	−0.64	−0.01	−0.04	0.03	0.15	0.79	0.02	−7.81	0.05	−0.06	0.15	0.89	*re is consistent*
	SLo	−0.08	−0.07	−5.17	−0.12	0.15	0.28	0.07	0.04	0.09***	−4.09	−0.02	0.15	0.33	0.87	–
	SNe	0.05	−0.20	0.56	−0.20	0.25	0.05	0.67	0.22**	0.08***	2.91	−0.01	0.17***	0.20	0.91	*re is consistent*
	SWi	0.14	0.03	−6.28	−0.18	0.21**	0.11	0.84	0.18	0.10***	−4.46	−0.06	0.17**	0.22	0.93	*re is consistent*
	BLo	0.60**	0.31	3.85	−0.32	0.13	−0.25	0.70	0.50	0.12**	7.62	−0.19	0.08	−0.16	0.73	–
	BNe	0.42**	−0.29	−2.97	−0.20	0.05	0.16	0.49	0.56***	0.04	0.92	−0.01	0.01	0.20	0.87	*re is consistent*
	BWi	0.24	−0.26	4.30	−0.15	0.14	0.04	0.58	0.53***	0.03	−5.49	−0.07	0.03	0.40	0.80	*re is consistent*
Aggregate		**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**LBR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	Hausman's Specification Test
	SL	1.14***	−0.24	2.13E-09	0.77***	1.72***	−0.13	0.84	1.14***	−0.25***	2.63E-09	0.78***	1.72***	−0.14	0.84	–
	SM	1.01***	−0.17	−4.61E-11	0.35***	1.29***	0.004	0.90	1.01***	−0.18***	6.26E-10	0.41***	1.27***	0.01	0.90	*re is consistent*
	SH	0.93***	−0.10	3.54e-09**	0.38***	1.46***	−0.05	0.87	0.93***	−0.18***	3.68e-09**	0.33***	1.39	−0.12	0.88	*fe is consistent*
	BL	1.14***	0.31	1.64E-09	0.78	−0.13	−0.03	0.52	1.14***	1.002	4.57E-09	0.90	−0.13	−0.11	0.81	*re is consistent*
	BM	1.03***	0.02	4.67E-10	0.66	−0.08	0.03	0.89	1.04***	−0.08**	9.30E-10	0.69	−0.05	0.003	0.90	*re is consistent*
	BH	0.95***	0.02	−7.93E-10	−0.003	−0.08	−0.01	0.93	0.94***	0.009	−9.66e-10	−0.01	−0.08	0.01	0.93	–
	SLo	1.10***	−0.22	1.92E-09	0.22	1.43***	−0.90***	0.84	1.10***	−0.10	1.91E-09	0.26	1.43***	−0.87***	0.85	*re is consistent*
	SNe	0.96***	−0.17	2.41E-10	0.19	1.11***	0.27	0.84	0.96***	−0.11**	2.21E-09	0.15	1.10***	0.12	0.85	*re is consistent*
	SWi	1.04***	−0.25	1.49E-09	0.39	1.70***	0.60***	0.78	1.04***	−0.29***	1.81E-09	0.39	1.70***	0.60***	0.78	*re is consistent*
	BLo	1.06***	0.16	4.89e-09***	−0.22	0.18	−1.43***	0.86	1.05***	3.97e-09**	−0.272	0.21	−1.33***	0.97	0.73	*fe is consistent*
	BNe	0.94***	0.09	3.22E-10	0.16	−0.11	0.07	0.93	0.95***	−0.03	4.91E-10	0.15	−0.01	0.11	0.94	*fe is consistent*
	BWi	1.04***	−0.19	1.96E-09	0.23	0.08	0.78***	0.88	1.05***	−0.15***	2.48e-09*	0.25	0.15	0.80***	0.89	*re is consistent*

Panel B: Fixed and random effects estimate with WCR

		Fixed effects estimates							Random effects estimates							Hausman's specification test
Emerging economies		**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	
	SL	4.16***	0.21	13.46**	0.75***	0.90***	0.04	0.90	4.29***	−0.07	14.06**	0.73***	0.90***	0.02	0.91	*re is consistent*
	SM	4.62***	0.30	12.82**	0.26***	0.74***	0.03	0.78	4.65***	−0.19	14.20***	0.24***	0.73***	0.01	0.83	*re is consistent*
	SH	4.07***	0.09	15.36***	−0.07	0.79***	0.04	0.81	4.24***	0.03	15.25***	−0.09	0.79***	0.04	0.82	*re is consistent*
	BL	5.46***	0.36	10.97	0.58***	−0.46**	0.07	0.57	5.51***	0.12	11.58	0.57***	−0.46***	0.06	0.57	*re is consistent*
	BM	5.48***	0.48	15.87**	0.46***	−0.19	0.01	0.62	5.57***	−0.09	17.39**	0.44***	−0.19	−0.01	0.69	*re is consistent*
	BH	3.15***	−0.13	12.46**	−0.13	0.02	0.05	0.76	0.254***	−0.16	12.38***	−0.13**	0.03	0.04	0.76	*re is consistent*
	SLo	4.75***	0.00	8.91	0.23***	0.78***	−0.47***	0.84	4.98***	0.05	8.38	0.21**	0.79***	−0.48***	0.84	*re is consistent*
	SNe	5.34***	0.27	16.72**	0.13	0.97***	0.20	0.91	5.34***	0.11	16.56**	0.13	0.97***	0.20	0.92	*re is consistent*
	SWi	4.51***	0.03	11.91***	0.16**	0.83***	0.24***	0.85	4.50***	−0.01	12.03**	0.15**	0.83***	0.24***	0.85	*re is consistent*
	BLo	3.89***	−0.08	12.26	−0.02	−0.01	−0.78***	0.69	3.99***	0.24	11.12	−0.02	0.01	−0.78***	0.71	*re is consistent*
	BNe	5.00***	0.62	11.31	−0.03	0.26**	0.19	−0.02	5.01***	−0.12	10.53	−0.05	0.27**	0.18	0.85	*re is consistent*
	BWi	3.68***	−0.19	14.69**	0.13	−0.07	0.55***	0.58	4.12***	0.13	12.96*	0.09	−0.05	0.54***	0.60	*fe is consistent*
Developed economies		**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	Hausman's Specification Test
	SL	1.15***	−0.56**	3.22E-09	0.16	1.42***	0.01	0.46	1.05***	0.16***	5.06e-09**	0.10	1.15***	−0.15	0.79	*re is consistent*
	SM	1.00***	−0.03	−1.29E-09	0.13	0.98***	0.14	0.83	0.95***	0.05**	−8.77e-10	0.05	0.79***	0.02	0.86	–
	SH	0.94***	0.24	3.05E-09	0.28**	1.14***	−0.08	0.79	0.92***	0.06*	2.40E-09	0.14	0.92***	−0.23	0.82	*re is consistent*
	BL	1.09***	−0.05	1.52E-09	0.12	0.04	−0.08	0.85	1.04***	0.07**	3.99e-09***	0.24**	0.08	−0.05	0.87	–
	BM	0.95***	0.06	1.76e-09**	0.31***	−0.07	0.04	0.94	0.93***	0.01	1.58e-09*	0.28***	−0.11	−0.002	0.94	–
	BH	0.98	−0.13	−1.21E-09	0.11	−0.05	0.02	0.90	0.99***	−0.04**	−1.97e-09**	0.07	−0.10	−0.003	0.92	*fe is consistent*
	SLo	1.21***	−0.13	7.67E-10	0.04	1.15***	−0.77***	0.75	1.19***	0.12***	2.44E-10	0.10	1.13***	−0.69***	0.79	*re is consistent*
	SNe	0.82***	−0.18	3.57E-10	0.12	1.00***	0.24	0.66	0.80***	0.06*	1.75E-09	0.01	0.85***	0.04	0.77	*fe is consistent*
	SWi	1.02***	−0.37	2.17E-10	0.13	1.45***	0.75***	0.48	0.98***	0.19***	9.37E-11	0.01	1.10***	0.56**	0.68	*fe is consistent*
	BLo	1.04***	−0.05	2.91E-09	−0.38***	0.06	−0.91***	0.84	1.06***	−0.03	3.40e-09**	−0.16	0.34	−0.69	0.88	–
	BNe	0.79***	0.08	5.07E-10	0.12	−0.06	0.09	0.91	0.80***	−0.008	5.54E-10	0.07	−0.02	0.08	0.92	*re is consistent*
	BWi	0.94***	−0.18	3.37e-09**	0.14	0.10	0.65***	0.75	0.96***	0.05*	2.99e-09**	0.04	−0.006	0.56***	0.85	*re is consistent*
Aggregate		**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**WCR**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	Hausman's Specification Test
	SL	2.76***	−0.11	−1.55	1.16***	1.180**	0.34	0.41	1.95***	0.71***	0.88	1.03***	0.48	−0.03	0.64	*re is consistent*
	SM	2.28***	−0.03	−1.17	0.66***	1.10***	0.12	0.49	1.95***	0.40***	−1.44	0.35	0.70***	−0.23	0.61	*re is consistent*
	SH	2.05***	−0.01	1.61	0.61	1.37	0.20	0.51	1.70***	0.30***	0.22	0.22	0.94	−0.25	0.58	*re is consistent*
	BL	3.50***	1.80	−0.03	1.29	−0.55	0.16	0.21	2.82***	0.58***	2.96	0.99	−1.04	−0.16	0.28	*re is consistent*
	BM	2.80**	0.10	−0.75	1.01***	−0.48	0.16	0.41	2.58***	0.35**	−1.32	0.81***	−0.71***	−0.07	0.49	*re is consistent*
	BH	2.17***	0.39	−2.41	0.35**	−0.20	0.08	0.51	2.09***	0.26**	−2.48	0.24	−0.27	0.00	0.55	*re is consistent*
	SLo	2.12***	0.22	−0.76	0.49	1.21***	−0.48	0.46	1.99	0.32***	−1.28	1.11	0.86***	−0.87***	0.53	–
	SNe	1.21***	0.05	−1.21	0.30	0.92***	0.53	0.45	1.19***	0.31***	0.36	0.07	0.70**	0.22	0.54	–
	SWi	2.160**	−0.51	2.26	0.42	1.57	0.80	0.35	1.71***	0.44***	0.93	0.08	0.96***	0.29	0.55	*re is consistent*
	BLo	2.244**	0.92**	−1.08	0.12	−0.05	−0.92	0.19	2.41***	0.14**	−0.47	−0.18	−0.09	−1.15***	0.46	*re is consistent*
	BNe	1.70***	0.16	−0.43	0.36	−0.08	0.30	0.48	1.71***	0.23***	−0.23	0.12	−0.27	−0.03	0.58	–
	BWi	2.79***	−0.13	0.55	0.43	−0.07	0.75**	0.40	2.45***	0.31***	0.18	0.07	−0.46	0.28	0.54	*re is consistent*

(*continued on next page*)

Table 4 (*continued*)

Panel C: Fixed and random effects estimate with HI

		Fixed effects estimates							Random effects estimates							Hausman's Specification Test
Emerging economies		**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**Overall R^2**	
	SL	0.95***	−0.06	−2.63	0.47***	0.98***	0.00	0.98	0.95***	−0.04	−2.70	0.47***	0.98***	0.001	0.98	*re is consistent*
	SM	0.74***	−0.16*	1.59	−0.04	0.90***	−0.07*	0.96	0.73***	−0.15**	1.49	−0.05	0.90***	−0.08**	0.96	*re is consistent*
	SH	0.54***	−0.02	12.53***	−0.32***	1.08***	−0.03	0.93	0.58***	0.04	12.11***	−0.33***	1.07***	−0.04	0.93	*re is consistent*
	BL	0.56***	−0.19	14.06**	0.41***	−0.17	0.11	0.77	0.64***	−0.007	12.785*	0.34***	−0.20*	0.07	0.78	*re is consistent*
	BM	0.69	−0.09	0.63	−0.01	0.01	−0.10	0.91	0.68***	−0.07	0.568	−0.02	0.005	−0.10**	0.91	*re is consistent*
	BH	0.99***	−0.03	−3.47	−0.32***	0.10***	0.04	0.96	0.96***	−0.09	−3.027	−0.30***	0.11***	0.05	0.96	*fe is consistent*
	SLo	1.30***	0.06	−13.63**	0.06	0.80***	−0.32***	0.97	1.23***	−0.02	−12.7**	0.09	0.82***	−0.29***	0.97	*re is consistent*
	SNe	0.89***	−0.06	−8.68***	0.00	1.11***	−0.03	1.00	0.90***	−0.03	−8.41***	0.01	1.11***	−0.03	1.00	*re is consistent*
	SWi	1.15***	0.06	−9.99**	0.00	0.93***	0.23***	0.96	0.99***	−0.17	−9.57*	0.03	0.97***	0.28***	0.97	*re is consistent*
	BLo	1.13***	0.21	−14.03**	−0.32***	0.05	−0.95***	0.84	0.84***	−0.28	−16.13*	−0.30**	0.07	−0.88***	0.89	*re is consistent*
	BNe	0.98***	0.03	−7.73*	−0.09	0.08	0.11	0.98	0.98***	0.03	−7.69**	−0.09	0.07	0.11	0.98	*re is consistent*
	BWi	1.27***	0.20	−17.46***	−0.25***	−0.07	0.48***	0.88	1.07***	−0.13	−19.16***	−0.24**	−0.05	0.53***	0.91	–
Developed economies		**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**R^2**	**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**R^2**	Hausman's Specification Test
	SL	1.12	−0.003	7.88	−0.10	1.13***	0.32	0.74	1.136***	−0.19***	6.98	0.02	0.87***	−0.14	0.80	–
	SM	0.99***	0.06	3.67	0.23	0.89***	0.44	0.77	0.99	−0.01	3.48	0.19	0.64***	−0.07	0.84	–
	SH	1.01***	0.06	4.81	0.63***	1.09***	0.30	0.65	0.97***	0.003	2.39	0.32	0.81***	−0.35	0.77	*re is consistent*
	BL	1.02***	−0.02	4.44	−0.10	0.21	−0.20	0.85	1.08***	−0.18***	6.91**	0.14	0.21	−0.26	0.88	–
	BM	0.97***	−0.03	2.97	0.34***	−0.13	0.11	0.93	0.96***	0.05*	3.44*	0.33***	−0.23**	0.04	0.94	*fe is consistent*
	BH	0.96***	0.02	0.48	0.28**	−0.12	0.23	0.89	0.94***	0.05	−3.43	0.14	−0.06	0.06	0.91	*re is consistent*
	SLo	1.13	0.10	5.17	0.05	0.74***	−0.58	0.76	1.20	0.05	4.59	0.20	0.90	−0.67	0.77	*fe is consistent*
	SNe	0.90***	0.05	3.79	−0.06	0.77***	0.33	0.71	0.90***	−0.01	3.88	−0.03	0.69***	0.03	0.73	*re is consistent*
	SWi	1.14***	0.20	8.15	0.23	1.16***	0.71	0.61	1.20***	−0.01	10.35	0.33	0.85**	0.12	0.65	*fe is consistent*
	BLo	1.06***	0.14	6.92*	−0.16	−0.09	−0.93***	0.79	1.08***	0.11**	6.57*	−0.01	0.16	−0.50**	0.87	*re is consistent*
	BNe	0.92***	−0.07	−1.87	0.05	−0.20	−0.09	0.88	0.95***	0.09**	−0.66	0.13	−0.16	0.04	0.92	*fe is consistent*
	BWi	0.92***	0.00	−1.44	−0.21	0.06	0.97***	0.84	0.94***	0.11**	0.64	−0.27	−0.07	0.76**	0.88	*re is consistent*
Aggregate		**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**R^2**	**R_m-R_f**	**HI**	**ΔSAV**	**HML**	**SMB**	**WML**	**R^2**	Hausman's Specification Test
	SL	1.95***	−0.32	−4.56	0.07	1.64	1.13	0.46	0.79	−0.6***	5.13	0.03	1.28**	−0.11	0.58	*re is consistent*
	SM	1.88***	−0.07	−1.81	−0.03	1.08***	0.56	0.58	1.07**	−0.33***	1.11	−0.11	0.97***	−0.22	0.68	*re is consistent*
	SH	1.72***	−0.10	−0.72	0.25	1.54***	0.75	0.53	0.89	−0.24**	−2.68	−0.17	1.28***	−0.42	0.62	*fe is consistent*
	BL	1.92***	−0.30	−5.72	0.09	0.02	−0.11	0.45	1.57***	−0.44***	1.61	−0.01	0.02	−0.36	0.54	*fe is consistent*
	BM	1.81***	−0.13	−0.27	0.18	−0.12	0.08	0.60	1.51***	−0.13**	2.31	−0.01	−0.26	−0.18	0.66	*re is consistent*
	BH	2.06***	−0.09	−1.28	0.24	−0.39**	−0.01	0.66	1.88***	−0.08	−2.43	−0.06	−0.46***	−0.28	0.74	*re is consistent*
	SLo	0.72	−0.01	4.99	−0.04	1.09**	0.36	0.43	1.05	−0.14	1.63	−0.02	0.93	−0.51	0.46	–
	SNe	0.78	0.02	−5.08	−0.36	0.92**	0.38	0.47	0.92*	−0.22*	1.77	−0.36	0.77**	0.08	0.52	–
	SWi	1.62	−0.12	−2.63	0.01	1.47**	0.31	0.47	1.47*	−0.37*	5.06	0.04	1.05	−0.22	0.50	–
	BLo	1.28***	−0.03	1.78	−0.34	0.12	−0.49	0.43	1.36***	−0.09	2.91	−0.40**	0.03	−0.38	0.45	*re is consistent*
	BNe	1.09***	−0.08	−2.63	0.13	−0.10	0.35	0.54	1.38***	−0.10*	1.89	0.03	−0.21	−0.25	0.62	–
	BWi	1.41***	−0.02	−0.91	−0.28	0.30	0.72	0.58	1.05***	−0.02	1.03	−0.44	0.22	0.37	0.60	*re is consistent*

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level respectively. [2] fe denoted fixed effect and *re* denotes random effect. [3] DIV, TRM, and RTB estimates results are not reported since the detailed results are shown in Tables A4.1−A4.3.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

correlated whereas HI is negatively correlated with value strategy as reported in panel A, B, C, and D of Table A2. The size strategy is negatively correlated with HI, LBR, and WCR in emerging economies whereas positively correlated in developed economies, the Aggregate, and global economies as evident in panel A, B, C, and D of Table A2. Further, the momentum strategy is positively correlated with human capital proxies for all classifications as reported in panel A, B, C, and D of Table A2.

5. Result

5.1. Dynamics of the factors

Panel A, B, and C of Table 4 summarizes the dynamic behavior of the priced factors. Table 4 reports the coefficients of the panel regression with fixed and random effects estimated monthly. The coefficients are estimated following Equation (3). We report and discuss the results obtained from panel regression with random effect since the Hausman's specification test confirms estimates with random effects generates robust results than the result obtained from fixed effects estimates. Panel A of Table 4 reports the coefficient estimates of the priced factors on FF portfolios sorted on size-BE/ME and size-momentum return with the human capital proxy LBR in the ICAPM framework for emerging and developed economies, and the Aggregate. The R_m-R_f (aggregate market), SAV (saving), and SMB (size) significantly priced the small stocks (SL, SM, SH, SLo, SNe, SWi) in emerging economies with the sizeable average R^2 (coefficient of variation) of 86%. Conversely, the R_m-R_f, SAV, and HML significantly priced the growth stocks (BL, BM, BH, BLo, BNe, BHi) with the average R^2 of 70%. Moreover, the magnitude of the coefficient estimate on SAV for FF portfolios is comparatively higher (twice) than the coefficient estimate on R_m-R_f. Further, the second section in Panel A indicates the R_m-R_f, LBR (labor income), and SMB significantly priced the small stocks with the average R^2 of 92% in developed economies. The third section of Panel A reports R_m-R_f and LBR significantly price the utmost of the FF portfolios with the average R^2 of 86% in the Aggregate. The results intuitively indicates that the representative agents in emerging economies comparatively tend to save more today by cutting their current consumption, to smoothen the future consumption, than the representative agents do in developed economies.

Panel B of Table 4 reports the coefficient estimates of panel regression with random effects of FF portfolios with WCR proxy human capital in consumption-based CAPM framework. Panel B shows R_m-R_f, SAV, and SMB significantly priced the small stocks with an average R^2 of 86% in emerging economies whereas R_m-R_f and WCR (wealth-to-consumption ratio) significantly priced the utmost FF portfolios with an average R^2 of 84% in developed economies. Further, R_m-R_f and WCR significantly priced FF portfolios with an average R^2 of 53% in the Aggregate. Panel C reports the result of panel regression estimates with random effects of FF portfolios with HI as an aggregate level proxy of the human capital component. The R_m-R_f, SAV, and SMB significantly priced the excess return on small stocks with the average R^2 of 97% in emerging economies whereas R_m-R_f and HI significantly priced the big stocks with an average R^2 of 90% in developed economies. Moreover, R_m-R_f and HI significantly priced the FF portfolios with an average R^2 of 63% in the Aggregate. Tables A4.1−A4.3 in Appendices reports the detailed results of panel regression with fixed and random effects.

The results obtained from the panel regression with random effects for emerging, and developed economies, and the Aggregate, reflects similar pattern as in the pooled OLS estimates. Further, it quantify the presumption that aggregate market and the human capital component are the strong predictors of FF portfolios. Tables A3.1−A3.3 in appendices report the detailed results of panel regression estimates of FF portfolios in an intertemporal and consumption-based CAPM for all classifications. The priced factors considered are the aggregate market, FF factors, momentum, dividend yield, term spread, and relative Treasury bill, and human capital component. Table A3.1 show the comprehensive results of ICAPM framework, where the aggregate market along with saving in emerging economies, and aggregate market and labor income growth in developed economies predominantly price the risk of the FF portfolios. In line with the findings observed in an intertemporal framework, Table A3.2 represents the identical results in emerging and developed economies in the CCAPM framework, where the WCR proxy human capital component. Though the CCAPM results occasionally suffered from the power loss function, hence the ICAPM results comparatively show more persistence in FF portfolio return predictability. Table A3.3 reports the result of the extended version of the CAPM with Hansson Index that proxy the human capital component.

5.2. Expected future labor income and human capital

Owing to the result from the previous section, savings represent the state variable for the expected future labor income along with an aggregate market, predominantly price the risk of the FF portfolios in emerging economies. Although aggregate market and human capital component mostly price the risk of FF portfolios in developed economies. We further test the orthogonality of predominant variable, aggregate market, saving, and human capital component employing IV-GMM. The anomaly literature, evidence that the FF factors, momentum, dividend yield, term spread, and the relative Treasury bill may be instrumental in enhancing the FF portfolios return predictability. Thus, we used these factors as instrumental variables in panel IV-GMM estimates where the country-specific component is time varying. We implement this framework using the panel data sets of emerging and developed economies, and the Aggregate following Equations (7)−(14). Panel A of Table 5 shows the result of IV-GMM

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 5
IV-GMM estimates with random effect.

Panel A: IV-GMM estimates with LBR

FF Portfolios	Emerging economies					Developed economies					Aggregate					Global				
	R_m-R_f	SAV	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics	R_m-R_f	LBR	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics	R_m-R_f	LBR	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics	R_m-R_f	LBR	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics
SL	1.157***	91.167***	0.000	1.000	60.348***	0.866***	1.242***	0.008	0.991	253.096***	2.010***	4.367***	0.006	0.993	44.208***	1.898***	3.524***	0.002	0.997	53.844***
	(11.452)	(2.722)				(8.097)	(3.047)				(17.094)	(10.062)				(16.894)	(9.972)			
SM	1.050***	71.952***	0.000	1.000	46.714***	0.846***	1.321***	0.002	0.997	130.920***	1.890***	2.198***	0.0002	0.997	73.395***	1.788***	1.607***	0.000	1.000	104.071***
	(13.446)	(2.778)				(11.262)	(6.476)				(17.723)	(7.149)				(17.575)	(6.522)			
SH	1.000***	65.751***	0.000	1.000	46.476***	0.938***	1.805***	0.004	0.996	93.098***	1.783***	1.585***	0.001	0.998	117.331***	1.694***	1.310***	0.000	1.000	142.792***
	(15.268)	(3.027)				(11.386)	(7.330)				(16.208)	(5.604)				(16.268)	(5.193)			
BL	1.094***	−29.988	0.000	1.000	36.297***	1.188***	0.719***	0.004	0.9995	15.875***	1.978***	1.659***	0.000	1.000	22.814***	1.863***	1.859***	0.000	1.000	18.652***
	(15.469)	(-1.278)				(24.074)	(4.690)				(15.351)	(5.942)				(15.406)	(6.345)			
BM	1.070***	18.886	0.000	1.000	37.009***	0.956***	0.627***	0.000	1.000	28.750***	1.484***	1.408***	0.017	0.982	27.979***	1.428***	1.282***	0.010	0.989	24.723***
	(25.897)	(1.379)				(23.887)	(7.214)				(22.473)	(3.686)				(21.405)	(3.608)			
BH	0.963***	−22.926***	0.000	1.000	31.744***	1.127***	0.828***	0.002	0.998	30.152***	1.072***	0.367*	0.013	0.986	45.979***	1.039***	0.155	0.001	0.998	39.401***
	(37.074)	(8.612)				(21.014)	(5.968)				(26.549)	(1.779)				(21.971)	(1.157)			
SLo	1.075***	134.920***	0.000	1.000	18.867***	2.095***	0.240	0.000	1.000	300.216***	3.413***	0.859	0.000	1.000	65.363***	3.279***	0.747	0.000	1.000	70.120***
	(9.396)	(37.933)				(13.231)	(0.700)				(12.568)	(1.459)				(13.208)	(1.245)			
SNe	–	–	–	–	–	0.890***	1.519***	0.003	0.997	86.772***	1.153***	3.093***	0.005	0.994	33.382***	1.124***	1.966***	0.008	0.999	60.456***
						(11.074)	(6.768)				(14.644)	(10.432)				(14.114)	(9.475)			
SWi	1.076***	48.157**	0.000	1.000	70.169***	−0.016	1.512***	0.000	1.000	71.925***	0.678***	1.889***	0.000	1.000	124.765***	0.665***	2.378***	0.000	1.000	80.912***
	(15.444)	(2.084)				(-0.114)	(4.930)				(6.179)	(7.936)				(6.459)	(9.546)			
BLo	1.029***	64.970***	0.000	1.000	36.293***	2.815***	−0.275	0.000	1.000	30.489***	3.614***	−0.023	0.000	1.000	14.618***	3.413***	−0.618	0.000	1.000	14.586***
	(13.092)	(2.493)				(15.379)	(-0.692)				(11.926)	(-0.035)				(12.603)	(-0.945)			
BNe	–	–	–	–	–	1.093***	0.243***	0.000	1.000	66.863***	1.156***	0.312***	0.000	1.000	38.446***	1.131***	0.235*	0.000	1.000	28.206***
						(24.957)	(2.561)				(25.370)	(2.772)				(21.127)	(1833)			
BWi	0.916***	−77.297***	0.000	1.000	17.256***	−0.272	0.721**	0.000	1.000	8.148	−0.514***	0.395	0.000	1.000	15.959***	−0.449***	0.766**	0.000	1.000	12.359**
	(13.906)	(-3.540)				(-1.898)	(2.313)				(-2.779)	(0.985)				(-2.706)	(1.909)			

Panel B: IV-GMM estimates with WCR

FF Portfolios	Emerging economies					Developed economies					Aggregate				
	R_m-R_f	SAV	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics	R_m-R_f	WCR	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics	R_m-R_f	WCR	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	J-statistics
SL	1.149***	100.036***	0.036	0.963	53.661***	0.777	−0.959**	0.004	0.995	495.536***	1.704***	1.613***	0.000	1.000	232.771***
	(11.080)	(2.783)				(6.185)	(0.273)				(10.315)	(3.559)			
SM	1.050***	83.079***	0.036	0.963	38.376***	0.716***	−0.448***	0.000	1.000	655.2621***	1.705***	1.143***	0.000	1.000	218.574***
	(13.147)	(3.000)				(9.048)	(-3.180)				(12.711)	(3.070)			
SH	0.997***	72.830***	0.036	0.963	40.398***	0.787***	−0.457***	0.000	1.000	659.811***	1.643***	0.690	0.000	1.000	352.876***
	(14.703)	(3.099)				(9.649)	(-3.155)				(9.874)	(1.511)			
BL	1.100***	−29.965	0.036	0.963	36.802***	1.138***	−0.038	0.005	0.994	86.609***	1.904***	2.145***	0.000	1.000	19.526***
	(15.443)	(24.678)				(24.067)	(-0.217)				(12.295)	(5.047)			
BM	1.067***	18.905	0.036	0.963	36.027***	0.902***	0.046	0.000	1.000	303.958***	1.463***	1.120***	0.000	1.000	19.997***
	(25.963)	(1.327)				(20.326)	(0.585)				(14.622)	(4.019)			
BH	0.964***	−22.357***	0.036	0.963	32.839***	1.078***	0.262***	0.000	1.000	178.917***	1.026***	1.070***	0.005	0.994	10.587*
	(36.457)	(-2.440)				(17.192)	(2.352)				(22.867)	(2.838)			
SLo	1.073***	146.167***	0.036	0.963	15.852***	2.081***	−0.115	0.000	1.000	346.496***	0.840***	2.600***	0.000	1.000	40.764***
	(9.018)	(3.544)				(12.471)	(-0.388)				(10.057)	(0.505)			
SNe	–	–	–	–	–	0.768***	−0.916***	0.006	0.993	379.688***	1.100***	−1.107	0.000	1.000	109.571***
						(9.970)	(-0.133)				(6.478)	(-1.036)			
SWi	1.067***	57.606**	0.036	0.963	60.696***	−0.229	−1.121***	0.000	1.000	129.556***	1.237***	−1.620*	0.013	0.986	145.891***
	(15.246)	(57.606)				(-1.695)	(-4.641)				(15.364)	(-1.850)			
BLo	1.012***	78.627***	0.036	0.963	30.637***	2.909***	0.864***	0.000	1.000	19.036***	0.689***	3.226***	0.000	1.000	8.391
	(12.268)	(2.750)				(17.265)	(2.876)				(6.313)	(4.884)			

BNe	–	–	–	–	–	1.088***	0.237**	0.000	1.000	81.497***	0.956***	0.460***	0.000	1.000	13.519**
						(19.463)	(2.383)				(34.838)	(2.665)			
BWi	0.916***	−77.536***	0.036	0.963	16.684***	−0.390***	−0.700***	0.000	1.000	7.035	1.200***	−1.884***	0.000	1.000	22.688***
	(0.036)	(0.963)				(-2.969)	(-2.986)				(19.098)	(-4.957)			

Panel C: IV-GMM estimates with HI

FF Portfolios	Emerging economies					Developed economies					Aggregate					Global economies				
	R_m-R_f	*SAV*	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	*J-statistics*	R_m-R_f	*HI*	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	*J-statistics*	R_m-R_f	*HI*	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	*J-statistics*	R_m-R_f	*HI*	ρ^{C-S}_{random}	$\rho^{Idiosyncratic}_{random}$	*J-statistics*
SL	1.328***	102.247**	0.0007	0.999	26.969***	1.246***	1.526***	0.000	1.000	76.212***	2.824***	−1.251	0.223	0.776	243.198***	0.544	1.095	0.000	1.000	273.087***
	(5.531)	(2.505)				(6.992)	(3.774)				(4.281)	(-1.544)				(1.234)	(0.952)			
SM	1.235***	5.121***	0.0007	0.999	15.004***	1.083***	2.019***	0.000	1.000	34.936***	3.850***	−0.336	0.160	0.839	224.941***	0.859**	0.386	0.000	1.000	465.193***
	(5.121)	(2.826)				(4.625)	(0.531)				(6.229)	(-0.600)				(2.250)	(0.388)			
SH	1.076***	154.119***	0.007	0.999	12.766**	0.893***	2.715***	0.000	1.000	16.921***	4.042***	0.126	0.120	0.879	197.211***	0.967**	0.422	0.000	1.000	414.410***
	(3.693)	(3.112)				(2.933)	(3.929)				(6.856)	(0.302)				(2.393)	(0.420)			
BL	0.914***	−19.585	0.0007	0.999	12.762**	1.045***	−0.084	0.025	0.974	6.065	3.474***	−0.606***	0.003	0.996	13.489**	1.094***	−0.849***	0.000	1.000	10.044*
	(5.386)	(-0.679)				(17.579)	(-0.417)				(5.025)	(-3.684)				(10.490)	(-3.124)			
BM	1.143***	15.481	0.0007	0.999	7.021	0.955***	0.117	0.000	1.000	99.386***	2.937***	−0.502***	0.000	1.000	21.818***	1.224***	−0.939***	0.001	0.998	12.356**
	(11.458)	(0.913)				(7.573)	(0.409)				(5.556)	(-4.028)				(15.341)	(-3.832)			
BH	0.963***	10.992	0.0007	0.999	34.817***	0.815***	0.338	0.000	1.000	65.312***	3.751***	−0.450***	0.015	0.984	14.727**	1.253***	−0.597**	0.000	1.000	15.323***
	(14.370)	(0.619)				(4.775)	(0.872)				(6.315)	(0.450)				(13.707)	(-2.507)			
SLo	1.418***	185.806***	0.0007	0.999	8.604	1.244***	3.408***	0.000	1.000	10.572*	6.855***	−0.514**	0.008	0.991	73.197***	2.515***	1.098	0.000	1.000	107.126***
	(3.678)	(2.836)				(4.084)	(4.761)				(7.691)	(-2.292)				(5.838)	(0.928)			
SNe	–	–	–	–	–	1.120***	2.234***	0.000	1.000	20.594***	3.818***	−0.180	0.057	0.943	141.970***	0.905***	3.130***	0.000	1.000	39.887***
						(3.559)	(3.020)				(4.787)	(-0.553)				(3.107)	(3.601)			
SWi	0.929***	69.545**	0.0007	0.999	40.060***	1.208***	1.498***	0.000	1.000	66.064***	−0.141	−0.163	0.081	0.918	202.273***	−0.372	2.359**	0.000	1.000	64.483***
	(5.110)	(2.250)				(3.674)	(1.939)				(-0.201)	(-0.476)				(-0.874)	(2.015)			
BLo	1.399***	156.604***	0.007	0.999	11.037**	1.071***	2.098***	0.000	1.000	4.257	6.593***	−0.848***	0.000	1.000	46.768***	3.599***	−0.307	0.000	1.000	4.149
	(4.017)	(2.645)				(6.383)	(5.318)				(5.063)	(-2.653)				(10.122)	(-0.314)			
BNe	–	–	–	–	–	1.060***	0.305	0.000	1.000	19.252***	4.159***	−0.577***	0.038	0.961	11.949	1.204***	−0.049	0.000	1.000	17.559***
						(9.318)	(1.140)				(7.334)	(-2.967)				(15.134)	(-0.901)			
BWi	0.629***	−36.362	0.0007	0.9993	16.224***	1.164***	−0.983***	0.000	1.000	13.829**	−1.055	0.036	0.026	0.973	30.910***	−0.280	0.862***	0.000	1.000	13.524**
	(3.794)	(-1.289)				(9.828)	(-3.533)				(-1.825)	(0.209)				(-1.592)	(3.141)			

The IV-GMM specifications are tested on the Aggregate market along with Human capital proxies in explaining the variations in returns on FF portfolios. The IV-GMM specifications consist the Random effect dynamics and instrumental variables, namely, SAV, HML, SMB, WML, DIV, TRM, and RTB to estimate the parameters of the vectors in setting the relationship with FF portfolios for Emerging, developed, aggregate, and global economies, respectively. The SNe and BNe portfolios dataset are not available for Emerging economies. The estimates for Global economies are missing due to unavailability of WCR data. *, **, and *** denotes significance at 10, 5 and 1% level, respectively. Standard errors are in parenthesis ().

estimates with LBR. The R_m-R_f and SAV significantly price all the FF portfolio with the exception of BL and BM portfolios, in emerging economies. The R_m-R_f and LBR statistically and significantly capture the variations in all FF portfolios return, except SLo and BLo portfolios, in developed economies. The R_m-R_f and LBR significantly price the risk of all the FF portfolios except SLo, BLo, and BWi portfolios, for the Aggregate.

Panel B of Table 5 reports the results of IV-GMM estimates with WCR. R_m-R_f and SAV significantly capturing the variations in all FF portfolios return in emerging economies with an exception of BL and BM portfolios. R_m-R_f and WCR significantly price all the FF portfolios except BL, BM, and SLo portfolios in the developed economies. Similarly, R_m-R_f and WCR captures the variations in the FF portfolios return except SH and SNe portfolios.

Panel B of Table 5 reports the results of IV-GMM estimates with HI. The R_m-R_f and SAV price the risk of FF portfolios in emerging economies with the exception of BL, BM, BH, and BWi portfolios. Moreover, The R_m-R_f and HI estimates the variations in the FF portfolios return in developed economies, excluding BL, BM, BH, and BNe portfolios. Similarly, R_m-R_f and HI price the risk of all FF portfolios for the Aggregate, leaving small portfolios.

The result of an IV-GMM estimate satisfies our presumption developed in the study that the asset pricing factors governing the asset return predictability depend on the country-specific risk factor. Our claim been evidenced in the panel datasets of emerging and developed economies, and the Aggregate, that the aggregate market is the primary factor along with saving determining the risk of FF portfolios in emerging economies. Conversely, the aggregate market and human capital are the major factors determining the risk of FF portfolios in developed economies. Moreover, the FF factors, momentum, dividend yield and the bond market factors are instrumental in enhancing the portfolio return predictability.

5.3. Alternative specifications

The principal component analysis (PCA) is used to reduce the probability of multicollinearity among the priced factors, including aggregate market, human capital components (LBR, WCR, HI), FF factors, saving, momentum, dividend yield, term spread, and relative Treasury bill. PCA centered on a linear transformation of the factors ensures that they are orthogonal to each other. PCA is appropriate because it maximizes the variance instead of minimizing the least square distance. PCA declassify the components in the system that maximizes component score variance for the cases. Panel A of Table 6 reports the PCA result for emerging economies, where LBR and SAV capture the maximum variation in Component 1 with an eigenvalue of 20.8. Panel B reports LBR captures the maximum variation in Component 1 with an eigenvalue of 1.94 for developed economies. Panel C reports LBR captures the maximum variation in Component 1 with an eigenvalue of 1.91 for the Aggregate and similarly panel D of Table 6 reports, WCR captures the maximum variation in Component 1 with the eigenvalue of 2.65 for Global.

The PCA results further strengthen our claim that saving and human capital component share the maximum variation among the rest of the components in the system.

6. Summary and discussion

The theoretical assumption that the risk of an asset is measured by the covariance of an asset's return with the return on the aggregate market and the human capital component is being examined in emerging and developed economies, and the Aggregate. The study constructs two aggregate and one firm-level measurement of the human capital component. The aggregate labor income growth rate and wealth-to-consumption ratio proxies aggregate measure, whereas Hansson Index proxy firm-level measure of the human capital component. We introduce saving, an innovation in human capital component that proxies expected future labor income. We develop an intertemporal and consumption-based CAPM framework to examine the presumptions across the economies. Alternatively, an extended version of the CAPM is built to widen the scope and for better understanding. We introduce the size and value strategies along with the momentum strategy in an ICAPM and CCAPM framework controlling for the effects of dividend yield, term spread, and the relative Treasury bill. FF portfolios formed at the intersection of size-BE/ME and size-momentum return, are used to the test the proposition developed in the study. Moreover, testing the crafted presumptions of the study in the ICAPM and CCAPM framework on country-specific data sets requires the country-specific component to be time variant. Hence, we rely on the panel data regression methodology with random effects. Further IV-GMM and PCA are used to control the endogeneity, orthogonality, and multicollinearity issues.

Hausman's specification test identifies that the panel regression with random effect yield better estimates of the parameters of interests and the results show that ICAPM fits the data better than the CCAPM and extended version of the CAPM. The results are persistent in utmost FF portfolios across emerging and developed economies, and the Aggregate. The results show that both the aggregate market and human capital component are strong predictors of return on FF portfolios in developed economies. Interestingly, on the contrary, aggregate market along with saving appears strong predictor of return on FF portfolios in emerging economies. The results are more persistent in small stocks and the magnitude of coefficient estimates on saving is higher than the coefficient estimates of the aggregate market. Moreover, the pricing factors, value, momentum, dividend yield, term spread, and relative Treasury bill, in the system becomes trivial with the exception of size effect that shows some resistance in FF portfolios return predictability. However, the IV-GMM result

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 6
Principal component analysis.

Panel A: Emerging economies

Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 11
R_m-R_f	−0.122	0.137	0.483	−0.071	−0.279	−0.062	0.757	0.269	−0.002	0.005	0.022
LBR	0.453	−0.188	0.155	0.129	−0.429	0.251	−0.210	0.253	−0.242	0.552	−0.029
WCR	0.357	0.597	0.009	0.074	0.093	−0.025	0.016	−0.034	−0.020	−0.049	−0.705
HI	−0.031	−0.003	−0.207	0.691	−0.376	0.312	0.098	−0.044	0.383	−0.287	0.004
SAV	0.359	0.597	−0.001	0.080	0.070	−0.033	−0.027	−0.035	−0.027	−0.008	0.707
HML	−0.028	−0.052	0.591	0.166	0.131	0.201	−0.031	−0.736	0.008	0.139	0.001
SMB	−0.148	0.011	0.392	0.297	0.519	0.305	−0.224	0.543	−0.070	−0.153	0.009
WML	0.155	−0.059	−0.325	−0.269	0.294	0.725	0.411	−0.074	−0.031	0.084	0.018
DIV	−0.377	0.141	−0.301	0.464	0.210	−0.166	0.228	−0.055	−0.361	0.524	−0.011
TRM	−0.418	0.355	0.029	−0.248	−0.114	0.200	−0.234	0.094	0.564	0.449	−0.016
RTB	0.399	−0.285	0.009	0.153	0.391	−0.327	0.213	0.078	0.583	0.290	0.004
Eigen value	2.089	1.913	1.479	1.253	1.024	0.894	0.780	0.705	0.481	0.314	0.070
Variance proportion	0.190	0.174	0.135	0.114	0.093	0.081	0.071	0.064	0.044	0.029	0.006
Cumulative proportion	0.190	0.364	0.498	0.612	0.705	0.786	0.857	0.921	0.965	0.994	1.000

Panel B: Developed economies

Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 11
R_m-R_f	0.028	0.326	−0.253	0.655	−0.030	−0.074	−0.184	−0.261	0.363	0.400	0.002
LBR	0.685	0.098	0.088	−0.048	−0.082	0.022	−0.092	−0.035	−0.049	−0.021	0.701
WCR	−0.689	−0.095	−0.097	0.028	−0.041	0.013	0.029	0.040	0.055	0.004	0.706
HI	0.021	−0.061	−0.103	0.031	0.343	0.917	−0.128	0.034	0.007	0.085	0.002
SAV	0.051	−0.047	0.043	0.235	−0.628	0.320	0.663	−0.005	−0.012	0.004	−0.029
HML	0.050	0.310	−0.413	−0.484	−0.106	−0.008	0.126	0.491	0.302	0.371	−0.012
SMB	−0.018	−0.090	0.528	0.333	−0.083	−0.002	−0.231	0.712	0.035	0.183	−0.010
WML	0.050	−0.524	0.326	−0.267	−0.019	−0.007	0.024	−0.298	0.565	0.368	0.002
DIV	0.059	0.114	0.168	0.151	0.673	−0.152	0.655	0.086	0.050	0.096	0.095
TRM	−0.111	0.533	0.376	−0.121	−0.041	0.141	−0.032	−0.070	0.520	−0.499	−0.017
RTB	0.175	−0.439	−0.426	0.241	0.077	−0.081	0.023	0.280	0.422	−0.518	0.003
Eigen value	1.945	1.462	1.358	1.127	1.028	0.994	0.953	0.803	0.692	0.554	0.086
Variance proportion	0.177	0.133	0.124	0.102	0.093	0.090	0.087	0.073	0.063	0.050	0.008
Cumulative proportion	0.177	0.310	0.433	0.536	0.629	0.719	0.806	0.879	0.942	0.992	1.000

Panel C: Aggregate

Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 11
R_m-R_f	0.014	0.363	0.422	0.076	0.193	0.172	−0.013	−0.567	0.537	−0.081	0.002
LBR	0.692	0.100	−0.049	0.047	−0.042	−0.093	−0.013	−0.034	−0.047	0.007	0.702
WCR	−0.689	−0.124	0.091	0.075	0.022	−0.005	0.014	0.017	0.029	0.009	0.703
HI	0.014	−0.057	0.069	−0.406	0.561	−0.524	0.481	0.033	0.046	−0.048	0.005
SAV	0.047	−0.017	−0.026	0.501	0.703	0.013	−0.405	0.294	0.001	−0.015	−0.027
HML	0.043	0.223	0.481	0.059	−0.255	−0.089	0.118	0.716	0.328	−0.080	−0.012
SMB	0.006	0.132	−0.183	0.469	0.072	0.367	0.752	0.033	−0.117	−0.097	−0.007
WML	0.053	−0.414	−0.484	0.111	−0.100	−0.093	0.048	0.040	0.745	−0.051	0.000
DIV	0.019	0.111	−0.197	−0.579	0.252	0.663	−0.060	0.262	0.117	−0.104	0.114
TRM	−0.126	0.567	−0.350	−0.010	0.005	−0.146	0.001	0.072	0.125	0.705	0.005
RTB	0.149	−0.517	0.381	−0.006	0.085	0.273	0.138	−0.002	0.034	0.681	−0.008
Eigen value	1.912	1.501	1.233	1.042	1.003	0.993	0.969	0.902	0.744	0.599	0.103
Variance proportion	0.174	0.137	0.112	0.095	0.091	0.090	0.088	0.082	0.068	0.054	0.009
Cumulative proportion	0.174	0.310	0.422	0.517	0.608	0.699	0.787	0.869	0.936	0.991	1.000

Panel D: Global economies

Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 11
R_m-R_f	0.005	0.252	−0.113	0.702	−0.051	−0.097	−0.313	0.314	0.468	0.058	0.016
LBR	0.571	0.091	0.109	−0.036	0.026	−0.027	0.039	0.159	−0.109	0.562	−0.545
WCR	0.605	0.026	0.053	−0.041	−0.006	−0.036	−0.025	0.033	−0.033	0.111	0.783
HI	0.026	−0.131	−0.040	0.015	0.961	−0.168	−0.027	−0.085	0.147	0.002	−0.004
SAV	0.028	0.230	0.127	0.019	0.188	0.942	−0.026	0.002	0.077	−0.023	0.014
HML	−0.001	−0.455	0.504	0.029	−0.127	0.031	0.360	−0.096	0.607	0.115	0.009
SMB	0.040	0.552	−0.300	0.018	−0.023	−0.094	0.524	−0.498	0.255	0.084	0.004
WML	−0.035	0.029	−0.413	−0.624	−0.032	0.028	−0.053	0.450	0.478	0.057	0.014
DIV	−0.545	0.117	0.114	0.014	0.081	−0.013	0.133	0.186	−0.178	0.704	0.300
TRM	−0.006	0.461	0.496	−0.094	0.114	−0.196	0.324	0.480	−0.073	−0.375	−0.018

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table 6 (*continued*)

Panel D: Global economies											
Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6	Component 7	Component 8	Component 9	Component 10	Component 11
RTB	0.078	−0.346	−0.425	0.324	0.037	0.156	0.607	0.379	−0.204	−0.092	0.012
Eigen value	2.656	1.526	1.457	1.266	1.003	0.963	0.715	0.643	0.527	0.221	0.024
Variance proportion	0.242	0.139	0.132	0.115	0.091	0.088	0.065	0.058	0.048	0.020	0.002
Cumulative proportion	0.242	0.380	0.513	0.628	0.719	0.806	0.871	0.930	0.978	0.998	1.000

reveals that the FF factors, momentum, dividend yield, term spread, and relative Treasury bill are instrumental in capturing the variations in return predictability of FF portfolios across emerging and developed economies. The core findings of the study that priced factors in the asset return predictability certainly depends on dynamic country-specific dimensions further deepened our understanding about the priced factors in the asset return predictability. Moreover, the study used most sophisticated methodological approach to overcome the issues in fitting the panel data. To the best of our knowledge, the present study is the first of its kind where we test the presumptions in an ICAPM and CCAPM framework across the emerging and developed economies.

Human capital component subsumes the predictive ability of FF value and size factors in the asset return predictability, after introducing in an intertemporal framework of Campbell (1996). The findings of the study specify that the common factors in asset return predictability are governed by the dynamicity in the human capital component is in line with Kim et al. (2011). The findings that the aggregate market along with human capital share the risk of an asset across developed economies is in line with the evidence of Berk and Walden (2013) and Palacios (2015). We agree with the asset pricing literature that the aggregate market predominantly priced the risk of an asset across the economies. However, the findings of the present study revealed that human capital and the innovations governing underneath plays crucial roles in modeling the risk and return relationship in the asset-pricing framework. Further, we argue based on the results of the present study that the pricing factors governing the risk of the asset class depends on the country-specific dimensions and hence intensive care and devotion are needed in the investment decision-making process.

7. Conclusion

The study develops the presumption that the risk of an asset is measured by the covariance of an asset's return with the return on the aggregate market and human capital wealth across the economies. Moreover, the anomaly literature augments that there exist factors, that equally price the risk of an asset. Thus, we considered the frequently used factors to assess the risk and return relationship in the asset pricing framework. The priced factors considered in the study are the aggregate market, human capital components, saving, FF factors, momentum, dividend yield, relative Treasury bill, and term spread. We primarily develop the intertemporal and consumption-based asset pricing framework and an extended version of the CAPM to study the presumption of the study related to risk and return relationship. We rely on the panel data sets pertaining to the emerging and developed economies, and the Aggregate for quantification. The panel regression with random effects, IV-GMM with random effects, and PCA are employed to fit the data with the motivation to dissect the anomalies and human capital components in asset return predictability.

The result indicates that the ICAPM framework yields better result than the CCAPM and extended version of the CAPM. The aggregate market along with saving which proxy the future labor income growth rate, price the risk of utmost FF portfolios across the emerging economies, whereas aggregate market and human capital priced the risk of FF portfolios across the developed economies. Though we found weak evidence for the size effect in FF portfolio return predictability across the emerging and developed economies. The results are more persistent on small stocks relative to the bigger stocks. Interestingly, the human capital component subsumes the predictive power of FF factors and subsequently becomes redundant along with dividend yield and bond market factors in the asset return predictability.

We used three measures of human capital, labor income growth, wealth-to-consumption ratio, and Hansson Index. Though labor income growth and wealth-to-consumption ratio relatively yield better estimates than Hansson Index, however, enhanced human capital proxy is required while examining the risk and relationship in an asset pricing framework. An enhanced human capital proxy may strengthen its share in the asset return predictability and in turn, will develop a better understanding of the patterns in cross-sectional and time-series return. Further, it would be interesting to extend the present framework, including the human capital proxy that closely and explicitly represents the human capital component of aggregate wealth, and study the dynamicity governing risk sharing among aggregate market and human capital component in asset return predictability.

Acknowledgement

We are grateful to Dr. H Anil Kumar (Librarian, IIM Ahmedabad) the Editor, and the anonymous referees. The work is from doctoral dissertation ‘Essays on Capital Asset Pricing of Dynamic Economies: The World Evidence’.

Appendices

Table A1
Descriptive statistics.

Sl. No	Variables	Emerging economies				Developed economies				Aggregate				Global economies			
		Moments															
		μ	***σ***	***Skew***	***Kurt***	***μ***	***σ***	***Skew***	***Kurt***	***μ***	***σ***	***Skew***	***Kurt***	***μ***	***σ***	***Skew***	***Kurt***
1	*SL*	2.631	11.410	0.537	4.285	0.734	6.274	0.020	7.134	1.088	7.536	0.540	7.365	1.011	7.371	0.497	7.434
2	*SM*	2.220	9.882	0.157	4.506	0.803	5.464	−0.083	7.736	1.068	6.540	0.218	7.592	1.029	6.386	0.184	7.678
3	*SH*	1.912	9.583	0.128	4.719	0.771	5.838	−0.003	9.710	0.984	6.709	0.167	8.262	0.976	6.518	0.139	8.444
4	*BL*	1.597	13.222	1.127	8.621	0.763	5.722	−0.147	7.414	0.918	7.699	1.131	16.171	0.880	7.441	1.118	16.726
5	*BM*	1.749	9.527	0.237	4.195	0.747	5.114	−0.394	5.438	0.934	6.188	0.104	6.588	0.908	6.030	0.077	6.702
6	*BH*	1.418	8.144	−0.231	4.390	0.755	5.109	−0.471	5.771	0.879	5.800	−0.319	5.993	0.855	5.728	−0.342	5.983
7	*SLo*	1.415	11.673	0.752	6.459	0.317	7.385	0.344	8.304	0.525	8.375	0.645	8.837	0.501	8.179	0.626	8.947
8	*SNe*	2.496	9.820	0.152	4.512	0.882	5.508	−0.204	9.486	1.023	6.025	0.033	8.963	0.999	5.840	0.003	9.161
9	*SWi*	2.416	9.753	−0.061	4.157	1.362	6.169	0.083	7.532	1.562	6.999	0.096	6.655	1.524	6.835	0.063	6.727
10	*BLo*	1.189	11.529	0.322	5.398	0.501	7.484	0.356	9.070	0.631	8.402	0.402	8.277	0.604	8.173	0.391	8.440
11	*BNe*	1.313	9.102	−0.275	3.897	0.686	5.004	−0.306	6.295	0.741	5.487	−0.269	6.514	0.729	5.348	−0.294	6.587
12	*BWi*	1.626	8.983	0.021	5.174	0.867	5.402	−0.380	5.730	1.010	6.244	−0.114	6.829	0.991	6.121	−0.133	6.812
13	R_m-R_f	0.978	8.224	−0.082	4.500	0.490	4.939	−0.509	5.598	0.581	5.698	−0.263	6.215	0.565	5.585	−0.286	6.234
14	*HML*	0.754	5.973	1.118	6.571	0.441	3.088	0.512	6.895	0.499	3.796	1.101	10.152	0.482	3.683	1.105	10.463
15	*SMB*	0.530	4.987	0.043	3.654	0.014	3.377	0.566	8.103	0.111	3.734	0.420	6.567	0.102	3.604	0.422	6.872
16	*WML*	0.922	7.147	0.068	6.240	0.635	4.953	−1.045	11.351	0.689	5.429	−0.595	9.911	0.687	5.322	−0.616	10.004
17	*DIV*	0.014	0.015	0.615	1.978	0.343	0.835	2.469	7.889	0.271	0.750	2.926	10.513	0.257	0.730	3.044	11.268
18	*TRM*	0.986	0.911	0.483	3.536	1.273	0.910	0.349	2.492	1.216	0.917	0.363	2.682	1.075	1.013	0.114	2.796
19	*RTB*	0.025	1.192	−0.061	5.538	−0.075	0.546	−1.195	7.880	−0.055	0.720	−0.333	10.255	−0.059	0.728	−0.400	9.564
20	*HI*	0.101	0.450	6.250	46.287	2.132	62.387	1721.417	2.206	1.738	56.002	2136	46.045	1.575	53.288	48.394	2360.387
21	*LBR*	20.140	1.214	−0.157	2.053	18.081	5.694	−3.359	14.903	18.496	5.183	−3.772	18.519	18.087	5.088	−3.419	16.907
22	*WCR*	11.908	4.035	−0.663	2.179	8.434	5.914	−0.103	1.964	9.107	5.765	−0.271	2.026	9.107	5.765	−0.271	2.026

Notes: [1] ***μ*** - Mean, ***σ*** - Standard deviation, ***Skew*** - Skewness, ***Kurt*** - Kurtosis.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A2
Correlation* - Covariance Matrix.

Panel A: Emerging economies

cov **corr**	SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi	R_m-R_f	HML	SMB	WML	DIV	TRM	RTB	HI	LBR	WCR
SL	–	79.429	80.707	59.552	67.810	60.839	85.401	75.361	73.007	72.218	67.449	52.719	61.619	−0.484	17.652	−15.942	0.003	2.899	−4.092	−3.364	−1.461	−3.068
SM	**0.959**	–	87.823	60.238	70.634	61.270	90.449	78.479	74.597	78.830	69.510	56.539	61.077	−4.709	19.907	−19.067	0.007	3.245	−4.422	−3.588	−2.199	−5.332
SH	**0.896**	**0.954**	–	63.360	73.374	62.222	97.795	83.556	78.860	81.918	70.710	60.736	61.362	−9.131	23.230	−20.054	0.007	3.359	−4.454	−1.992	−1.993	−4.708
BL	**0.805**	**0.796**	**0.770**	–	62.491	49.315	64.189	55.817	54.331	64.499	58.760	48.585	55.470	7.259	1.236	−12.880	0.006	1.759	−2.526	−1.660	−0.998	−2.522
BM	**0.867**	**0.884**	**0.844**	**0.875**	–	60.117	75.989	66.545	62.618	77.725	67.935	57.330	63.401	−1.591	4.590	−16.877	0.011	2.576	−4.002	−2.190	−1.786	−4.608
BH	**0.874**	**0.861**	**0.804**	**0.775**	**0.895**	–	62.608	59.305	60.402	61.674	57.136	51.439	57.729	−5.962	5.012	−6.216	0.006	2.207	−3.325	−1.654	−1.032	−2.408
SLo	**0.917**	**0.951**	**0.945**	**0.755**	**0.846**	**0.782**	–	85.939	77.373	86.713	73.914	57.373	62.552	−5.401	23.622	−29.478	0.006	3.856	−5.327	−4.144	−2.407	−5.378
SNe	**0.955**	**0.973**	**0.953**	**0.774**	**0.874**	**0.874**	**0.948**	–	73.519	71.548	65.422	54.347	58.815	−5.838	18.577	−14.806	0.003	2.761	−3.531	−2.074	−1.401	−2.949
SWi	**0.913**	**0.913**	**0.888**	**0.744**	**0.812**	**0.879**	**0.842**	**0.945**	–	65.362	64.094	56.564	59.550	−5.959	16.370	−3.660	0.006	2.603	−3.109	−1.241	−1.326	−3.580
BLo	**0.762**	**0.814**	**0.778**	**0.745**	**0.850**	**0.757**	**0.796**	**0.775**	**0.699**	–	72.419	56.938	64.305	−3.432	9.688	−37.594	0.009	3.104	−4.540	−3.152	−3.042	−7.602
BNe	**0.908**	**0.915**	**0.856**	**0.865**	**0.947**	**0.894**	**0.865**	**0.904**	**0.874**	**0.833**	–	54.696	59.343	−0.815	7.943	−13.766	0.006	2.210	−3.048	−1.412	−1.240	−3.379
BWi	**0.754**	**0.791**	**0.781**	**0.760**	**0.849**	**0.855**	**0.714**	**0.798**	**0.820**	**0.696**	**0.852**	–	50.600	−5.433	4.211	1.329	0.009	1.396	−2.096	−1.142	−1.026	−3.410
R_m-R_f	**0.882**	**0.855**	**0.790**	**0.869**	**0.940**	**0.961**	**0.779**	**0.864**	**0.864**	**0.787**	**0.925**	**0.838**	–	−0.996	2.486	−8.348	0.006	2.008	−3.158	−1.647	−0.876	−2.017
HML	**−0.016**	**−0.155**	**−0.276**	**0.267**	**−0.055**	**−0.233**	**−0.158**	**−0.201**	**−0.203**	**−0.099**	**−0.030**	**−0.211**	**−0.039**	–	−4.677	−1.278	−0.001	−0.454	0.580	−0.689	0.283	0.763
SMB	**0.481**	**0.530**	**0.569**	**0.037**	**0.130**	**0.159**	**0.560**	**0.519**	**0.452**	**0.226**	**0.236**	**0.133**	**0.078**	**−0.347**	–	−6.366	−0.002	0.987	−1.040	−1.147	−0.612	−1.187
WML	**−0.311**	**−0.364**	**−0.352**	**−0.275**	**−0.342**	**−0.141**	**−0.501**	**−0.297**	**−0.072**	**−0.628**	**−0.293**	**0.030**	**−0.189**	**−0.068**	**−0.274**	–	0.0001	−1.481	2.331	2.455	1.548	2.995
DIV	**0.051**	**0.108**	**0.088**	**0.096**	**0.170**	**0.098**	**0.080**	**0.045**	**0.090**	**0.110**	**0.099**	**0.157**	**0.102**	**−0.060**	**−0.056**	**0.003**	–	0.002	−0.005	0.003	−0.004	−0.014
TRM	**0.376**	**0.412**	**0.391**	**0.249**	**0.346**	**0.333**	**0.435**	**0.367**	**0.342**	**0.344**	**0.312**	**0.210**	**0.302**	**−0.160**	**0.282**	**−0.304**	**0.261**	–	−0.741	−0.466	−0.606	−1.587
RTB	**−0.359**	**−0.379**	**−0.351**	**−0.242**	**−0.364**	**−0.339**	**−0.406**	**−0.318**	**−0.276**	**−0.340**	**−0.291**	**−0.213**	**−0.321**	**0.138**	**−0.201**	**0.323**	**−0.535**	**−0.682**	–	0.315	0.667	1.767
HI	**−0.157**	**−0.163**	**−0.083**	**−0.085**	**−0.106**	**−0.090**	**−0.168**	**−0.099**	**−0.059**	**−0.125**	**−0.072**	**−0.062**	**−0.089**	**−0.087**	**−0.118**	**0.181**	**0.175**	**−0.228**	**0.104**	–	0.710	1.361
LBR	**−0.157**	**−0.231**	**−0.193**	**−0.117**	**−0.199**	**−0.129**	**−0.225**	**−0.155**	**−0.144**	**−0.279**	**−0.145**	**−0.128**	**−0.109**	**0.083**	**−0.145**	**0.263**	**−0.460**	**−0.684**	**0.509**	**0.288**	–	3.017
WCR	**−0.113**	**−0.191**	**−0.155**	**−0.101**	**−0.175**	**−0.103**	**−0.172**	**−0.111**	**−0.133**	**−0.239**	**−0.135**	**−0.145**	**−0.086**	**0.076**	**−0.096**	**0.174**	**−0.603**	**−0.611**	**0.461**	**0.188**	**0.963**	–

Panel B: Developed economies

cov **corr**	SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi	R_m-R_f	HML	SMB	WML	DIV	TRM	RTB	HI	LBR	WCR
SL	–	31.241	29.523	26.341	19.980	18.204	37.523	29.493	34.010	27.082	19.453	21.127	21.999	−2.060	11.802	−1.829	0.390	0.666	−0.177	1.072	3.092	−0.057
SM	**0.913**	–	28.596	23.328	19.513	19.026	34.286	27.485	29.825	25.928	18.999	19.209	20.273	0.310	9.279	−3.678	0.409	0.430	−0.148	1.535	2.802	−1.260
SH	**0.824**	**0.914**	–	22.023	19.165	19.717	34.537	27.995	30.043	25.354	18.816	18.599	19.718	0.643	9.998	−4.723	0.494	0.334	−0.106	1.718	2.189	−1.135
BL	**0.743**	**0.753**	**0.679**	–	23.421	20.932	29.289	22.617	23.241	31.224	22.802	20.884	23.827	2.463	−1.596	−7.607	0.213	0.437	0.041	0.433	2.862	−0.780
BM	**0.653**	**0.730**	**0.684**	**0.845**	–	20.773	24.067	18.955	18.795	27.921	21.222	19.962	21.520	2.816	−3.153	−6.722	0.289	0.310	0.078	0.565	2.427	−1.318
BH	**0.594**	**0.711**	**0.703**	**0.754**	**0.867**	–	23.070	18.786	18.219	26.662	20.778	18.903	20.960	2.705	−2.915	−6.831	0.337	0.192	0.072	0.308	2.423	−0.665
SLo	**0.820**	**0.858**	**0.825**	**0.707**	**0.673**	**0.644**	–	36.152	35.480	40.097	25.030	21.326	24.909	0.664	9.972	−14.621	0.537	0.886	−0.381	1.838	2.348	−0.302
SNe	**0.843**	**0.899**	**0.874**	**0.714**	**0.693**	**0.686**	**0.884**	–	30.774	27.347	19.554	18.909	19.455	1.633	8.205	−5.413	0.392	0.642	−0.185	1.505	3.330	−0.693
SWi	**0.844**	**0.848**	**0.815**	**0.637**	**0.597**	**0.578**	**0.754**	**0.855**	–	22.906	18.902	22.676	20.317	−1.010	11.207	3.180	0.523	0.289	0.064	2.031	4.166	−0.162
BLo	**0.603**	**0.661**	**0.617**	**0.768**	**0.796**	**0.759**	**0.764**	**0.682**	**0.496**	–	28.544	19.637	27.260	3.292	−2.482	−22.307	0.431	0.751	−0.249	0.460	2.357	−1.355
BNe	**0.648**	**0.725**	**0.686**	**0.839**	**0.905**	**0.885**	**0.714**	**0.729**	**0.613**	**0.830**	–	18.574	20.891	1.835	−2.512	−7.662	0.296	0.244	0.078	0.692	2.255	−1.047

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

BWi	**0.651**	**0.678**	**0.626**	**0.710**	**0.787**	**0.744**	**0.562**	**0.652**	**0.679**	**0.528**	**0.747**	–	20.050	−0.465	−0.271	4.231	0.539	0.093	0.208	1.435	2.316	−0.658
R_m-R_f	**0.748**	**0.789**	**0.733**	**0.894**	**0.936**	**0.911**	**0.725**	**0.740**	**0.672**	**0.809**	**0.927**	**0.823**	–	0.082	−1.440	−5.496	0.320	0.385	0.061	0.446	1.875	−0.355
HML	**−0.107**	**0.018**	**0.037**	**0.142**	**0.188**	**0.180**	**0.030**	**0.095**	**−0.051**	**0.149**	**0.125**	**−0.029**	**0.006**	–	−3.030	−4.214	−0.117	0.179	0.008	−0.294	1.794	0.065
SMB	**0.525**	**0.472**	**0.486**	**−0.078**	**−0.179**	**−0.166**	**0.379**	**0.408**	**0.485**	**−0.096**	**−0.146**	**−0.015**	**−0.085**	**−0.275**	–	3.644	0.151	0.165	−0.208	1.007	0.124	0.104
WML	**−0.058**	**−0.134**	**−0.165**	**−0.268**	**−0.274**	**−0.279**	**−0.399**	**−0.193**	**0.099**	**−0.621**	**−0.319**	**0.163**	**−0.234**	**−0.274**	**0.203**	–	−0.066	−0.557	0.392	0.046	0.819	0.294
DIV	**0.075**	**0.090**	**0.104**	**0.045**	**0.071**	**0.083**	**0.088**	**0.084**	**0.098**	**0.072**	**0.074**	**0.125**	**0.082**	**−0.046**	**0.051**	**−0.016**	–	0.002	0.037	1.764	0.386	0.471
TRM	**0.106**	**0.079**	**0.058**	**0.077**	**0.063**	**0.039**	**0.121**	**0.115**	**0.045**	**0.105**	**0.051**	**0.018**	**0.082**	**0.058**	**0.046**	**−0.111**	**0.002**	–	−0.206	0.114	0.182	0.296
RTB	**−0.047**	**−0.045**	**−0.031**	**0.012**	**0.026**	**0.025**	**−0.087**	**−0.055**	**0.017**	**−0.058**	**0.027**	**0.067**	**0.022**	**0.005**	**−0.096**	**0.131**	**0.075**	**−0.344**	–	0.103	0.453	−0.265
HI	**0.046**	**0.075**	**0.080**	**0.020**	**0.031**	**0.017**	**0.067**	**0.072**	**0.084**	**0.017**	**0.039**	**0.074**	**0.025**	**−0.026**	**0.075**	**0.002**	**0.567**	**0.030**	**0.046**	–	−4.196	−2.472
LBR	**0.062**	**0.064**	**0.048**	**0.063**	**0.062**	**0.062**	**0.040**	**0.075**	**0.081**	**0.041**	**0.059**	**0.056**	**0.050**	**0.073**	**0.004**	**0.021**	**0.058**	**0.023**	**0.095**	**−0.141**	–	−22.868
WCR	**−0.002**	**−0.040**	**−0.034**	**−0.024**	**−0.046**	**−0.023**	**−0.007**	**−0.021**	**−0.004**	**−0.033**	**−0.038**	**−0.022**	**−0.013**	**0.004**	**0.005**	**0.010**	**0.098**	**0.051**	**−0.076**	**−0.114**	**−0.495**	–

Panel C: Aggregate

cov **corr**	SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi	R_m-R_f	HML	SMB	WML	DIV	TRM	RTB	HI	LBR	WCR
SL	–	36.094	34.658	29.534	24.617	22.353	42.382	34.052	37.806	31.556	24.115	24.100	25.835	−1.987	12.535	−3.384	0.317	0.895	−0.595	0.595	3.012	−0.273
SM	**0.921**	–	34.576	26.863	24.459	23.132	40.033	32.580	34.181	31.191	23.898	22.696	24.212	−0.295	10.547	−5.434	0.319	0.721	−0.615	0.971	2.833	−1.546
SH	**0.837**	**0.924**	–	25.994	24.415	23.849	40.958	33.527	34.794	30.967	23.852	22.566	23.742	−0.417	11.504	−6.456	0.398	0.644	−0.577	1.297	2.264	−1.380
BL	**0.752**	**0.756**	**0.693**	–	27.243	23.704	32.613	25.819	26.276	34.439	26.317	23.631	26.925	2.965	−1.388	−8.046	0.208	0.561	−0.194	0.248	2.331	−0.983
BM	**0.695**	**0.764**	**0.722**	**0.848**	–	24.613	29.082	23.574	23.071	32.760	25.783	23.634	25.612	2.407	−2.440	−7.667	0.271	0.528	−0.311	0.308	1.923	−1.659
BH	**0.648**	**0.741**	**0.723**	**0.758**	**0.872**	–	26.910	22.731	22.334	30.070	24.326	22.085	24.549	1.867	−2.157	−6.755	0.308	0.387	−0.256	0.120	2.054	−0.842
SLo	**0.838**	**0.875**	**0.848**	**0.711**	**0.703**	**0.668**	–	41.158	39.552	44.771	29.763	24.652	28.531	−0.069	11.589	−16.385	0.422	1.195	−0.926	1.175	2.523	−0.660
SNe	**0.865**	**0.915**	**0.891**	**0.723**	**0.732**	**0.725**	**0.896**	–	34.937	31.716	24.013	22.280	23.272	0.840	9.345	−6.471	0.325	0.858	−0.540	1.121	3.156	−0.852
SWi	**0.855**	**0.855**	**0.824**	**0.656**	**0.639**	**0.635**	**0.767**	**0.870**	–	27.042	23.311	25.988	24.145	−1.487	11.699	2.525	0.475	0.514	−0.243	1.715	3.606	−0.501
BLo	**0.633**	**0.692**	**0.651**	**0.763**	**0.804**	**0.758**	**0.770**	**0.701**	**0.532**	–	32.810	23.202	30.854	2.582	−1.186	−23.918	0.366	0.988	−0.691	0.077	2.075	−1.912
BNe	**0.700**	**0.767**	**0.725**	**0.843**	**0.915**	**0.887**	**0.740**	**0.767**	**0.663**	**0.828**	–	22.116	24.647	1.591	−1.521	−8.226	0.275	0.434	−0.220	0.495	1.849	−1.288
BWi	**0.665**	**0.693**	**0.652**	**0.720**	**0.798**	**0.766**	**0.583**	**0.677**	**0.704**	**0.557**	**0.768**	–	23.058	−0.868	0.003	4.127	0.523	0.208	0.019	1.228	1.627	−1.004
R_m-R_f	**0.772**	**0.800**	**0.743**	**0.888**	**0.937**	**0.921**	**0.731**	**0.766**	**0.708**	**0.802**	**0.927**	**0.825**	–	−0.002	−1.100	−5.727	0.299	0.540	−0.244	0.253	1.511	−0.538
HML	**−0.097**	**−0.016**	**−0.021**	**0.160**	**0.144**	**0.115**	**−0.003**	**0.045**	**−0.071**	**0.110**	**0.098**	**−0.051**	**−0.0001**	–	−3.313	−3.794	−0.079	0.109	0.091	−0.299	1.374	0.075
SMB	**0.518**	**0.482**	**0.497**	**−0.063**	**−0.123**	**−0.112**	**0.410**	**0.425**	**0.474**	**−0.043**	**−0.079**	**0.0002**	**−0.059**	**−0.290**	–	2.398	0.082	0.262	−0.342	0.729	0.600	0.095
WML	**−0.101**	**−0.179**	**−0.201**	**−0.264**	**−0.279**	**−0.252**	**−0.418**	**−0.212**	**0.074**	**−0.619**	**−0.308**	**0.147**	**−0.221**	**−0.239**	**0.128**	–	0.00018	−0.666	0.640	0.356	0.287	0.429
DIV	**0.060**	**0.067**	**0.079**	**0.044**	**0.063**	**0.074**	**0.069**	**0.068**	**0.089**	**0.061**	**0.066**	**0.119**	**0.074**	**−0.032**	**0.028**	**0.000**	–	−0.002	0.045	1.607	0.227	0.398
TRM	**0.137**	**0.122**	**0.104**	**0.095**	**0.099**	**0.075**	**0.157**	**0.145**	**0.077**	**0.132**	**0.084**	**0.038**	**0.107**	**0.036**	**0.072**	**−0.132**	**−0.003**	–	−0.262	0.052	0.143	0.120
RTB	**−0.129**	**−0.147**	**−0.131**	**−0.046**	**−0.082**	**−0.070**	**−0.172**	**−0.129**	**−0.052**	**−0.130**	**−0.060**	**0.005**	**−0.068**	**0.042**	**−0.133**	**0.179**	**0.080**	**−0.378**	–	0.138	0.355	−0.092
HI	**0.025**	**0.045**	**0.057**	**0.011**	**0.016**	**0.006**	**0.042**	**0.052**	**0.070**	**0.003**	**0.026**	**0.061**	**0.014**	**−0.027**	**0.055**	**0.019**	**0.555**	**0.015**	**0.054**	–	−3.868	−2.130
LBR	**0.060**	**0.062**	**0.047**	**0.051**	**0.047**	**0.051**	**0.043**	**0.069**	**0.070**	**0.036**	**0.046**	**0.039**	**0.039**	**0.058**	**0.021**	**0.007**	**0.037**	**0.019**	**0.066**	**−0.139**	–	−20.081
WCR	**−0.007**	**−0.046**	**−0.039**	**−0.029**	**−0.055**	**−0.029**	**−0.015**	**−0.025**	**−0.013**	**−0.045**	**−0.044**	**−0.033**	**−0.019**	**0.004**	**0.005**	**0.015**	**0.089**	**0.022**	**−0.023**	**−0.105**	**−0.469**	–

(*continued on next page*)

Table A2 (*continued*)

Panel D: Global economies

cov **corr**	SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi	R_m-R_f	HML	SMB	WML	DIV	TRM	RTB	HI	LBR	WCR
SL	–	41.501	40.038	35.477	30.333	27.321	49.346	39.324	41.612	39.116	28.960	28.425	31.266	−1.230	12.738	−6.950	−0.121	0.708	−0.120	−11.268	2.091	0.339
SM	**0.931**	–	39.029	31.910	29.073	27.248	45.357	37.041	37.794	36.708	27.895	26.270	28.804	0.543	10.726	−7.603	−0.068	0.648	−0.145	−11.062	1.657	−0.609
SH	**0.858**	**0.935**	–	30.840	28.901	27.798	46.094	37.619	38.211	36.277	27.641	25.794	28.235	0.554	11.733	−8.577	−0.007	0.689	−0.124	−11.990	1.192	−0.531
BL	**0.792**	**0.796**	**0.735**	–	31.169	27.798	38.420	30.574	30.428	39.908	30.494	27.459	31.357	2.673	−0.350	−9.288	−0.102	0.382	0.109	−2.608	1.385	−0.393
BM	**0.749**	**0.802**	**0.762**	**0.855**	–	28.142	33.964	27.917	27.364	36.885	29.531	27.184	29.728	2.260	−1.321	−7.946	−0.065	0.351	0.039	−5.489	1.132	−0.319
BH	**0.694**	**0.773**	**0.754**	**0.784**	**0.878**	–	31.412	26.151	25.607	34.485	27.678	24.821	28.309	1.808	−1.575	−7.865	−0.106	0.257	0.066	−4.587	1.084	−0.371
SLo	**0.861**	**0.885**	**0.859**	**0.745**	**0.729**	**0.693**	–	47.311	44.830	51.152	34.137	28.861	33.771	0.354	12.333	−17.979	−0.013	1.136	−0.369	−10.450	1.276	0.192
SNe	**0.870**	**0.916**	**0.889**	**0.752**	**0.759**	**0.732**	**0.910**	–	39.612	37.357	27.889	26.022	27.418	1.647	9.781	−7.781	−0.105	0.747	−0.146	−8.224	1.975	0.020
SWi	**0.848**	**0.860**	**0.831**	**0.689**	**0.685**	**0.660**	**0.794**	**0.889**	–	32.924	27.058	29.647	27.935	−0.226	11.406	0.485	−0.115	0.557	0.057	−10.575	2.123	−0.281
BLo	**0.703**	**0.737**	**0.696**	**0.797**	**0.815**	**0.784**	**0.799**	**0.740**	**0.600**	–	36.440	27.282	35.816	1.622	0.273	−23.358	−0.053	0.698	−0.151	−0.462	0.762	−0.645
BNe	**0.735**	**0.791**	**0.749**	**0.861**	**0.922**	**0.889**	**0.753**	**0.780**	**0.697**	**0.828**	–	25.355	28.553	1.488	−1.069	−8.464	−0.018	0.284	0.046	−2.891	1.030	−0.447
BWi	**0.691**	**0.714**	**0.669**	**0.742**	**0.812**	**0.763**	**0.610**	**0.697**	**0.731**	**0.593**	**0.779**	–	26.497	−0.466	0.342	3.834	0.024	0.165	0.209	−6.293	1.066	−0.705
R_m-R_f	**0.809**	**0.833**	**0.781**	**0.902**	**0.946**	**0.927**	**0.760**	**0.782**	**0.734**	**0.830**	**0.935**	**0.830**	–	−0.088	−0.363	−6.966	−0.049	0.397	0.041	−4.231	0.895	0.109
HML	**−0.056**	**0.028**	**0.027**	**0.135**	**0.126**	**0.104**	**0.014**	**0.082**	**−0.010**	**0.066**	**0.085**	**−0.026**	**−0.005**	–	−2.291	−2.659	−0.072	0.148	0.066	−2.387	0.893	0.507
SMB	**0.504**	**0.474**	**0.496**	**−0.015**	**−0.064**	**−0.079**	**0.424**	**0.427**	**0.458**	**0.010**	**−0.054**	**0.016**	**−0.019**	**−0.205**	–	0.657	0.025	0.352	−0.201	−7.205	0.446	0.094
WML	**−0.200**	**−0.245**	**−0.264**	**−0.297**	**−0.281**	**−0.286**	**−0.450**	**−0.247**	**0.014**	**−0.602**	**−0.308**	**0.134**	**−0.259**	**−0.173**	**0.037**	–	−0.080	−0.528	0.365	−3.064	0.635	−0.435
DIV	**−0.022**	**−0.014**	**−0.001**	**−0.021**	**−0.015**	**−0.025**	**−0.002**	**−0.021**	**−0.021**	**−0.009**	**−0.004**	**0.005**	**−0.012**	**−0.030**	**0.009**	**−0.021**	–	0.047	−0.012	−0.087	−0.131	0.570
TRM	**0.102**	**0.105**	**0.106**	**0.061**	**0.062**	**0.047**	**0.143**	**0.119**	**0.082**	**0.090**	**0.052**	**0.029**	**0.074**	**0.048**	**0.100**	**−0.109**	**0.062**	–	−0.274	−0.992	−0.160	0.059
RTB	**−0.024**	**−0.033**	**−0.027**	**0.024**	**0.010**	**0.017**	**−0.065**	**−0.032**	**0.012**	**−0.027**	**0.012**	**0.051**	**0.011**	**0.030**	**−0.080**	**0.105**	**−0.022**	**−0.397**	–	2.118	0.303	−0.032
HI	**−0.023**	**−0.025**	**−0.026**	**−0.006**	**−0.014**	**−0.012**	**−0.018**	**−0.018**	**−0.022**	**−0.001**	**−0.007**	**−0.015**	**−0.011**	**−0.011**	**−0.028**	**−0.009**	**−0.002**	**−0.014**	**0.043**	–	1.949	−10.444
LBR	**0.048**	**0.043**	**0.029**	**0.035**	**0.032**	**0.032**	**0.026**	**0.050**	**0.050**	**0.016**	**0.030**	**0.030**	**0.027**	**0.047**	**0.020**	**0.021**	**−0.027**	**−0.026**	**0.070**	**0.004**	–	−9.932
WCR	**0.009**	**−0.018**	**−0.015**	**−0.012**	**−0.010**	**−0.013**	**0.004**	**0.001**	**−0.008**	**−0.015**	**−0.015**	**−0.023**	**0.004**	**0.031**	**0.005**	**−0.017**	**0.139**	**0.011**	**−0.009**	**−0.028**	**−0.303**	–

Note: [1] Correlations are in bold face, **corr** - Correlation, cov **-** Covariance.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A3.1
Pooled OLS estimates with LBR.

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + R_m - R_{f_{it}}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$											
			α_0	R_m-R_f	LBR	ΔSAV	HML	SMB	WML	DIV	TRM	RTB	$\overline{R}^2$	F-statistics
A	Emerging economies	*SL*	−4.089	4.419***	0.172	12.887**	0.723***	0.901***	0.014	−6.022	0.152	−0.131	0.898	71.141***
				(0.538)	(0.428)	(5.576)	(0.073)	(0.090)	(0.076)	(11.299)	(0.866)	(0.378)		
		SM	−3.928	4.901***	0.177	12.003**	0.217***	0.727***	−0.010	11.403	0.041	−0.035	0.795	31.716***
				(0.576)	(0.458)	(5.975)	(0.078)	(0.096)	(0.081)	(12.109)	(0.928)	(0.405)		
		SH	−6.525	4.305***	0.315	14.457***	−0.089	0.795***	0.034	−0.358	−0.765	−0.123	0.790	30.691***
				(0.517)	(0.411)	(5.358)	(0.070)	(0.086)	(0.073)	(10.858)	(0.832)	(0.364)		
		BL	−18.800	5.639***	0.877	9.699	0.571***	−0.473***	0.062	16.076	0.690	0.688	0.519	9.512***
				(1.050)	(0.835)	(10.886)	(0.143)	(0.175)	(0.148)	(22.061)	(1.691)	(0.739)		
		BM	−10.439	5.805***	0.462	15.074**	0.417***	−0.202	−0.030	27.555	0.737	0.014	0.648	15.572***
				(0.757)	(0.602)	(7.849)	(0.103)	(0.126)	(0.106)	(15.907)	(1.219)	(0.533)		
		BH	4.591	3.359***	−0.223	11.721**	−0.156**	0.023	0.029	−27.705**	−0.678	−0.114	0.719	21.221***
				(0.511)	(0.407)	(5.303)	(0.070)	(0.085)	(0.072)	(10.747)	(0.824)	(0.360)		
		SLo	−10.537	5.074***	0.479	7.203	0.209**	0.792***	−0.485***	15.659	−0.207	−0.355	0.821	37.292***
				(0.624)	(0.496)	(6.467)	(0.085)	(0.104)	(0.088)	(13.105)	(1.004)	(0.439)		
		SNe	−11.707	5.326***	0.490	16.676**	0.141	0.975***	0.195	−9.874	−0.972	−0.250	0.884	21.214***
				(0.826)	(0.670)	(7.735)	(0.170)	(0.128)	(0.155)	(16.317)	(1.509)	(0.495)		
		SWi	−5.920	4.595***	0.293	11.007**	0.152**	0.828***	0.240***	3.220	−0.686	−0.480	0.831	40.005***
				(0.512)	(0.407)	(5.311)	(0.070)	(0.085)	(0.072)	(10.763)	(0.825)	(0.360)		
		BLo	−4.759	3.809***	0.272	12.314	0.005	0.008	−0.760***	−9.685	−0.586	−0.264	0.655	16.018***
				(0.821)	(0.653)	(8.516)	(0.112)	(0.137)	(0.116)	(17.258)	(1.323)	(0.578)		
		BNe	4.574	5.027***	−0.298	10.186	−0.061	0.266**	0.174	−16.439	0.552	−0.077	0.798	15.568***
				(0.809)	(0.656)	(7.576)	(0.166)	(0.126)	(0.151)	(15.981)	(1.478)	(0.485)		
		BWi	−9.131	4.101***	0.433	12.701*	0.100	−0.048	0.559***	1.895	−0.776	−0.427	0.545	10.485***
				(0.727)	(0.578)	(7.542)	(0.099)	(0.121)	(0.102)	(15.285)	(1.171)	(0.512)		
B	Developed economies	*SL*	7.957***	1.133***	−0.276**	16.918	0.937**	1.324***	0.191	0.526	−2.750	−0.305	0.693	15.360***
				(0.144)	(0.128)	(13.693)	(0.404)	(0.357)	(0.526)	(11.527)	(1.429)	(0.559)		
		SM	7.174***	1.132***	−0.264***	−1.891	0.569**	1.006***	0.470	0.866	−2.215**	−0.046	0.852	37.606***
				(0.086)	(0.076)	(8.137)	(0.240)	(0.212)	(0.313)	(6.850)	(0.849)	(0.332)		
		SH	1.167***	−0.267***	1.446***	0.518	1.347***	−0.022	8.210	−4.244***	0.294	7.105	0.755	20.566***
				(0.105)	(11.202)	(0.331)	(0.292)	(0.430)	(9.430)	(1.169)	(0.458)	(1.831)		
		BL	−0.019	1.086***	0.045	15.125*	0.542**	0.161	−0.561	−4.825	−0.374	−0.287	0.827	31.472***
				(0.090)	(0.080)	(8.573)	(0.253)	(0.223)	(0.329)	(7.217)	(0.895)	(0.350)		
		BM	1.349**	0.937***	−0.055*	9.938***	0.276***	−0.060	0.269**	−2.918	0.049	−0.020	0.957	144.439***
				(0.036)	(0.032)	(3.377)	(0.100)	(0.088)	(0.130)	(2.843)	(0.352)	(0.138)		
		BH	1.016	0.001***	−16.538	0.006***	−0.055	−0.021	3.866	−0.593	0.079	0.317	0.930	86.318***
				(0.041)	(4.326)	(0.128)	(0.113)	(0.166)	(3.642)	(0.451)	(0.177)	(0.707)		
		SLo	4.420	1.474***	−0.162	3.203	0.075	1.221***	−0.456	24.948	−1.927	0.449	0.669	13.172***
				(0.165)	(0.143)	(14.951)	(0.443)	(0.393)	(0.631)	(12.936)	(1.612)	(0.614)		
		SNe	6.616***	0.922***	−0.191	10.270	0.486	0.978***	0.519	−8.073	−1.497	−0.358	0.632	11.342***
				(0.147)	(0.128)	(13.348)	(0.395)	(0.351)	(0.563)	(11.548)	(1.439)	(0.548)		
		SWi	10.341***	1.199***	−0.363*	1.214	0.196	1.601***	1.303	1.545	−4.688**	−0.112	0.540	8.051***
				(0.222)	(0.193)	(20.169)	(0.597)	(0.530)	(0.851)	(17.450)	(2.175)	(0.829)		
		BLo	−3.346***	0.978***	0.158**	7.236	−0.337	−0.076	−0.579	−7.143	−1.541	−0.219	0.844	33.538***
				(0.080)	(0.069)	(7.233)	(0.214)	(0.190)	(0.305)	(6.258)	(0.780)	(0.297)		
		BNe	0.777	0.842***	−0.024	6.861	0.002	0.069	0.310	−11.099**	0.311	−0.234	0.884	47.143***
				(0.062)	(0.054)	(5.610)	(0.166)	(0.147)	(0.237)	(4.854)	(0.605)	(0.230)		
		BWi	5.143***	0.840***	−0.202**	12.868	0.066	0.183	1.585***	−13.741	2.581**	−0.278	0.751	19.165***
				(0.113)	(0.098)	(10.256)	(0.304)	(0.269)	(0.433)	(8.873)	(1.106)	(0.421)		
C	Aggregate	*SL*	7.479***	1.135***	−0.251***	5.61E-09***	0.988***	1.768***	−0.196	5.238	−0.576	−0.016	0.838	131.790***
				(0.039)	(0.066)	(2.08E-09)	(0.186)	(0.211)	(0.195)	(6.489)	(0.620)	(0.774)		
		SM	5.881***	1.014***	−0.181***	9.23E-10	0.447***	1.269***	0.019	3.104	−0.358	−0.190	0.893	210.634***
				(0.026)	(0.044)	(1.38E-09)	(0.124)	(0.140)	(0.130)	(4.304)	(0.411)	(0.514)		
		SH	5.806***	0.939***	−0.187***	3.68E-09**	0.340***	1.398***	−0.129	1.181	−1.375***	−0.578	0.870	169.179***
				(0.027)	(0.046)	(1.45E-09)	(0.130)	(0.147)	(0.137)	(4.538)	(0.433)	(0.542)		
		BL	0.812	1.150	0.002	4.57E-09	0.901**	−0.135	−0.111	2.789	−0.646	0.427	0.529	29.282***
				(0.078)	(0.133)	(4.16E-09)	(0.373)	(0.422)	(0.392)	(13.000)	(1.241)	(1.551)		
		BM	2.058***	1.045***	−0.085**	9.30E-10	0.696***	−0.058	0.004	−0.963	−0.084	−0.553	0.891	205.577***
				(0.026)	(0.044)	(1.38E-09)	(0.124)	(0.140)	(0.131)	(4.317)	(0.412)	(0.515)		
		BH	0.155	0.940***	0.007	−1.56E-09*	−0.043	−0.112	0.047	1.683	−0.278	−0.532	0.929	331.524***
				(0.018)	(0.030)	(9.41E-10)	(0.084)	(0.095)	(0.089)	(2.938)	(0.281)	(0.351)		
		SLo	3.656***	1.112***	−0.116**	0.103	0.212	1.638***	−0.876***	6.744	−0.675	−2.097***	0.848	125.675***
				(0.036)	(0.061)	(2.387)	(0.179)	(0.209)	(0.188)	(6.137)	(0.594)	(0.724)		
		SNe	4.765***	0.967***	−0.115**	−0.331	0.190	1.105***	0.144	−5.256	−0.843	0.532	0.836	93.886***
				(0.037)	(0.059)	(2.218)	(0.179)	(0.204)	(0.187)	(5.395)	(0.617)	(1.377)		
		SWi	9.376***	1.031***	−0.306***	2.714	0.482**	1.734***	0.608**	0.823	−1.293	−0.175	0.768	75.014***
				(0.046)	(0.078)	(3.055)	(0.229)	(0.268)	(0.240)	(7.853)	(0.760)	(0.926)		
		BLo	−4.367***	1.059***	0.189***	1.619	−0.250	0.148	−1.331***	0.927	−0.546	0.959	0.848	125.642***

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A3.1 (*continued*)

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + R_m - R_{f_{it}}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$											
			α_0	R_m-R_f	LBR	ΔSAV	HML	SMB	WML	DIV	TRM	RTB	$\overline{R}^2$	F-statistics
				(0.034)	(0.057)	(2.245)	(0.168)	(0.197)	(0.177)	(5.771)	(0.559)	(0.681)		
		BNe	1.057	0.965***	−0.045	−0.426	0.161	0.016	0.099	−3.452	−0.070	0.504	0.939	280.670***
				(0.020)	(0.032)	(1.218)	(0.099)	(0.112)	(0.103)	(2.963)	(0.339)	(0.756)		
		BWi	4.338***	1.051***	−0.157***	1.313	0.200	0.204	0.837***	3.377	1.026**	0.116	0.880	166.263***
				(0.029)	(0.048)	(1.892)	(0.142)	(0.166)	(0.149)	(4.864)	(0.471)	(0.574)		
D	Global economies	*SL*	13.640***	1.492***	−0.488***	−1.124	1.752***	1.429***	0.264	−45.916**	−1.131	2.845	0.555	18.500***
				(0.523)	(0.137)	(4.377)	(0.415)	(0.450)	(0.415)	(11.887)	(1.495)	(2.499)		
		SM	10.572***	1.797***	−0.346***	−0.714	0.625**	1.263***	−0.068	−30.906***	−0.571	3.635**	0.571	19.694***
				(0.382)	(0.100)	(3.195)	(0.303)	(0.329)	(0.303)	(8.678)	(1.092)	(1.825)		
		SH	10.264***	1.666***	−0.325***	1.536	0.373	1.493***	−0.157	−22.315***	−2.198**	2.767	0.569	19.541***
				(0.349)	(0.091)	(2.921)	(0.277)	(0.301)	(0.277)	(7.934)	(0.998)	(1.668)		
		BL	7.788	2.887***	−0.272	0.175	1.619**	−0.840	−0.030	−8.248	−0.329	4.985	0.160	3.679***
				(0.934)	(0.244)	(7.821)	(0.741)	(0.805)	(0.741)	(21.240)	(2.672)	(4.465)		
		BM	6.654***	2.420***	−0.249**	−0.578	0.950***	−0.602	−0.070	−25.810***	0.782	6.186***	0.527	16.533***
				(0.382)	(0.101)	(3.197)	(0.305)	(0.329)	(0.307)	(8.686)	(1.093)	(1.830)		
		BH	4.522***	2.027***	−0.135**	−1.470	0.016	−0.231	−0.085	−20.708***	0.232	1.272	0.627	1.244***
				(0.222)	(0.058)	(1.855)	(0.176)	(0.191)	(0.176)	(5.037)	(0.634)	(1.059)		
		SLo	9.345***	1.618***	−0.298***	−1.392	0.404	1.596***	−0.597	−26.042**	−0.912	3.474	0.451	12.239***
				(0.451)	(0.114)	(3.663)	(0.350)	(0.377)	(0.357)	(10.215)	(1.258)	(2.088)		
		SNe	6.275***	0.526	−0.108	−0.993	0.137	1.178***	0.307	−47.358***	−1.311	7.186***	0.491	11.724***
				(0.457)	(0.116)	(3.613)	(0.382)	(0.380)	(0.351)	(10.839)	(1.427)	(2.602)		
		SWi	13.637***	1.388**	−0.423***	1.002	0.571	1.817***	0.627	−31.854**	−2.163	2.379	0.453	12.344***
				(0.559)	(0.142)	(4.541)	(0.433)	(0.468)	(0.443)	(12.663)	(1.560)	(2.588)		
		BLo	0.713	2.148***	0.021	−0.540	−0.241	−0.133	−1.091***	−22.155***	0.360	3.667**	0.428	11.227***
				(0.346)	(0.088)	(2.809)	(0.268)	(0.289)	(0.274)	(7.834)	(0.965)	(1.601)		
		BNe	3.758***	1.457	−0.106	−1.112	0.057	−0.050	0.099	−36.983***	0.597	5.574***	0.614	18.696***
				(0.286)	(0.073)	(2.262)	(0.239)	(0.238)	(0.220)	(6.787)	(0.894)	(1.629)		
		BWi	8.279***	2.164***	−0.282***	0.567	0.331	−0.066	0.602	−34.453***	1.840	3.033	0.521	15.906***
				(0.412)	(0.104)	(3.345)	(0.319)	(0.344)	(0.326)	(9.327)	(1.149)	(1.906)		

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. [2] $\overline{R}^2$ denotes adjusted R-squared. [3] F-statistics indicates overall model fit.

Table A3.2
Pooled OLS estimates with WCR.

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + Rm - Rf_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$											
			α_0	R_m-R_f	WCR	ΔSAV	HML	SMB	WML	DIV	TRM	RTB	$\overline{R}^2$	F-statistics
A	Emerging economies	*SL*	0.389	4.299***	−0.069	14.036**	0.738***	0.906***	0.024	−7.718	0.160	−0.147	0.899	71.330***
				(0.540)	(0.123)	(5.497)	(0.074)	(0.090)	(0.077)	(11.388)	(0.865)	(0.379)		
		SM	2.216	4.657***	−0.186	14.173**	0.248***	0.738***	0.013	7.747	0.079	−0.076	0.801	32.889***
				(0.571)	(0.130)	(5.810)	(0.079)	(0.095)	(0.081)	(12.037)	(0.914)	(0.400)		
		SH	−0.427	4.251***	0.031	15.212***	−0.085	0.797***	0.035	−0.854	−0.792	−0.117	0.788	30.379***
				(0.521)	(0.119)	(5.311)	(0.072)	(0.087)	(0.074)	(11.002)	(0.836)	(0.366)		
		BL	−2.259	5.522***	0.118	11.524	0.576***	−0.469***	0.061	15.233	0.607	0.710	0.512	9.287***
				(1.062)	(0.243)	(10.819)	(0.147)	(0.176)	(0.151)	(22.414)	(1.703)	(0.746)		
		BM	0.327	5.582***	−0.091	17.352**	0.442***	−0.193	−0.013	24.562	0.734	−0.008	0.647	15.459***
				(0.763)	(0.174)	(7.767)	(0.105)	(0.127)	(0.108)	(16.091)	(1.222)	(0.535)		
		BH	2.116	3.252***	−0.160	12.370***	−0.139	0.028	0.044	−29.645***	−0.623	−0.147	0.726	21.944***
				(0.508)	(0.116)	(5.169)	(0.070)	(0.084)	(0.072)	(10.708)	(0.813)	(0.356)		
		SLo	−1.257	4.992***	0.047	8.356	0.214**	0.796***	−0.484***	14.897	−0.248	−0.347	0.819	36.710***
				(0.631)	(0.144)	(6.426)	(0.087)	(0.105)	(0.090)	(13.312)	(1.011)	(0.443)		
		SNe	−2.976	5.349***	0.111	16.549**	0.129	0.975***	0.195	−8.746	−0.955	−0.254	0.883	28.876***
				(0.829)	(0.212)	(7.822)	(0.172)	(0.130)	(0.157)	(16.364)	(1.524)	(0.498)		
		SWi	0.226	4.507***	−0.007	12.016**	0.160**	0.832***	0.245***	2.165	−0.702	−0.482	0.830	39.620***
				(0.517)	(0.118)	(5.264)	(0.071)	(0.086)	(0.073)	(10.905)	(0.828)	(0.363)		
		BLo	−2.383	3.991***	0.244	11.101	−0.023	0.000	−0.783***	−6.501	−0.666	−0.213	0.663	16.589***
				(0.815)	(0.186)	(8.303)	(0.112)	(0.135)	(0.116)	(17.201)	(1.307)	(0.572)		
		BNe	−0.136	5.013***	−0.124	10.530	−0.047	0.271**	0.182	−17.245	0.606	−0.068	0.800	15.686***
				(0.805)	(0.206)	(7.596)	(0.167)	(0.126)	(0.152)	(15.892)	(1.480)	(0.484)		
		BWi	−1.974	4.123***	0.135	12.950*	0.092	−0.050	0.550***	2.741	−0.836	−0.400	0.546	10.510***
				(0.731)	(0.167)	(7.439)	(0.101)	(0.121)	(0.104)	(15.412)	(1.171)	(0.513)		
B	Developed economies	*SL*	0.870**	1.057***	0.167***	5.06E-09**	0.103	1.158***	−0.154	−0.929	−0.229	0.870	0.777	73.149***
				(0.073)	(0.042)	(1.99E-09)	(0.160)	(0.161)	(0.177)	(6.203)	(0.623)	(1.658)		
		SM	2.123***	0.958***	0.059**	−8.77E-10	0.057	0.794***	0.029	−3.724	−0.286	2.665**	0.854	122.366***
				(0.051)	(0.029)	(1.38E-09)	(0.111)	(0.112)	(0.123)	(4.326)	(0.434)	(1.157)		
		SH	2.240***	0.930***	0.060*	2.40E-09	0.144	0.927***	−0.234	−1.921	−1.115**	2.605*	0.811	89.722***

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A3.2 (*continued*)

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + Rm - Rf_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$										
			α_0	R_m-R_f	WCR	ΔSAV	HML	SMB	WML	DIV	TRM	RTB	$\overline{R}^2$	F-statistics
				(0.059)	(0.034)	(1.61E-09)	(0.129)	(0.131)	(0.143)	(5.026)	(0.505)	(1.343)		
		BL	−0.309	1.044***	0.072**	3.99E-09***	0.250**	0.080	−0.055	−0.171	0.174	2.434**	0.865	133.705***
				(0.050)	(0.029)	(1.37E-09)	(0.110)	(0.111)	(0.122)	(4.268)	(0.428)	(1.141)		
		BM	0.247	0.940***	0.018	1.58E-09*	0.286***	−0.112	−0.003	−5.202**	0.203	0.339	0.936	305.754***
				(0.031)	(0.018)	(8.41E-10)	(0.068)	(0.068)	(0.075)	(2.626)	(0.264)	(0.702)		
		BH	0.853***	0.994***	−0.043**	−1.97E-09**	0.073	−0.101	−0.004	3.198	−0.516	−2.044**	0.915	225.199***
				(0.035)	(0.020)	(9.45E-10)	(0.076)	(0.077)	(0.084)	(2.953)	(0.296)	(0.790)		
		SLo	0.615	1.198***	0.120***	2.44E-10	0.108	1.136***	−0.699***	5.237	0.248	2.599	0.783	73.886***
				(0.077)	(0.044)	(2.05E-09)	(0.166)	(0.168)	(0.186)	(6.540)	(0.648)	(1.713)		
		SNe	2.298***	0.809***	0.064*	1.75E-09	0.019	0.857***	0.048	−9.734	−0.725	0.440	0.752	62.226***
				(0.067)	(0.038)	(1.78E-09)	(0.144)	(0.145)	(0.161)	(5.669)	(0.561)	(1.485)		
		SWi	2.461***	0.981***	0.200***	9.37E-11	0.011	1.109***	0.563**	−9.396	−1.186	2.244	0.664	40.918***
				(0.104)	(0.058)	(2.75E-09)	(0.222)	(0.225)	(0.250)	(8.773)	(0.869)	(2.298)		
		BLo	−0.797**	1.062***	−0.030	3.40E-09**	−0.168	0.348***	−0.694***	−3.715	−1.150**	0.505	0.870	135.749***
				(0.055)	(0.031)	(1.45E-09)	(0.117)	(0.119)	(0.132)	(4.630)	(0.459)	(1.213)		
		BNe	0.377	0.807***	−0.009	5.54E-10	0.071	−0.029	0.084	−14.548***	−0.002	0.742	0.917	224.088***
				(0.035)	(0.020)	(9.30E-10)	(0.075)	(0.076)	(0.085)	(2.970)	(0.294)	(0.778)		
		BWi	1.015***	0.960***	0.056*	2.99E-09**	0.041	−0.007	0.568***	−6.265	1.143**	−0.146	0.840	106.794***
				(0.055)	(0.031)	(1.45E-09)	(0.117)	(0.119)	(0.132)	(4.627)	(0.458)	(1.212)		
C	Aggregate	*SL*	−0.928	1.956***	0.716***	0.882	1.031***	0.477	−0.026	−2.262	−0.619	3.880	0.614	26.35***
				(0.387)	(0.089)	(4.013)	(0.333)	(0.336)	(0.359)	(8.914)	(1.759)	(2.177)		
		SM	2.050**	1.889**	0.357***	−0.909	0.346	0.570**	−0.312	1.870	−1.178	3.800**	0.588	23.749***
				(0.302)	(0.069)	(3.131)	(0.260)	(0.262)	(0.280)	(6.954)	(1.372)	(1.698)		
		SH	3.485***	1.624***	0.214***	0.309	0.152	0.783***	−0.414	1.893	−1.643	3.600**	0.556	20.928***
				(0.288)	(0.066)	(2.988)	(0.248)	(0.250)	(0.267)	(6.638)	(1.310)	(1.621)		
		BL	−2.720	2.821***	0.582***	2.963	0.990	−1.037	−0.156	−5.088	−1.497	4.442	0.228	5.718***
				(0.699)	(0.160)	(7.253)	(0.602)	(0.607)	(0.649)	(16.111)	(3.180)	(3.935)		
		BM	0.955	2.440***	0.231***	−0.975	0.677**	−0.935***	−0.345	−2.775	−0.141	5.360***	0.475	15.281***
				(0.319)	(0.073)	(3.306)	(0.275)	(0.277)	(0.298)	(7.343)	(1.453)	(1.796)		
		BH	1.898	2.006***	0.103**	−2.214	0.043	−0.463***	−0.247	3.146	0.421	1.124	0.560	21.238***
				(0.193)	(0.044)	(2.006)	(0.167)	(0.168)	(0.179)	(4.455)	(0.879)	(1.088)		
		SLo	1.615	1.986***	0.322***	−1.278	0.111	0.868***	−0.876***	6.347	−0.004	4.597**	0.494	16.221***
				(0.340)	(0.077)	(3.488)	(0.292)	(0.294)	(0.320)	(8.027)	(1.539)	(1.889)		
		SNe	2.353**	1.200***	0.316***	0.358	0.070	0.708**	0.216	−8.410	−0.866	8.366***	0.500	13.892***
				(0.368)	(0.095)	(3.655)	(0.314)	(0.303)	(0.329)	(7.755)	(1.987)	(2.352)		
		SWi	2.787**	1.714***	0.449***	0.930	0.084	0.960***	0.286	−1.636	−1.283	3.512	0.516	17.635***
				(0.416)	(0.094)	(4.263)	(0.357)	(0.359)	(0.391)	(9.809)	(1.880)	(2.309)		
		BLo	0.178	2.415***	0.141**	−0.469	−0.181	−0.085	−1.157***	2.678	0.191	3.323**	0.420	12.286***
				(0.266)	(0.060)	(2.728)	(0.229)	(0.230)	(0.250)	(6.277)	(1.203)	(1.477)		
		BNe	0.602	1.715***	0.231***	−0.228	0.121	−0.271	−0.026	−1.455	0.392	6.312***	0.539	16.121***
				(0.249)	(0.065)	(2.478)	(0.213)	(0.205)	(0.223)	(5.257)	(1.347)	(1.595)		
		BWi	1.288	2.436***	0.306***	0.343	0.076	−0.482	0.258	1.108	0.926	2.588	0.510	17.254***
				(0.326)	(0.074)	(3.340)	(0.280)	(0.281)	(0.306)	(7.685)	(1.473)	(1.809)		

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. [2] $\overline{R}^2$ denotes adjusted R-squared. [3] F-statistics indicates overall model fit.

Table A3.3
Pooled OLS estimates with HI.

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + Rm - Rf_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$										
			α_0	R_m-R_f	*HI*	*ΔSAV*	*HML*	*SMB*	*WML*	*DIV*	*TRM*	*RTB*	$\overline{R}^2$	F-statistics
A	Emerging economies	*SL*	0.099	0.956***	−0.050	−2.707	0.472***	0.982***	0.001	−5.353	−0.466	−0.221	0.975	405.918***
				(0.047)	(0.061)	(2.435)	(0.038)	(0.037)	(0.029)	(4.400)	(0.451)	(0.316)		
		SM	0.199	0.738***	−0.154**	1.473	−0.059	0.907***	−0.081**	−24.466***	0.635	0.091	0.951	204.807***
				(0.061)	(0.079)	(3.182)	(0.049)	(0.049)	(0.038)	(5.749)	(0.589)	(0.412)		
		SH	0.354	0.582***	0.044	12.089***	−0.334***	1.077***	−0.041	−40.087***	1.395	0.569	0.917	116.334***
				(0.084)	(0.109)	(4.355)	(0.067)	(0.067)	(0.052)	(7.869)	(0.806)	(0.565)		
		BL	0.596	0.646***	−0.007	12.744*	0.348***	−0.204*	0.072	−36.176***	1.965	1.129	0.750	32.159***
				(0.139)	(0.181)	(7.258)	(0.112)	(0.111)	(0.086)	(13.115)	(1.344)	(0.941)		
		BM	0.139	0.688***	−0.078	0.555	−0.023	0.006	−0.109	−37.177***	0.044	−0.052	0.897	91.101***
				(0.085)	(0.111)	(4.449)	(0.069)	(0.068)	(0.053)	(8.038)	(0.824)	(0.577)		
		BH	0.064	0.968***	−0.093	−3.030	−0.301***	0.118***	0.055	0.149	−0.216	−0.143	0.959	0.959***
				(0.047)	(0.061)	(2.443)	(0.038)	(0.037)	(0.029)	(4.413)	(0.452)	(0.317)		
		SLo	0.177	1.237***	−0.022	−12.745**	0.090	0.830***	−0.299***	24.300**	0.500	−0.205	0.963	117.291***
				(0.119)	(0.123)	(5.197)	(0.073)	(0.100)	(0.081)	(9.746)	(0.600)	(0.267)		
		SNe	0.282	0.909***	−0.031	−8.413***	0.012	1.120***	−0.033	−4.571	0.294	−0.105	0.993	513.76***
				(0.075)	(0.077)	(2.321)	(0.049)	(0.064)	(0.041)	(6.693)	(0.281)	(0.127)		

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A3.3 (*continued*)

Panel	Group	FF portfolios	$y_{it}^{FF\ T.A.} = \alpha_0 + Rm - Rf_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$											
			α_0	R_m-R_f	*HI*	*ΔSAV*	*HML*	*SMB*	*WML*	*DIV*	*TRM*	*RTB*	$\overline{R}^2$	F-statistics
		SWi	−0.220	0.998***	−0.171	−9.572*	0.038	0.973***	0.290***	0.094	0.388	−0.161	0.966	129.776***
				(0.119)	(0.123)	(5.191)	(0.073)	(0.100)	(0.081)	(9.734)	(0.599)	(0.267)		
		BLo	−0.277	0.845***	−0.280	−16.158*	−0.301**	0.073	−0.885***	−10.004	−1.491	0.230	0.858	27.901***
				(0.215)	(0.222)	(9.357)	(0.132)	(0.180)	(0.146)	(17.547)	(1.079)	(0.481)		
		BNe	0.790	0.987***	0.030	−7.683**	−0.091	0.076	0.114	−2.619	−0.156	0.076	0.976	137.479***
				(0.123)	(0.126)	(3.789)	(0.081)	(0.105)	(0.066)	(10.925)	(0.458)	(0.208)		
		BWi	0.079	1.079***	−0.132	−19.159**	−0.245**	−0.055	0.535***	14.132	−1.413	0.157	0.883	34.848***
				(0.174)	(0.180)	(7.580)	(0.107)	(0.146)	(0.119)	(14.215)	(0.874)	(0.390)		
B	Developed economies	*SL*	4.291***	1.252**	−0.479***	4.440	−0.371	1.081**	−0.235	−9.185	−3.464**	8.020	0.539	8.543***
				(0.591)	(0.142)	(8.668)	(0.439)	(0.479)	(0.538)	(13.488)	(1.694)	(4.650)		
		SM	4.585***	1.353***	−0.298***	0.480	−0.228	0.816**	−0.298	−6.117	−2.146	6.766	0.618	11.454***
				(0.446)	(0.107)	(6.541)	(0.331)	(0.362)	(0.406)	(10.178)	(1.279)	(3.509)		
		SH	4.754***	1.161**	−0.228*	−2.277	−0.249	1.172***	−0.532	−11.150	−3.658**	5.432	0.545	8.728***
				(0.532)	(0.128)	(7.811)	(0.395)	(0.432)	(0.485)	(12.154)	(1.527)	(4.190)		
		BL	1.621***	1.581***	−0.412***	4.702	−0.092	0.178	−0.493	−12.485	−0.896	5.010	0.602	10.753***
				(0.349)	(0.084)	(5.116)	(0.259)	(0.283)	(0.318)	(7.961)	(1.000)	(2.744)		
		BM	2.294***	1.438***	−0.146**	2.061	−0.049	−0.146	−0.188	−7.089	−0.694	0.555	0.633	12.143***
				(0.254)	(0.061)	(3.729)	(0.189)	(0.206)	(0.231)	(5.803)	(0.729)	(2.000)		
		BH	2.676***	1.965***	−0.112**	−0.910	0.024	−0.414**	−0.427**	3.167	−0.153	−1.440	0.732	18.623***
				(0.223)	(0.054)	(3.276)	(0.166)	(0.181)	(0.203)	(5.097)	(0.640)	(1.757)		
		SLo	1.486	1.898***	0.539**	−2.455	−0.193	0.031	−0.347	49.877**	−9.724**	0.414	0.695	8.865***
				(0.258)	(0.228)	(19.324)	(0.596)	(0.575)	(0.738)	(17.881)	(3.733)	(0.885)		
		SNe	2.273**	1.159***	0.325	−2.185	−0.153	0.164	0.285	10.124	−11.860***	−0.099	0.668	7.946***
				(0.220)	(0.194)	(16.489)	(0.509)	(0.490)	(0.630)	(15.258)	(3.185)	(0.755)		
		SWi	3.269**	1.692***	0.285	−3.715	−0.182	0.365	0.171	35.267	−19.898***	−0.011	0.646	7.295***
				(0.340)	(0.300)	(25.468)	(0.785)	(0.757)	(0.973)	(23.566)	(4.920)	(1.166)		
		BLo	−1.149**	1.185***	0.050	2.603	−0.418	−0.161	0.313	−3.990	0.472	−0.132	0.835	15.526***
				(0.121)	(0.107)	(9.061)	(0.279)	(0.269)	(0.346)	(8.384)	(1.750)	(0.415)		
		BNe	0.076	0.978***	0.141*	4.001	−0.064	−0.277	0.337	−1.290	−2.034	−0.210	0.867	23.556***
				(0.090)	(0.079)	(6.702)	(0.207)	(0.199)	(0.256)	(6.202)	(1.295)	(0.307)		
		BWi	1.570**	1.059***	0.275**	7.321	−0.203	−0.427	0.952**	12.969	0.217	−0.602	0.746	11.140***
				(0.143)	(0.126)	(10.711)	(0.330)	(0.319)	(0.409)	(9.911)	(2.069)	(0.490)		
C	Aggregate	*SL*	4.885***	0.786	−0.609***	5.128	0.028	1.289**	−0.110	−16.342	−3.124	0.972	0.510	8.533***
				(0.689)	(0.165)	(9.687)	(0.519)	(0.576)	(0.612)	(16.154)	(1.994)	(5.277)		
		SM	4.798***	1.072**	−0.332***	1.109	−0.110	0.970**	−0.223	−10.819	−2.394	3.910	0.627	13.172***
				(0.436)	(0.105)	(6.131)	(0.328)	(0.365)	(0.387)	(10.223)	(1.262)	(3.339)		
		SH	4.865***	0.892	−0.241**	−2.678	−0.171	1.287	−0.423	−15.188	−3.580	3.477	0.557	10.088***
				(0.503)	(0.121)	(7.075)	(0.379)	(0.421)	(0.447)	(11.797)	(1.456)	(3.854)		
		BL	1.703***	1.576***	−0.442***	1.613	−0.014	0.024	−0.359	−7.904	−0.291	5.348	0.468	7.359***
				(0.429)	(0.103)	(6.034)	(0.323)	(0.359)	(0.381)	(10.062)	(1.242)	(3.287)		
		BM	2.301***	1.512***	−0.131**	2.310	−0.008	−0.263	−0.177	−5.748	−0.377	0.426	0.607	12.157***
				(0.249)	(0.060)	(3.506)	(0.188)	(0.208)	(0.221)	(5.847)	(0.722)	(1.910)		
		BH	2.519***	1.883***	−0.079	−2.429	−0.061	−0.467**	−0.275	3.699	−0.199	−1.517	0.700	17.928***
				(0.212)	(0.051)	(2.977)	0.159	(0.177)	(0.188)	(4.965)	(0.613)	(1.622)		
		SLo	4.184***	2.527**	0.469*	82.762	−0.965	−0.323	−0.929	65.665***	−19.593***	0.672	0.631	5.957***
				(1.118)	(0.237)	(64.614)	(0.687)	(0.770)	(0.976)	(19.321)	(4.337)	(0.857)		
		SNe	3.321	1.582	0.326	78.030	−1.037	−0.048	−0.031	27.138	−19.334***	0.056	0.674	6.517***
				(1.067)	(0.223)	(58.172)	(0.644)	(0.730)	(0.877)	(18.153)	(3.995)	(0.775)		
		SWi	5.777***	2.414	0.286	41.572	−1.201	0.200	−0.540	53.361	−29.211***	0.184	0.639	6.128***
				(1.615)	(0.342)	(93.354)	(0.993)	(1.113)	(1.410)	(27.915)	(6.266)	(1.239)		
		BLo	0.344	1.761***	0.016	56.022	−0.827**	−0.700	0.149	6.345	−4.591**	0.030	0.484	3.720***
				(0.542)	(0.115)	(31.311)	(0.333)	(0.373)	(0.473)	(9.363)	(2.102)	(0.415)		
		BNe	1.681***	1.485***	0.132	−7.491	−0.481	−0.520	0.117	3.776	−5.414***	−0.028	0.627	5.499***
				(0.475)	(0.099)	(25.903)	(0.287)	(0.325)	(0.390)	(8.083)	(1.779)	(0.345)		
		BWi	3.538***	1.323	0.334**	23.229	−0.605	−0.500	0.690	16.236	−4.104	−0.805	0.504	3.945***
				(0.725)	(0.154)	(41.899)	(0.446)	(0.500)	(0.633)	(12.529)	(2.812)	(0.556)		
D	Global economies	*SL*	5.096***	0.797	−0.548***	9.068	0.298	1.051	−0.190	5.913	−3.393	0.503	0.447	7.215***
				(0.668)	(0.168)	(10.030)	(0.545)	(0.578)	(0.625)	(10.784)	(2.057)	(5.383)		
		SM	4.946***	1.044**	−0.279**	4.018	0.087	0.796**	−0.247	4.629	−2.580	3.291	0.552	10.448***
				(0.438)	(0.110)	(6.572)	(0.357)	(0.379)	(0.409)	(7.067)	(1.348)	(3.527)		
		SH	5.049	0.960*	−0.208*	0.377	0.001	1.080**	−0.475	0.814	−3.757**	2.709	0.492	8.436***
				(0.491)	(0.124)	(7.373)	(0.401)	(0.425)	(0.459)	(7.927)	(1.512)	(3.957)		
		BL	1.549***	−0.403***	3.888***	0.105	−0.106	−0.345	0.657	−0.425	4.475	1.802	0.392	5.957***
				(0.105)	(6.267)	(0.341)	(0.361)	(0.390)	(6.739)	(1.286)	(3.364)	(0.524)		
		BM	2.364***	1.526***	−0.111*	3.843	0.063	−0.349	−0.188	−0.770	−0.467	−0.080	0.546	10.238***
				(0.245)	(0.062)	(3.673)	(0.200)	(0.212)	(0.229)	(3.949)	(0.753)	(1.971)		
		BH	2.486***	1.754	−0.031	−1.313	0.025	−0.483**	−0.239	3.867	−0.258	−1.843	0.638	14.520***
				(0.213)	(0.054)	(3.205)	(0.174)	(0.185)	(0.200)	(3.446)	(0.657)	(1.720)		
		SLo	2.712**	1.564***	0.430**	15.470	0.466	0.208	−0.550	34.275	−7.344**	0.149	0.614	7.454***
				(0.238)	(0.182)	(17.812)	(0.491)	(0.499)	(0.637)	(17.212)	(2.859)	(0.825)		

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A3.3 (*continued*)

Panel	Group	FF portfolios	$y_{it}^{FF\,T.A.} = \alpha_0 + Rm - Rf_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + u_{it}$											
			α_0	R_m-R_f	*HI*	*ΔSAV*	*HML*	*SMB*	*WML*	*DIV*	*TRM*	*RTB*	$\overline{R}^2$	F-statistics
		SNe	2.160**	1.125***	0.386**	1.958	−0.107	0.066	0.345	9.965	−12.492***	−0.252	0.675	9.337***
				(0.201)	(0.161)	(14.600)	(0.464)	(0.437)	(0.569)	(14.265)	(2.614)	(0.665)		
		SWi	4.159***	1.311***	0.199	12.137	0.158	0.438	0.414	17.192	−15.491***	−0.054	0.575	7.323***
				(0.306)	(0.234)	(22.879)	(0.631)	(0.641)	(0.818)	(22.107)	(3.673)	(1.060)		
		BLo	−0.970***	1.110	0.046	9.374	−0.250	−0.227	0.264	−3.735	0.148	−0.318	0.823	22.714***
				(0.102)	(0.078)	(7.664)	(0.211)	(0.215)	(0.274)	(7.406)	(1.230)	(0.355)		
		BNe	0.079	0.965***	0.172**	8.296	0.013	−0.315	0.274	−0.450	−2.876**	−0.352	0.860	25.590***
				(0.085)	(0.068)	(6.208)	(0.197)	(0.186)	(0.242)	(6.065)	(1.112)	(0.283)		
		BWi	1.958	0.884	0.284	21.018	0.036	−0.519	0.976	9.284	−0.241	−0.899	0.659	10.024***
				(0.138)	(0.106)	(10.357)	(0.286)	(0.290)	(0.370)	(10.008)	(1.663)	(0.480)		

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. [2] $\overline{R}^2$ denotes adjusted R-squared. [3] F-statistics indicates overall model fit.

Table A4.1
Fixed and Random Effects estimate with LBR.

Panel A: Emerging economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	−7.523	−18.005	−3.795	−21.632	−20.761	0.229	−7.009	−19.613	−10.301	10.738	−10.351	7.089
	R_m-R_f	4.177***	4.711***	4.083***	5.568***	5.542***	3.194***	4.820***	5.306***	4.607***	3.816***	4.990***	3.670***
	LBR	0.341	0.857	0.187	1.013	0.962	−0.010	0.313	0.879	0.503	−0.472	0.437	−0.340
	ΔSAV	13.415**	11.822**	15.260***	9.797	15.299**	11.979**	8.123	17.169**	10.756**	13.145	11.083	14.794**
	HML	0.756***	0.258***	−0.067	0.582***	0.461***	−0.130	0.232**	0.159	0.156**	−0.016	−0.027	0.126
	SMB	0.903***	0.739***	0.792***	−0.470**	−0.192	0.025	0.788***	0.979***	0.832***	−0.006	0.273**	−0.064
	WML	0.037	0.030	0.043	0.072	0.007	0.049	−0.475***	0.203	0.247***	−0.790***	0.190	0.556***
	DIV	−10.411	6.245	−3.543	14.471	21.749	−30.950***	12.080	−11.415	2.751	−7.210	−19.362	−2.545
	TRM	0.219	0.234	−0.779	0.727	0.887	−0.602	−0.229	−0.926	−0.633	−0.781	0.637	−0.936
	RTB	−0.220	−0.133	−0.189	0.658	−0.099	−0.179	−0.431	−0.230	−0.485	−0.224	−0.041	−0.533
	Overall R^2	0.910	0.808	0.815	0.579	0.683	0.750	0.843	0.915	0.852	0.690	0.845	0.590
	F-statistics	70.78***	34.16***	29.45***	9.13***	15.78***	20.45***	36.11***	26.78***	38.22***	16.00***	15.11***	10.68***
	σ_u	0.722	1.809	0.751	0.382	1.395	0.655	0.898	0.613	0.579	2.022	1.157	2.619
	σ_ε	2.690	2.809	2.608	5.393	3.787	2.583	3.154	2.611	2.624	4.146	2.544	3.556
	P	0.067	0.293	0.076	0.005	0.119	0.060	0.075	0.052	0.046	0.192	0.171	0.351
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	−4.078	−3.912	−6.513	−18.774	−10.413	4.591	−10.528	−11.689	−5.915	−4.773	4.598	−9.143
	R_m-R_f	4.417***	4.897***	4.302***	5.635***	5.798***	3.360***	5.072***	5.325***	4.594***	3.815***	5.027	4.105***
	LBR	0.171	0.176	0.314	0.875	0.460	−0.222	0.478	0.489	0.292	0.273	−0.299	0.433
	ΔSAV	12.917**	12.037**	14.501***	9.757	15.119**	11.741**	7.229	16.693**	11.023**	12.333	10.186	12.719*
	HML	0.723***	0.216***	−0.088	0.570***	0.416***	−0.155**	0.208**	0.141	0.151**	0.005	−0.060	0.100
	SMB	0.901***	0.727***	0.795***	−0.472***	−0.201	0.022	0.792***	0.975***	0.828***	0.007	0.265**	−0.048
	WML	0.013	−0.010	0.034	0.061	−0.030	0.029	−0.485***	0.194	0.239***	−0.759***	0.173	0.558***
	DIV	−6.062	11.280	−0.453	15.962	27.355	−27.667**	15.586	−9.878	3.185	−9.491	−16.463	2.008
	TRM	0.150	0.036	−0.767	0.684	0.729	−0.675	−0.210	−0.971	−0.688	−0.585	0.552	−0.776
	RTB	−0.130	−0.035	−0.121	0.688	0.013	−0.112	−0.354	−0.248	−0.479	−0.263	−0.076	−0.426
	Overall R^2	0.911	0.821	0.816	0.580	0.693	0.754	0.844	0.916	0.853	0.699	0.853	0.603
	Wald χ^2	640***	285.46***	276.47***	85.64***	140.05	190.92	335.66***	263.04***	360.15***	144.16	140.10	94.43***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_ε	2.690	2.089	2.608	5.393	3.787	2.583	3.154	2.611	2.624	4.146	2.544	3.556
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	3.78	8.29	2.28	0.11	3.69	2.28	2.04	0.09	0.42	2.27	0.34	9.76
	H_0: re is consistent, H_1: fe is consistent	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*

Panel B: Developed economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	6.316	1.337	0.666	3.548	−4.034	4.284	2.306	4.340	0.781	−5.245	4.888	4.855
	R_m-R_f	0.527***	0.576***	0.505***	0.746***	0.615***	0.729***	−0.076	0.050	0.135	0.602**	0.426**	0.236
	LBR	−0.321	−0.021	0.014	−0.178	0.258	−0.248	−0.074	−0.199	0.034	0.308	−0.286	−0.258
	ΔSAV	−1.379	−1.363	5.306	−3.661	−0.627	−0.641	−5.174	0.556	−6.284	3.849	−2.974	4.301
	HML	−0.047	0.062	0.068	0.051	0.117	−0.007	−0.123	−0.198	−0.179	−0.324	−0.197	−0.153
	SMB	0.309***	0.226***	0.276***	0.009	−0.093	−0.039	0.148	0.254	0.215**	0.128	0.054	0.141
	WML	−0.225	−0.028	−0.124	−0.263	0.209	0.026	0.276	0.052	0.110	−0.251	0.159	0.043
	DIV	1.052	0.691	0.905	1.639	−0.438	0.550	0.680	−0.639	1.373	−0.847	−0.254	−0.180

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.1 (*continued*)

Panel B: Developed economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
	TRM	−0.020	0.015	−0.557**	−0.251	−0.245	0.145	−0.107	0.252	−0.035	−0.147	0.207	0.665
	RTB	0.119	−0.020	0.034	0.020	−0.065	0.076	0.140	0.130	0.006	0.398	0.172	0.064
	Overall R^2	0.434	0.934	0.943	0.226	0.857	0.149	0.069	0.668	0.838	0.697	0.487	0.580
	F-statistics	5.33	9.51***	9.82***	2.24	4.58***	5.31***	0.92	1.90	2.23	1.73***	2.51**	0.95
	σ_u	4.030	0.665	0.377	2.785	2.347	3.136	2.126	3.284	1.041	2.023	3.479	3.764
	σ_e	0.674	0.471	0.414	0.603	0.477	0.676	0.640	0.576	0.547	1.064	0.693	0.837
	ρ	0.972	0.666	0.452	0.955	0.960	0.955	0.916	0.970	0.783	0.783	0.961	0.952
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	−0.302	0.467	0.188	−1.224**	−0.076	−0.136	−0.619	−0.453	−0.332	−2.135**	−0.411	0.034
	R_m-R_f	0.608***	0.613***	0.470***	0.622***	0.560	0.790	0.035	0.224**	0.184	0.495	0.561***	0.538***
	LBR	0.075***	0.031	0.043**	0.095***	0.025	0.024	0.097***	0.087***	0.100***	0.123**	0.037	0.031
	ΔSAV	4.146	−1.922	5.327	5.477	0.708	−7.806	−4.090	2.909	−4.461	7.623	0.920	−5.486
	HML	0.113	0.105	0.031	0.246**	0.109	0.051	−0.018	−0.013	−0.061	−0.189	−0.005	−0.073
	SMB	0.214***	0.207***	0.313***	−0.087	−0.065	−0.063	0.152	0.176***	0.171**	0.080	0.009	0.029
	WML	−0.151	0.014	−0.074	−0.135	0.189	0.146	0.325	0.198	0.215	−0.161	0.203	0.398
	DIV	0.758	0.467	1.176	1.316	0.041	0.826	1.238	−0.827	1.553	0.975	−0.087	−0.841
	TRM	−0.120	−0.118	−0.358	−0.247	0.058	−0.103	−0.229	−0.068	−0.156	−0.202	0.039	0.027
	RTB	−0.045	−0.040	0.038	−0.139	0.003	0.010	0.068	−0.008	−0.038	0.389	0.009	−0.060
	Overall R^2	0.917	0.960	0.951	0.896	0.909	0.893	0.874	0.909	0.927	0.725	0.873	0.795
	Wald χ^2	357.33***	760.53***	592.56***	198.70***	302.90***	235.22***	174.19***	301.98***	371.89***	58.03***	193.67***	108.87***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_e	0.674	0.471	0.414	0.603	0.477	0.676	0.640	0.576	0.547	1.064	0.693	0.837
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	9.00	1.21	2.44	9.38	13.71	5.42	−1.63	17.34**	6.28	−38.39	25.46***	16.36
	H_0: *re is consistent, H_1: fe is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	–	*re is consistent*	*re is consistent*	–	*re is consistent*	*re is consistent*

Panel C: Aggregate

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	7.472**	5.822**	4.167	−4.895	0.110	−0.104	5.769	5.814	8.510	−3.898	−1.389	5.085
	R_m-R_f	1.144***	1.016***	0.938***	1.143***	1.038***	0.952***	1.109***	0.964***	1.043***	1.060***	0.942***	1.042***
	LBR	−0.246	−0.176	−0.102	0.314	0.020	0.020	−0.226	−0.177	−0.259	0.164	0.093	−0.199
	ΔSAV	2.13e-09	−4.61e-11	3.54e-09**	1.64e-09	4.67e-10	−7.93e-10	1.92e-09	2.41e-10	1.49e-09	4.89e-09***	3.22e-10	1.96e-09
	HML	0.771***	0.354***	0.386***	0.786	0.667	−0.003	0.226	0.198	0.391	−0.223	0.161	0.234
	SMB	1.727***	1.293***	1.469***	−0.132	−0.089	−0.084	1.434***	1.117***	1.706***	0.182	−0.113	0.084
	WML	−0.133	0.004	−0.050	−0.037	0.036	−0.016	−0.901***	0.271	0.608***	−1.431***	0.079	0.785***
	DIV	5.539	3.434	1.207	3.075	−1.109	1.696	6.853	−5.617	0.641	1.554	−3.334	3.642
	TRM	−0.601	−0.418	−1.359***	−0.882	−0.102	−0.148	−0.323	−0.962	−1.212	−0.567	−0.200	1.047**
	RTB	−0.206	−0.284	−0.502	0.278	−0.533	−0.479	−1.753**	0.394	−0.195	0.989	0.765	0.038
	Overall R^2	0.841	0.896	0.865	0.520	0.888	0.931	0.839	0.842	0.779	0.855	0.926	0.884
	F-statistics	173.32***	199.71***	161.42***	26.26***	184.17	413.50***	126.54***	99.40***	77.46***	136.17***	300.08***	169.21***
	σ_u	1.870	0.751	1.426	2.982	0.949	1.123	1.284	0.797	1.277	0.652	0.971	0.912
	σ_e	2.698	2.161	2.301	6.721	2.257	1.341	2.957	2.532	3.677	2.755	1.382	2.322
	ρ	0.324	0.107	0.277	0.164	0.150	0.411	0.158	0.090	0.107	0.053	0.330	0.133
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	7.912***	5.927***	5.805***	0.811	2.058***	0.0003	3.534	4.660***	9.270***	−3.998***	0.959	4.199***
	R_m-R_f	1.141***	1.015***	0.938***	1.149***	1.045***	0.947***	1.105***	0.961***	1.042***	1.059***	0.959***	1.052***
	LBR	−0.254***	−0.181***	−0.186***	1.002	−0.085**	0.009	−0.105	−0.111**	−0.298***	3.97e-09**	−0.039	−0.154***
	ΔSAV	2.63e-09	6.26e-10	3.68e-09**	4.57e-09	9.30e-10	−9.66e-10	1.91e-09	2.21e-09	1.81e-09	−0.272	4.91e-10	2.48e-09*
	HML	0.786***	0.415***	0.339***	0.900	0.695	−0.011	0.263	0.151	0.394	0.212	0.155	0.250
	SMB	1.729***	1.276***	1.398	−0.135	−0.057	−0.088	1.435***	1.106***	1.701***	−1.339***	−0.014	0.157
	WML	−0.143	0.017	−0.128	−0.111	0.003	0.011	−0.878***	0.128	0.607***	0.979	0.118	0.801***
	DIV	5.500	3.215	1.180	2.788	−0.963	1.657	6.823	−5.193	0.616	−0.543	−3.553	3.487
	TRM	−0.588	−0.359	−1.374***	−0.646	−0.084	−0.196	−0.324	−0.650	−1.169	0.935	−0.024	1.122**
	RTB	−0.195	−0.216	−0.578	0.427	−0.552	−0.499	−1.699**	0.593	−0.190	0.855	0.605	0.079
	Overall R^2	0.842	0.897	0.875	0.811	0.895	0.931	0.850	0.846	0.779	0.725	0.939	0.887
	Wald χ^2	0.230***	1900.87***	1522.61***	263.54***	1850.20	3557.46	1207.29***	957.13***	741.18***	1257.86***	2704.64***	1665.96***
	σ_u	1.475	0.317	–	–	–	0.587	0.919	–	1.633	–	–	–
	σ_e	2.698	2.161	2.301	6.721	2.257	1.341	2.957	2.532	3.677	2.755	1.382	2.322
	ρ	0.230	0.021	–	–	–	0.160	0.088	–	0.164	–	–	–
Hausman's specification test	χ^2	−2.28	15.53	18.75**	5.81	3.59	−7.89	0.65	12.51	0.23	16.86**	100.09***	13.25
	H_0: *re is consistent, H_1: fe is consistent*	–	*re is consistent*	*fe is consistent*	*re is consistent*	*re is consistent*	–	*re is consistent*	*re is consistent*	*re is consistent*	*fe is consistent*	*fe is consistent*	*re is consistent*

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.1 *(continued)*

Panel D: Global economies													
	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	0.085	−0.381	−1.654	−23.619***	−1.478	−0.074	−2.600	4.160	5.211	−10.553	1.034	5.838
	R_m-R_f	2.511***	2.332***	2.153***	4.186***	2.652***	2.079***	1.800***	0.778	1.968***	2.104***	1.436***	2.401***
	LBR	0.280	0.277	0.329	1.483	0.207	0.121	0.374	0.026	0.048	0.648*	0.061	−0.138
	ΔSAV	−1.246	−0.498	2.673	−0.451	−0.249	−1.660	−0.227	−0.461	3.118	−0.124	−0.027	0.673
	HML	1.347***	0.558	0.530	1.364	0.971***	0.107	0.570	0.292	0.547	0.091	0.176	0.257
	SMB	1.404***	1.221	1.606***	−0.893	−0.625	−0.279	1.499***	1.167***	1.896	−0.202	−0.087	−0.187
	WML	0.327	0.013	0.104	−0.008	0.112	0.015	−0.440	0.493	0.825	−0.917***	0.270	0.729**
	DIV	−10.762	−6.332	−5.836	33.241	−12.846	−16.180***	−11.237	−31.023***	−9.417	−16.201	−27.574***	−23.111**
	TRM	−1.577	−0.529	−2.715***	−0.971	0.160	0.172	−1.062	−1.930	−2.242	−0.392	0.189	1.338
	RTB	1.662	2.404	1.400	3.921	4.830***	0.959	1.933	4.733	0.861	2.037	3.726**	1.830
	Overall R^2	0.414	0.424	0.418	0.103	0.403	0.528	0.321	0.470	0.400	0.217	0.543	0.523
	F-statistics	12.00***	11.07***	13.03***	2.66***	10.57***	16.26***	5.98***	6.070	6.41***	7.57***	12.49***	99.93***
	σ_u	7.973	6.078	6.826	15.488	4.527	2.498	6.151	3.209	5.715	5.693	2.468	2.704
	σ_ε	3.997	3.241	3.110	8.825	3.571	2.498	4.083	3.613	4.974	3.118	2.115	3.688
	ρ	0.799	0.778	0.828	0.754	0.616	0.579	0.694	0.440	0.569	0.769	0.576	0.349
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + LBR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	13.982	11.182***	10.463***	7.787	7.015***	4.441***	9.345	7.530***	13.755***	0.713	3.829	8.278***
	R_m-R_f	2.226***	2.069***	1.703***	2.886***	2.534***	2.034***	1.617	0.665	1.408**	2.148***	1.417***	2.163***
	LBR	−0.480***	−0.354***	−0.333***	−0.272	−0.254**	−0.131*	−0.297	−0.154	−0.425***	0.020	−0.067	−0.282***
	ΔSAV	−0.796	−0.082	1.671	0.175	−0.177	−1.572	−1.392	−0.035	1.350	−0.540	−0.033	0.566
	HML	1.190***	0.445	0.360	1.619**	0.854***	0.017	0.404	2.212	0.554	−0.241	0.139	0.330
	SMB	1.403***	1.263***	1.505***	−0.839	−0.609	−0.251	1.596	1.183***	1.815***	−0.132	−0.077	−0.066
	WML	0.272	−0.034	−0.141	−0.030	0.018	−0.026	−0.596	0.449	0.640	−1.091***	0.266	0.601
	DIV	−18.916	−17.331**	−21.028***	−8.247	−19.291**	−18.600***	−26.042	−37.546***	−30.651**	−22.154***	−28.550***	−34.453***
	TRM	−1.222	−0.419	−2.213**	−0.329	0.511	0.204	−0.911	−1.718	−2.155	0.360	0.235***	1.840
	RTB	2.168	3.063	2.703	4.985	5.570***	1.102	3.473	5.498**	2.294	3.666**	3.817	3.032
	Overall R^2	0.558	0.590	0.600	0.220	0.558	0.652	0.491	0.527	0.493	0.469	0.619	0.556
	Wald χ^2	118.43***	131.41***	169.63***	33.12***	120.35***	177.29***	110.15	76.47***	107.32***	101.05***	127.52***	143.16***
	σ_u	3.076	1.446	0.342	–	1.561	1.235	–	2.122	0.440	–	4.033	–
	σ_ε	3.997	3.241	3.110	8.825	3.571	2.128	4.083	3.613	4.974	3.118	2.115	3.688
	ρ	0.372	0.166	0.012	–	0.160	0.252	–	0.256	0.007	–	0.784	–
Hausman's specification test	χ^2	97.66***	598.62***	75.60***	0.97	8.16	2.72	20.61**	3.12	13.11	11.94	0.45	−38.18
	H_0: *re is consistent,* H_1: *fe is consistent*	*fe is consistent*	*fe is consistent*	*fe is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*fe is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	–

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. [2] Hausman's specification test, if the χ^2 value is significant implies reject the H_0 and accept H_1 or otherwise.

Table A4.2
Fixed and Random Effects estimates with WCR.

Panel A: Emerging economies													
	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	−3.251	−4.263	−1.178	−5.412	−7.208	1.772	−0.537	−4.648	−0.276	2.017	−8.256	2.665
	R_m-R_f	4.169***	4.623***	4.073***	5.464***	5.487***	3.156***	4.754***	5.347***	4.510***	3.891***	5.009***	3.681***
	WCR	0.208	0.299	0.093	0.356	0.475	−0.130	0.001	0.265	0.030	−0.080	0.624	−0.194
	ΔSAV	13.463**	12.822**	15.366***	10.970	15.873**	12.465**	8.912	16.728**	11.914***	12.260	11.312	14.697**
	HML	0.756***	0.261***	−0.067	0.586***	0.463***	−0.128	0.234***	0.132	0.160**	−0.020	−0.031	0.126
	SMB	0.905***	0.742***	0.792***	−0.467**	−0.188	0.024	0.788***	0.974***	0.832***	−0.007	0.267**	−0.066
	WML	0.037	0.029	0.043	0.070	0.007	0.048	−0.476***	0.197	0.246***	−0.789***	0.191	0.556***
	DIV	−10.650	5.356	−3.700	13.423	20.931	−31.103***	11.616	−9.373	2.042	−6.611	−20.214	−2.291
	TRM	0.202	0.161	−0.791	0.642	0.824	−0.619	−0.270	−0.951	−0.696	−0.729	0.620	−0.917
	RTB	−0.213	−0.120	−0.185	0.673	−0.080	−0.183	−0.430	−0.242	−0.483	−0.228	−0.016	−0.540
	Overall R^2	0.901	0.777	0.812	0.565	0.623	0.760	0.841	0.913	0.851	0.689	−0.016	0.576
	F-statistics	70.69	33.04***	29.42***	8.96***	15.51***	20.52***	35.93***	26.37***	37.54***	15.89***	15.19***	10.67***
	σ_u	1.274	2.430	0.696	1.134	2.753	0.393	1.159	0.690	0.199	1.919	3.346	3.111
	σ_ε	2.691	2.849	2.609	5.422	3.810	2.579	3.161	2.629	2.644	4.157	2.538	3.558
	ρ	0.183	0.421	0.066	0.041	0.343	0.022	0.118	0.064	0.005	0.175	0.634	0.433
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	0.387	2.217	−0.425	−2.254	0.333	2.110	−1.255	−2.973	0.225	−2.388	−0.133	−1.977
	R_m-R_f	4.298***	4.653***	4.247***	5.518***	5.575***	3.254***	4.989***	5.348***	4.506***	3.997***	5.012***	4.127***
	WCR	−0.068	−0.186	0.030	0.117	−0.091	−0.159	0.046	0.111	−0.007	0.244	−0.124	0.134

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.2 (*continued*)

Panel A: Emerging economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
	ΔSAV	14.064**	14.206***	15.257***	11.583	17.399**	12.385***	8.383	16.567**	12.031**	11.119	10.530	12.969*
	HML	0.737***	0.247***	−0.085	0.576***	0.441***	−0.138**	0.213**	0.128	0.159**	−0.022	−0.047	0.092
	SMB	0.906***	0.738***	0.797***	−0.468***	−0.191	0.027	0.795***	0.974***	0.831***	−0.0007	0.270**	−0.050
	WML	0.024	0.013	0.035	0.061	−0.013	0.044	−0.483***	0.195	0.245***	−0.783***	0.181	0.549***
	DIV	−7.750	7.637	−0.953	15.101	24.362	−29.584***	14.815	−8.766	2.130	−6.324	−17.270	2.843
	TRM	0.159	0.075	−0.794	0.602	0.727	−0.619	−0.251	−0.954	−0.703	−0.666	0.606	−0.837
	RTB	−0.146	−0.075	−0.116	0.710	−0.007	−0.145	−0.346	−0.252	−0.482	−0.211	−0.067	−0.399
	Overall R^2	0.912	0.826	0.815	0.574	0.691	0.761	0.842	0.915	0.851	0.706	0.854	0.604
	Wald χ^2	642.26***	296.07***	273.66***	83.62***	139.06***	197.37***	330.43***	260.00***	356.69***	149.31***	141.16***	94.65***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_ε	2.691	2.849	2.609	5.422	3.810	2.579	3.161	2.629	2.644	4.157	2.538	3.558
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	3.76	3.22	3.04	0.28	3.27	0.71	2.89	0.01	0.01	0.42	0.31	20.15**
	H_0: re is consistent, H_1: fe is consistent	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*fe is consistent*

Panel B: Developed economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	7.733***	2.982	0.634	0.785	−0.118	1.626	2.823	4.565	7.574**	−0.660	−0.441	3.183
	R_m-R_f	1.153***	1.004***	0.948***	1.090***	0.954***	0.978	1.216***	0.826***	1.029***	1.042***	0.798***	0.946***
	WCR	−0.564**	−0.034	0.240	−0.051	0.057	−0.127	−0.128	−0.183	−0.366	−0.051	0.084	−0.181
	ΔSAV	3.22e-09	−1.29e-09	3.05e-09	1.52e-09	1.76e-09**	−1.21e-09	7.67e-10	3.57e-10	2.17e-10	2.91e-09	5.07e-10	3.37e-09**
	HML	0.157	0.133	0.287**	0.116	0.315***	0.108	0.037	0.123	0.132	−0.389***	0.122	0.139
	SMB	1.426***	0.989***	1.146***	0.040	−0.066	−0.045	1.155***	1.003***	1.454***	0.064	−0.059	0.101
	WML	0.012	0.142	−0.080	−0.082	0.038	0.022	−0.771***	0.241	0.755***	−0.917***	0.086	0.650***
	DIV	4.838	0.897	0.912	3.549	−3.037	1.586	8.221	−8.378	−3.864	−4.110	−14.082***	−5.734
	TRM	−0.654	−0.547	−1.053**	−0.318	0.202	−0.414	0.074	−1.161**	−1.748**	−1.239***	−0.141	0.927**
	RTB	−1.085	1.730	2.455	1.823**	0.220	−2.224***	1.705	−0.621	−0.173	0.743	0.619	−1.074
	Overall R^2	0.457	0.825	0.787	0.853	0.936	0.903	0.748	0.658	0.477	0.838	0.908	0.754
	F-statistics	102.90***	131.08***	89.29***	238.62***	308.11***	237.49***	69.04	57.83***	37.11	137.56	230.29***	103.01***
	σ_u	4.852	1.430	1.134	1.598	0.471	0.940	1.473	2.049	4.195	1.438	0.770	1.890
	σ_ε	2.298	1.820	2.190	1.417	1.148	1.2693	2.890	2.491	3.762	1.998	1.257	1.982
	ρ	0.816	0.381	0.211	0.560	0.144	0.354	0.206	0.403	0.554	0.341	0.273	0.476
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	1.104**	2.123***	2.239***	−0.309	0.247	0.852***	0.614	2.298***	2.460***	−0.796	0.376	1.015
	R_m-R_f	1.057***	0.957***	0.929***	1.044***	0.939***	0.994***	1.197***	0.808***	0.980***	1.061***	0.806***	0.960***
	WCR	0.167***	0.059**	0.060*	0.072**	0.018	−0.042**	0.120***	0.064*	0.199***	−0.030	−0.008	0.056*
	ΔSAV	5.06e-09**	−8.77e-10	2.40e-09	3.99e-09***	1.58e-09*	−1.97e-09**	2.44e-10	1.75e-09	9.37e-11	3.40e-09**	5.54e-10	2.99e-09**
	HML	0.103	0.057	0.144	0.249**	0.286***	0.072	0.107	0.019	0.010	−0.167	0.071	0.041
	SMB	1.158***	0.793***	0.926***	0.080	−0.111	−0.100	1.135***	0.857***	1.109***	0.348	−0.028	−0.006
	WML	−0.153	0.028	−0.234	−0.055	−0.002	−0.003	−0.699***	0.047	0.562**	−0.693	0.083	0.568***
	DIV	−0.929	−3.723	−1.920	−0.170	−5.202**	3.198	5.236	−9.733	−9.396	−3.714	−14.548***	−6.265
	TRM	−0.229	−0.285	−1.114**	0.174	0.203	−0.515	0.247	−0.724	−1.185	−1.149	−0.002	1.143**
	RTB	0.870	2.664**	2.605	2.433**	0.338	−2.044**	2.598	0.439	2.244	0.505	0.742	−0.145
	Overall R^2	0.788	0.861	0.820	0.871	0.939	0.919	0.794	0.765	0.681	0.876	0.921	0.848
	Wald χ^2	658.35***	1101.30***	807.50***	1203.35***	2751.79***	2026.80***	664.97***	560.04***	368.27***	1221.75***	2016.79***	961.15***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_ε	2.298	1.820	2.190	1.417	1.148	1.269	2.890	2.491	3.762	1.998	1.257	1.982
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	5.32	−33.33	6.57	−2.35	−2.26	25.91***	5.94	16.17**	19.37***	−5.67	0.11	1.41
	H_0: re is consistent, H_1: fe is consistent	*re is consistent*	–	*re is consistent*	–	–	*fe is consistent*	*re is consistent*	*fe is consistent*	*fe is consistent*	–	*re is consistent*	*re is consistent*

Panel C: Aggregate

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	8.096	6.342	5.939	−16.333	2.452	−1.223	2.825	5.414	13.358	−8.357	1.656	6.101
	R_m-R_f	2.761***	2.284***	2.059***	3.500***	2.801**	2.170***	2.122***	1.214***	2.160***	2.244***	1.709***	2.793***
	WCR	−0.107	−0.029	−0.009	1.804	0.096	0.386	0.218	0.053	−0.506	0.920**	0.159	−0.128
	ΔSAV	−1.554	−1.173	1.614	−0.033	−0.747	−2.413	−0.759	−1.211	2.255	−1.079	−0.425	0.550
	HML	1.163***	0.669***	0.611	1.287	1.014***	0.351**	0.493	0.300	0.423	0.124	0.362	0.428

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.2 (*continued*)

Panel C: Aggregate

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
	SMB	1.180***	1.105***	1.366	−0.549	−0.478	−0.203	1.219***	0.922***	1.568	−0.046	−0.078	−0.065
	WML	0.341	0.116	0.201	0.1621	0.163	0.083	−0.481	0.525	0.799	−0.917	0.296	0.754**
	DIV	1.816	4.386	3.245	−2.385	−1.618	3.434	6.383	−7.430	−0.545	2.206	−1.216	0.878
	TRM	−0.172	−0.729	−1.689	−1.734	−0.387	0.238	0.053	−0.749	−0.746	−0.314	0.175	0.538
	RTB	3.314	2.617	2.327	3.562	3.990**	0.518	3.373	6.180***	2.599	1.863	4.078***	1.553
	Overall R^2	0.405	0.491	0.507	0.214	0.406	0.514	0.464	0.452	0.347	0.191	0.484	0.399
	F-statistics	13.10***	12.98***	13.43***	3.12***	11.24***	15.04***	6.74***	5.75***	7.11***	7.68***	9.62***	10.30***
	σ_u	6.567	0.448	4.550	6.442	3.750	2.076	2.981	3.393	6.777	3.635	2.603	4.579
	σ_ε	3.875	0.705	3.009	8.448	3.502	2.132	3.919	3.515	4.692	2.995	2.175	3.600
	ρ	0.741	0.612	0.695	0.367	0.534	0.486	0.366	0.482	0.675	0.595	0.588	0.617
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + WCR_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	−0.928	1.545	2.403	−2.719	−0.527	−0.125	1.615	2.352**	2.786**	0.177	0.601	1.134
	R_m-R_f	1.956***	1.954***	1.701***	2.821***	2.586***	2.098***	1.986	1.199***	1.713***	2.415***	1.714***	2.454***
	WCR	0.716***	0.400***	0.305***	0.581***	0.353**	0.265**	0.322***	0.316***	0.448***	0.141**	0.231***	0.316***
	ΔSAV	0.881	−1.442	0.219	2.962	−1.321	−2.482	−1.277	0.358	0.930	−0.469	−0.228	0.179
	HML	1.031***	0.346	0.220	0.989	0.815***	0.238	1.111	0.069	0.084	−0.180	0.121	0.073
	SMB	0.476	0.703***	0.939	−1.037	−0.710***	−0.274	0.867***	0.708**	0.960***	−0.085	−0.271	−0.461
	WML	−0.026	−0.227	−0.249	−0.156	−0.072	−0.004	−0.876***	0.215	0.285	−1.157***	−0.026	0.281
	DIV	−2.261	3.390	2.986	−5.087	−1.660	3.535	6.347	−8.410	−1.635	2.677	−1.454	1.189
	TRM	−0.618	−0.941	−1.595	−1.496	−0.312	0.294	−0.003	−0.865	−1.283	0.191	0.392	0.888
	RTB	3.880	3.389	3.081	4.442	4.403***	0.619	4.597**	8.365***	3.512	3.322**	6.311***	2.503
	Overall R^2	0.639	0.612	0.579	0.277	0.487	0.548	0.527	0.538	0.547	0.457	0.575	0.542
	Wald χ^2	237.23***	161.53***	139.51	51.47***	108.57***	145.41***	146.00	125.03***	158.72***	110.58***	145.09***	141.76***
	σ_u	–	0.784	0.936	–	1.992	1.855	–	–	–	–	–	0.420
	σ_ε	3.875	3.071	3.009	8.448	3.502	2.132	3.919	3.515	4.692	2.995	2.175	3.600
	ρ	–	0.061	0.088	–	0.244	0.430	–	–	–	–	–	0.013
Hausman's specification test	χ^2	5.40	10.46	11.23	6.38	4.39	5.91	3.919	−24.72	3.55	11.47	−9.24	10.90
	H_0: re is consistent, H_1: fe is consistent	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	–	–	*re is consistent*	*re is consistent*	–	*re is consistent*

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. [2] Hausman's specification test, if the χ^2 value is significant implies reject the H_0 and accept H_1 or otherwise.

Table A4.3
Fixed and Random Effects estimates with HI.

Panel A: Emerging economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	0.056	0.134	0.098	−0.193	0.093	0.335	0.507	0.194	0.692	1.631	0.778	1.364
	R_m-R_f	0.950***	0.749***	0.543***	0.564***	0.694	0.993***	1.300***	0.890***	1.150***	1.133***	0.985***	1.271***
	HI	−0.059	−0.165*	−0.015	−0.185	−0.085	−0.032	0.062	−0.063	0.062	0.211	0.026	0.200
	ΔSAV	−2.632	1.586	12.533***	14.069**	0.628	−3.468	−13.630**	−8.684***	−9.996**	−14.030**	−7.723*	−17.467***
	HML	0.474***	−0.037	−0.325***	0.410***	−0.009	−0.324***	0.062	0.004	−0.001	−0.324***	−0.091	−0.254***
	SMB	0.983***	0.907***	1.088***	−0.173	0.005	0.108***	0.804***	1.116***	0.935***	0.045	0.075	−0.068
	WML	0.002	−0.073*	−0.033	0.106	−0.104	0.042	−0.324***	−0.033	0.239***	−0.958***	0.114	0.488***
	DIV	−5.919	−23.242***	−44.509***	−45.828***	−36.399***	3.157	31.198**	−6.164	15.347	16.709	−2.784	31.780**
	TRM	−0.460	0.685	1.406	2.071	0.078	−0.256	0.313	0.129	0.627	0.165	−0.177	−0.189
	RTB	−0.225	0.009	0.589	1.047	−0.105	−0.108	−0.170	−0.126	−0.057	0.467	0.072	0.320
	Overall R^2	0.977	0.956	0.925	0.769	0.907	0.962	0.969	0.995	0.964	0.835	0.983	0.877
	F-statistics	353.41***	189.46***	110.87***	31.53***	85.05***	244.55***	104.52***	523.60***	132.62***	56.61***	129.24***	51.82***
	σ_u	0.080	0.438	0.483	1.513	0.284	0.534	0.728	0.491	1.328	4.087	0.789	2.944
	σ_ε	1.545	1.998	2.745	4.528	2.818	1.522	1.654	0.702	1.486	2.082	0.987***	1.901
	ρ	0.002	0.045	0.030	0.100	0.010	0.109	0.162	0.328	0.444	0.794	0.030	0.705
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	0.098	0.197	0.351	0.594	0.136	0.063	0.176	0.280	−0.221	−0.278	−7.690**	0.077
	R_m-R_f	0.955***	0.737***	0.581***	0.644***	0.687***	0.967***	1.238***	0.908***	0.997***	0.844***	0.987***	1.079***
	HI	−0.049	−0.154**	0.043	−0.007	−0.078	−0.093	−0.021	−0.031	−0.171	−0.280	0.030	−0.131
	ΔSAV	−2.701	1.497	12.112***	12.785*	0.568	−3.027	−12.783**	−8.419***	−9.578*	−16.133*	−7.690**	−19.166***
	HML	0.471***	−0.059	−0.334***	0.347***	−0.023	−0.301***	0.090	0.011	0.037	−0.300**	−0.090	−0.244**
	SMB	0.981***	0.907***	1.077***	−0.203*	0.005	0.118***	0.829***	1.119***	0.972***	0.072	0.075	−0.055

(*continued on next page*)

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.3 (*continued*)

Panel A: Emerging economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
	WML	0.001	−0.080**	−0.040	0.072	−0.108**	0.054	−0.298***	−0.033	0.289***	−0.885***	0.114	0.534***
	DIV	−5.395	−24.542***	−40.158***	−36.337***	−37.212***	0.111	24.449**	−4.576	0.066	−10.040	−2.581	14.246
	TRM	−0.465	0.636	1.398	1.966	0.046	−0.216	0.496	0.294	0.387	−1.491	−0.156	−1.415
	RTB	−0.222	0.089	0.567	1.125	−0.053	−0.143	−0.203	−0.105	−0.161	0.229	0.075	0.157
	Overall R^2	0.977	0.956	0.925	0.775	0.907	0.963	0.971	0.995	0.974	0.890	0.983	0.910
	Wald χ^2	3654.17***	1845.25***	1047.87***	289.71***	819.99***	2210.92***	1057.81***	4623.49***	1167.93***	251.00***	1236.94***	313.53***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_ε	1.545	1.998	2.745	4.528	2.818	2210.92***	1.654	0.702	1.486	2.082	1.195	1.901
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	0.07	1.72	1.16	2.94	0.34	3.11***	1.32	1.87	10.90	8.30	0.01	−24.79
	H_0: *re is consistent*, H_1: *fe is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*fe is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	*re is consistent*	–

Panel B: Developed economies

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	2.725***	3.270***	3.785***	−0.034	0.513**	0.829***	2.362	3.087***	5.781***	−0.916**	−0.144	1.511***
	R_m-R_f	1.117	0.993***	1.011***	1.026***	0.971***	0.968***	1.129	0.903***	1.148***	1.068***	0.927***	0.925***
	HI	−0.003	0.062	0.063	−0.017	−0.025	0.015	0.099	0.048	0.196	0.137	−0.071	0.002
	ΔSAV	7.882	3.667	4.813	4.436	2.971	0.480	5.169	3.790	8.153	6.926*	−1.868	−1.437
	HML	−0.100	0.228	0.638***	−0.098	0.340***	0.289**	0.046	−0.061	0.231	−0.159	0.052	−0.214
	SMB	1.132***	0.894***	1.099***	0.210	−0.131	−0.118	0.742***	0.777***	1.168***	−0.085	−0.198	0.055
	WML	0.319	0.439	0.301	−0.203	0.106	0.225	−0.576	0.334	0.709	−0.935***	−0.092	0.974***
	DIV	3.576	5.802	4.028	−0.657	0.394	4.852	16.121**	−0.456	9.817	0.535	1.835	7.939**
	TRM	−0.227	−0.185	−0.343	−0.063	−0.448	0.246	2.038	−0.480	−0.617	−0.970	−0.550	0.034
	RTB	4.125	2.471	3.830	1.250	1.110	−2.384	4.136	0.190	2.244	1.081	−0.515	−2.236
	Overall R^2	0.740	0.768	0.652	0.852	0.929	0.888	0.761	0.712	0.606	0.792	0.883	0.841
	F-statistics	45.46***	50.24***	31.49***	97.92***	148.66***	107.52***	26.26***	20.23***	13.36***	58.79	93.54***	58.53***
	σ_u	2.113	1.750	2.768	1.623	0.639	1.135	1.670	0.890	2.367	1.679	1.005	1.145
	σ_ε	2.343	1.958	2.543	1.449	1.097	1.309	3.145	2.784	4.414	2.020	1.346	1.710
	ρ	0.448	0.444	0.542	0.556	0.253	0.429	0.220	0.092	0.223	0.408	0.358	0.309
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	2.116***	2.852***	3.172***	−0.315	0.653***	0.818	2.411	2.880***	5.079***	−0.697**	0.390**	1.681***
	R_m-R_f	1.136***	0.988	0.977***	1.080***	0.966***	0.940***	1.195	0.908***	1.205***	1.086***	0.955***	0.948***
	HI	−0.197***	−0.012	0.003	−0.189***	0.055*	0.054	0.046	−0.009	−0.006	0.113**	0.090**	0.111**
	ΔSAV	6.978	3.478	2.387	6.914**	3.444*	−3.434	4.586	3.879	10.348	6.570*	−0.659	0.637
	HML	0.019	0.189	0.321	0.135	0.334***	0.135	0.200	−0.028	0.326	−0.012	0.134	−0.273
	SMB	0.872***	0.642***	0.814***	0.209	−0.233**	−0.061	0.903	0.698***	0.850**	0.160	−0.155	−0.067
	WML	−0.144	−0.074	−0.351	−0.264	0.039	0.055	−0.674	0.033	0.119	−0.507**	0.037	0.761**
	DIV	3.095	5.644	3.490	−1.230	0.566	4.870	16.358	−0.091	10.279	0.224	2.101	8.705**
	TRM	−0.298	0.082	−0.786	0.284	−0.438	−0.298	1.627	−0.179	−0.645	−1.028	−0.648	0.304
	RTB	8.352***	5.097***	4.229	4.042**	1.556	−3.787**	4.882	1.789	6.393	0.270	−0.797	−1.983
	Overall R^2	0.796	0.842	0.770	0.878	0.940	0.907	0.768	0.731	0.654	0.870	0.916	0.880
	Wald χ^2	387.29***	529.72***	331.86***	712.92***	1566.16***	966.02***	315.48***	258.44***	180.31	636.51***	1035.82***	698.08***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_ε	2.343	1.958	2.543	1.449	1.097	1.309	3.145	2.784	2.000	2.020	1.346	1.710
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	−23.57	−105.54	5.51	−26.37	200.16***	51.49***	24.37***	3.35	18.08**	9.56	13.37	11.44
	H_0: *re is consistent*, H_1: *fe is consistent*	–	–	*re is consistent*	–	*fe is consistent*	*re is consistent*	*fe is consistent*	*re is consistent*	*fe is consistent*	*re is consistent*	*fe is consistent*	*re is consistent*

Panel C: Aggregate

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
Fixed effects estimates	α_0	6.034***	5.795***	5.850***	2.321***	2.543***	2.857***	5.800***	5.430***	8.704***	1.623***	3.037***	4.497***
	R_m-R_f	1.951***	1.885***	1.724***	1.924***	1.811***	2.061***	0.721	0.776	1.616	1.288***	1.096***	1.418***
	HI	−0.317	−0.073	−0.096	−0.301	−0.131	−0.085	−0.013	0.023	−0.124	−0.033	−0.081	−0.020
	ΔSAV	−4.559	−1.814	−0.722	−5.716	−0.268	−1.284	4.991	−5.075	−2.631	1.784	−2.630	−0.913
	HML	0.070	−0.031	0.245	0.085	0.177	0.243	−0.044	−0.359	0.008	−0.339	0.126	−0.278
	SMB	1.635	1.085***	1.545***	0.024	−0.118	−0.394**	1.099**	0.924**	1.474**	0.116	−0.095	0.299
	WML	1.134	0.563	0.750	−0.112	0.082	−0.011	0.358	0.383	0.313	−0.487	0.345	0.724
	DIV	3.181	5.737	−3.265	3.976	−2.842	7.876	13.816	−2.607	8.121	−0.253	0.905	7.796

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Table A4.3 (*continued*)

Panel C: Aggregate

	Estimators	$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha_i + \varepsilon_{it}$											
		SL	SM	SH	BL	BM	BH	SLo	SNe	SWi	BLo	BNe	BWi
	TRM	−2.006	−2.259**	−3.052	−0.081	−0.128	0.169	2.750	−1.536	−1.358	−1.916	−0.229	−1.525
	RTB	−0.594	0.200	1.671	2.983	−0.163	−2.387	1.472	0.110	2.552	−3.033	−2.558	−7.408**
	Overall R^2	0.457	0.582	0.529	0.449	0.596	0.655	0.427	0.473	0.465	0.434	0.544	0.577
	F-statistics	4.20***	5.98***	4.61***	2.30***	4.82***	9.84***	1.35	1.16	1.34	1.97	2.69**	3.02***
	σ_u	5.712	3.601	4.587	2.368	1.683	1.808	2.812	2.100	3.846	0.931	1.953	2.072
	σ_e	3.660	2.303	3.230	2.748	1.688	1.270	4.035	3.365	5.551	2.016	1.543	2.439
	ρ	0.708	0.709	0.668	0.426	0.498	0.669	0.326	0.280	0.324	0.175	0.615	0.419
		$r_{it}^{FF\,T.A.} = (R_m - R_f)_{it}\beta_1 + HI_{it}\beta_2 + \Delta SAV_{it}\beta_3 + HML_{it}\beta_4 + SMB_{it}\beta_5 + WML_{it}\beta_6 + DIV_{it}\beta_7 + TRM_{it}\beta_8 + RTB_{it}\beta_9 + \alpha + u_i + \varepsilon_{it}$											
Random effects estimates	α_0	4.885***	4.797***	4.864***	1.702***	2.301***	2.519***	5.260***	4.755***	7.743***	1.428***	2.593***	4.068***
	R_m-R_f	0.786	1.071**	0.892	1.576***	1.512***	1.882***	1.050	0.929*	1.474*	1.361***	1.382***	1.059***
	HI	−0.609***	−0.331***	−0.240**	−0.441***	−0.131**	−0.078	−0.143	−0.221*	−0.376*	−0.088	−0.109*	−0.023
	ΔSAV	5.128	1.109	−2.677	1.613	2.310	−2.429	1.633	1.772	5.058	2.909	1.889	1.030
	HML	0.027	−0.109	−0.170	−0.014	−0.007	−0.061	−0.023	−0.358	0.038	−0.400**	0.034	−0.444
	SMB	1.288**	0.970***	1.286***	0.023	−0.263	−0.466***	0.933	0.774**	1.054	0.033	−0.214	0.222
	WML	−0.109	−0.223	−0.423	−0.358	−0.176	−0.275	−0.510	0.082	−0.218	−0.383	−0.253	0.365
	DIV	−16.341	−10.818	−15.187	−7.903	−5.747	3.699	14.752	−2.366	8.392	−0.426	1.864	8.520
	TRM	−3.124	−2.394	−3.579**	−0.291	−0.377	−0.199	1.430	−1.799	−3.094	−1.872	−0.887	−1.067
	RTB	0.971	3.910	3.476	5.347	0.426	−1.516	3.132	2.993	4.661	−1.795	−0.862	−6.110**
	Overall R^2	0.578	0.679	0.618	0.541	0.661	0.742	0.456	0.517	0.495	0.446	0.619	0.596
	Wald χ^2	76.81***	118.55	90.80***	66.24***	109.42***	161.35***	51.25***	60.05***	59.78***	49.14***	91.27***	90.19***
	σ_u	–	–	–	–	–	–	–	–	–	–	–	–
	σ_e	3.660	2.303	3.230	2.748	1.688	1.270	4.035	3.365	5.551	2.016	1.543	2.439
	ρ	–	–	–	–	–	–	–	–	–	–	–	–
Hausman's specification test	χ^2	10.96	2.10	19.50**	82.07***	7.30	0.49	−13.52	−65.77	−3.04	4.11	−111.91	2.82
	H_0: *re is consisten*, H_1: *fe is consistent*	*re is consistent*	*re is consistent*	*fe is consistent*	*fe is consistent*	*re is consistent*	*re is consistent*	–	–	*re is consistent*	–	*re is consistent*	

Notes: [1] *, **, and *** denotes statistical significance at 10, 5 and 1% level, respectively. 2 Hausman's specification test, if the c2 value is significant implies reject the H0 and accept H1 or otherwise.

References

Abadir, K. M., & Magnus, J. R. (2005). *Matrix Algebra*. New York: Cambridge University Press.

Agarwalla, S. K., Jacob, J., & Varma, J. R. (2014). Four factor model in Indian equities market. In *Working Paper W.P. No. 2013-09-05* (pp. 1−22). Ahmedabad: Indian Institute of Management. Retrieved from: http://www.iimahd.ernet.in/~iffm/Indian-Fama-French-Momentum/four-factors-India-90s-onwards-IIM-WP-Version.pdf.

Berk, J. B., & Walden, J. (2013). Limited capital market participation and human capital risk. *Review of Asset Pricing Studies, 3*(1), 1−37. http://dx.doi.org/10.1093/rapstu/rat003.

Campbell, J. Y. (1993). Intertemporal asset pricing without consumption data. *The American Economic Review, 83*(3), 487−512. Retrieved from: http://www.jstor.org/stable/2117530.

Campbell, J. Y. (1996). Understanding risk and return. *Journal of Political Economy, 104*(2), 298−345. http://dx.doi.org/10.1086/262026.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance, 52*(1), 57−82. http://dx.doi.org/10.2307/2329556.

Deaton, A. (1992). Saving and income smoothing in cote d'Ivoire. *Journal of African Economies, 1*(1), 1−24. http://dx.doi.org/10.1093/oxfordjournals.jae.a036737.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3−56. http://dx.doi.org/10.1016/0304-405X(93)90023-5.

Fama, E. F., & French, K. R. (2012). Size, value, and momentum in international stock returns. *Journal of Financial Economics, 105*(3), 457−472. http://dx.doi.org/10.1016/j.jfineco.2012.05.011.

French, K. R. (2016). *Fama French - data library*. Retrieved from: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Gregory, A., Tharyan, R., & Christidis, A. (2013). Constructing and testing alternative versions of the Fama-French and carhart models in the UK. *Journal of Business Finance and Accounting, 40*(1−2), 172−214. http://dx.doi.org/10.1111/jbfa.12006.

Griffin, J. M., Ji, X., & Martin, J. S. (2003). Momentum investing and business cycle risk: Evidence from pole to pole. *The Journal of Finance, 58*(6), 2515−2547. http://dx.doi.org/10.1046/j.1540-6261.2003.00614.x.

Griliches, Z., & Hausman, J. A. (1986). Errors in variables in panel data. *Journal of Econometrics, 31*(1), 93−118. http://dx.doi.org/10.1016/0304-4076(86)90058-8.

Hansson, B. (2004). Human capital and stock returns: Is the value premium an approximation for return on human capital? *Journal of Business Finance and Accounting, 31*(3−4), 333−357. http://dx.doi.org/10.1111/j.0306-686X.2004.00542.x.

Harvey, C. R., Liu, Y., & Zhu, H. (2016). ... and the cross-section of expected returns. *Review of Financial Studies, 29*(1), 5−68. http://dx.doi.org/10.1093/rfs/hhv059.

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica, 46*(6), 1251. http://dx.doi.org/10.2307/1913827.

Heaton, J., & Lucas, D. (2000). Portfolio choice and asset prices: The importance of entrepreneurial risk. *The Journal of Finance, 55*(3), 1163−1198. http://dx.doi.org/10.2307/222449.

Hou, K., Xue, C., & Zhang, L. (2015). Digesting anomalies: An investment approach. *Review of Financial Studies, 28*(3), 650−705. http://dx.doi.org/10.1093/rfs/hhu068.

IMF. (2016). *World economic outlook (WEO); WEO database - country data documentation*. Retrieved from: https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/co.pdf.

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance, 48*(1), 65−91. http://dx.doi.org/10.1111/j.1540-6261.1993.tb04702.x.

Kim, D., Kim, T. S., & Min, B. K. (2011). Future labor income growth and the cross-section of equity returns. *Journal of Banking and Finance, 35*(1), 67−81. http://dx.doi.org/10.1016/j.jbankfin.2010.07.014.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005

Lustig, H., & Van Nieuwerburgh, S. G. (2008). The returns on human capital: Good news on wall street is bad news on main street. *Review of Financial Studies, 21*(5), 2097−2137. http://dx.doi.org/10.1093/rfs/hhl035.

Lustig, H., Van Nieuwerburgh, S. G., & Verdelhan, A. (2013). The wealth-consumption ratio. *Review of Asset Pricing Studies, 3*(1), 38−94. http://dx.doi.org/10.1093/rapstu/rat002.

Marmi, S. (2012). *Stefano Marmi - data library*. Retrieved from: http://homepage.sns.it/marmi/Data_Library.html#datalibrary.

McMillan, D. G. (2013). Consumption and stock prices: Evidence from a small international panel. *Journal of Macroeconomics, 36*, 76−88. http://dx.doi.org/10.1016/j.jmacro.2013.01.007.

Neumeyer, P. A., & Perri, F. (2005). Business cycles in emerging economies: The role of interest rates. *Journal of Monetary Economics, 52*(2), 345−380. http://dx.doi.org/10.1016/j.jmoneco.2004.04.011.

Palacios, M. (2015). Human capital as an asset class implications from a general equilibrium model. *Review of Financial Studies, 28*(4), 978−1023. http://dx.doi.org/10.1093/rfs/hhu073.

Racicot, F.-E., & Rentz, W. F. (2017). A panel data robust instrumental variable approach: A test of the new Fama-French five-factor model. *Applied Economics Letters, 24*(6), 410−416. http://dx.doi.org/10.1080/13504851.2016.1197361.

Roll, R. (1981). A possible explanation of the small firm effect. *The Journal of Finance, 36*(4), 879−888. http://dx.doi.org/10.2307/2327553.

Stehle, R. (2015). *Richard Stehle - data library*. Retrieved from: http://www.wiwi.hu-berlin.de/professuren/bwl/bb/data/fama-french-factors-germany.

Please cite this article in press as: Roy, R., & Shijin, S., Dissecting anomalies and dynamic human capital: The global evidence, Borsa İstanbul Review (2017), http://dx.doi.org/10.1016/j.bir.2017.08.005