Theoretical Economics Letters, 2024, 14, 2425-2450
https://www.scirp.org/journal/tel
ISSN Online: 2162-2086
ISSN Print: 2162-2078

Rational Asset Pricing or Market Inefficiency: Analysis of the Asset Growth Anomaly in Developed and Emerging European Equity Markets

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How to cite this paper: Artikis, P. G., Diamantopoulou, L., Papanastasopoulos, G. A., & Sfakianakis, E. (2024). Rational Asset Pricing or Market Inefficiency: Analysis of the Asset Growth Anomaly in Developed and Emerging European Equity Markets. *Theoretical Economics Letters, 14,* 2425-2450.
https://doi.org/10.4236/tel.2024.146120

Received: August 2, 2024
Accepted: September 28, 2024
Published: December 10, 2024

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Abstract

This study advances the understanding of the asset growth anomaly in European equity markets, distinctively using firm-level data instead of the commonly used country-level proxies. It explores the dichotomy between rational and mispricing explanations for this anomaly, employing a nuanced approach to asset growth decomposition and firm losses. Our analysis utilizes data on 24 European nations, divided into Eastern-Southern and Western-Northern regions, with firm accounting data being available from 1996-2020 and firm returns from 1997-2022, encapsulating the COVID-19 health and economic crises, providing an extensive canvas for our study. The findings exhibit a robust asset growth effect within both regions. In established economies of Western-Northern, the asset growth effect appears more consistent with risk-based explanations, particularly within profitable firms. In contrast, the asset growth anomaly within Eastern-Southern, comprising less developed economies, exhibits evidence implying market inefficiencies, in particular within loss-making firms. The investigation reveals that both investment growth and accounting distortion components significantly influence the asset growth effect within dissimilarly developed European economies. These findings withstand diverse sets of analyses, including the exclusion of core markets and through the pandemic period, further demonstrating the relevance of this study.

Keywords

Asset Growth Decomposition, Profit and Loss, Risk, Mispricing, Country

Regions

1. Introduction

One and a half decades after the seminal paper by Cooper et al. (2008) documenting that corporate investment is negatively related to subsequent stock returns, the so called asset growth anomaly, researchers still actively investigate the underlying origins of its occurrence. Early studies on the US stock market decomposed firms' asset growth rates into subcomponents and linked those subcomponents to the two major competing theories of mispricing and market efficiency (Titman et al., 2004; Cooper et al., 2008). On the other hand, early studies using international settings, outside the US, used country-level proxies to disentangle between these two theories (Titman et al., 2013; Watanabe et al., 2013).

Recently published studies on the field provide new theories or empirical settings, directly or indirectly linked to the above-mentioned competing theories. Using a US setting, Goto et al. (2020) provide evidence that managerial equity incentives mitigate managers' empire-building motives, leading to a less pronounced asset growth effect. Ma et al. (2023) argue that the anomaly is due, in part, to investors' behavioral biases since high asset growth creates more challenging informational environments. Abdoh and Varela (2021) show that changes in total factor productivity serve as one of the drivers behind the asset growth effect. Studies outside the US market using firm-level data either relate their empirical findings to few and specific channels of risk or mispricing (Cai et al., 2019; Artikis et al., 2023) or indirectly favor one of the existing theories without formally testing or addressing a specific channel (Papanastasopoulos, 2017; Artikis et al., 2021).

However, we have to mention here that one study using international stock markets deviates from the pattern presented. Notably, Artikis et al. (2022), using firm level data, for non-financial listed firms in European stock markets, decompose firms' total assets into two subcomponents, drawing their inspiration from Richardson et al.'s (2006) decomposition on accruals. The authors link those subcomponents to the most cited channels under both the mispricing and the rationality camp. However, the authors also employ country-level proxies to address their developed hypotheses.

The present study aims to provide new insights into the ongoing debate on the origins of this prominent asset pricing puzzle in European stock markets by employing an empirical setting that encompasses a) firms' earnings sign as a heuristic, b) asset growth decomposition proposed by Artikis et al. (2022) and c) country regions proposed by the OECD[1] and the European Commission. Unlike previous studies on the drivers of the asset growth anomaly in European equity markets using country level proxies (Watanabe et al., 2013; Titman et al., 2013; Artikis et al., 2022), all variables employed in this study are measures at the firm-level and

[1]OCED focuses on Southeast Europe whereas the term Northwest Europe is adopted by the European Commission.

no country proxies are employed. In addition, we employ both Artikis et al. (2022) asset growth decomposition combined with firms' earnings sign serving the role of a heuristic as a more well-rounded indicator of mispricing/rationality, in order to provide further insights on the rationality versus mispricing debate behind the occurrence of the asset growth anomaly.

The present paper's contribution is as follows:

First, it expands upon recent research on the field in the EU by examining 24 countries including Bulgaria, Check Republic, Croatia, Cyprus, Hungary and Russia, countries neglected by recent studies on the EU field, although represented in worldwide organizations (e.g. OECD). We separate these countries into two country regions, namely, the Eastern-Southern and the Western-Northern country regions. Countries in Western Europe had economically liberalized far earlier than countries in Eastern European, which started liberalizing after the dissolution of the Soviet Union. Consequently, Eastern European members of the EU joined it much later than their western counterparts, which further gave Western Europe an advantage in free trade, access to the European market and financial support. Lastly, structural problems within these countries, like corruption and inefficient governance, have only exacerbated the problem. According to the 2020 CPI, several Eastern European countries have relatively high levels of corruption, including Bulgaria, Romania, and Belarus, which all scored below 50 on a scale of 0 (highly corrupt) to 100 (very clean).

Second, by combining firms' earnings sign (Papanastasopoulos, 2017) and Artikis et al. (2022) asset growth decomposition we can address the origins of the asset growth effect (mispricing or rationality) by using only firm level data since a) we re-enforce inferences provided by Papanastasaopoulos (2017) by including a subcomponent representing investment decisions and a subcomponent representing accounting distortions and b) at least indirectly addressed the linkage of asset growth subcomponents to the rational and mispricing camp without employing time invariant country level proxies.

Finally, our data ranges from 1996 to 2020 in terms of accounting data and from 1997 to 2022 in terms of firms' return investigating the COVID-19 pandemic as a major macroeconomic event that tremendously affected the financial markets (Okorie & Lin, 2021; Wang et al., 2021). Thus, the present paper fills important gaps in the literature by providing a more nuanced understanding of an international asset growth anomaly.

The remainder of this study is organized as follows. Section 2 presents the research design and the testable hypotheses proposed herein. In Section 3, we provide details about our data, sample formation, and variable measurement. In Section 4, we discuss the empirical results, and Section 5 offers concluding remarks.

2. Literature Review and Hypotheses Development

Consensus has not yet been reached on what causes the anomaly. Two prominent theories have been proposed; one assumes some form of irrationality and the

other is potentially consistent with rationality. Under the rational camp, two prominent channels are used to explain the negative effect of firms' asset growth on subsequent stock returns. The real options theory (Berk et al., 1999; Carlson et al., 2004) suggests that when managers invest, real options are exercised and converted into less risky assets on the balance sheet leading to lower expected returns. On the other hand, the q-theory of optimal investment (Lyandres et al., 2008; Li et al., 2009; Li & Zhang, 2010) suggests that managers invest up to the point where the expected cost of capital equals the expected return on investment.

Under the mispricing camp, four theories have been proposed by existing literature. The first explanation relates to agency problems and notably, to managers' empire building tendencies (Titman et al., 2004) pursuing their own personal agenda even if this is not aligned with firm's best interests. The second theory relates to firms' market timing behavior in financing decisions (Baker & Wurgler, 2002), where corporate insiders opportunistically raise equity financing when their stocks are undervalued, exploiting their inside information. The third explanation relates to earnings management suggesting that high balance sheet growth could be exploited as firm executives manipulate earnings upwards, especially when raising external capital and/or there is a forthcoming merger and acquisition (Teoh et al., 1998a; Teoh et al., 1998b; Dai et al., 2017).

The fourth explanation relates to investors' extrapolation bias (Lakonishok et al., 1994; Cooper et al., 2008), where investors excessively extrapolate firms' past growth, overvaluing higher asset growth firms leading to subsequent lower returns. All mispricing based explanations center around naïve investors who do not properly and/or timely evaluate publicly available information. Thus, high asset growth firms' lower returns are a form of market correction to the initial misreaction.

Both Watanabe et al. (2013) and Titman et al. (2013) argue that if the strongest asset growth effect takes place is existent and robust in more developed economies, it can only be in line with a risk-based explanation of the overall puzzle since, they exhibit a greater degree of market efficiency, less room for managerial discretion over earnings, greater investors' sophistication, less limits-to-arbitrage and stronger investors' protection mechanisms. With respect to less developed economies, Titman et al. (2013)[2] argue that under the optimal investment hypothesis, the asset growth anomaly is also expected to be more pronounced in less developed economies since they are of fewer market participants, fewer arbitrageurs and greater fluctuations in wealth leading to greater fluctuations in returns. However, Watanabe et al. (2013) relate a pronounced asset growth anomaly in less developed economies exclusively to mispricing.

Artikis et al. (2022) decomposed firms' asset growth into two separate components: one that reflects real investment growth and another that captures accounting distortions and/or less efficient use of existing capital. Extrapolating the

[2]Titman et al. (2013) argue that if the q-theory of investment and the behavioral/empire building theories are not mutually exclusive, but instead combined into one story, then one might also expect an offsetting positive relation between firms' asset growth and subsequent stock returns.

argumentation provided by Richardson et al. (2006), the authors argue that if asset growth encapsulates real investment growth, higher sales should lead to an increase in assets associated with an increase in output. On the contrary, if there is no increase (or even a decrease) in sales, then a decline in efficiency, either because of accounting distortions or because of less efficient use of existing capital should have led to an increase in firm's total assets.

A direct implication is that the effects of diminishing marginal returns to increased investment, favoring a risk-based explanation, should be limited to the growth component but, the very same component could also be consistent with the opportunistic use of managerial discretion to generate accounting distortions that temporarily inflate earnings, favoring a mispriced-based explanation (Artikis et al., 2022). On the other side, the effects of temporary accounting distortions that manipulate earnings upwards and/or reduce efficiency should be captured mainly by the efficiency component of asset growth.

Studies in the field (Ma et al., 2023) argue that heuristics may serve as the basis for some form of behavioral biases (that is, some form of mispricing). Papanastasopoulos (2017) provides evidence that the asset growth anomaly is more pronounced in loss firms. Ma et al. (2023) argue that high asset growth creates more challenging informational environments. High asset growth future returns and cash flows are less predictable and therefore create uncertainty regarding stock valuation level. Thus, naïve investors facing a high degree of uncertainty are more likely to rely on heuristics to arrive at valuation level estimates. Papanastasopoulos (2017) argues that since losses are more transitory and less informative about future prospects (Hayn, 1995; Collins et al., 1999), traditional valuation models may lead to unreliable estimates of firm values for loss firms. Using losses as a heuristic may lead to systematic errors in translating financial information into stock returns. In addition, the author argues that investors are more likely to misinterpret asset growth of loss firms, favoring a mispricing based story[3].

Adopting the notion that losses might serve as an additional indicator of mispricing, we expect that the combined information with a rational based indicator (e.g. asset growth and/or investment growth component) should lead to a weaker effect of those variables, since the disagreement between the signals implies that signal is more likely to be due to noise. But when both signals agree (either asset growth and/or accounting distortion component), the conditional probability that each signal is due to mispricing rather than noise is high.

All of the above being said, we form our hypotheses as follows:

H1: In Western-Northern sub-region combining firms' profits (losses) with

[3]Moreover, loss firms are harder to arbitrage (Baker & Wurgler, 2007) leading to a delayed correction of their initial misevaluation. Limits to arbitrage play an important role in explaining the asset growth anomaly (Li & Zhang, 2010; Lam & Wei, 2011; Lipson et al., 2011). However, since proxies of investment frictions and limits to arbitrage are highly correlated, it is difficult to distinguish between prediction of the q-theory (with investment frictions) and the overinvestment theory (with limits to arbitrage). Watanabe et al. (2013), however, concluded that in an international setting country characteristics representing limits-to-arbitrage theory had only limited power in explaining the asset growth anomaly.

asset growth rates and/or the investment growth subcomponent should lead to a more (less) pronounced effect of both variables on subsequent stock returns, under rationality (mispricing).

H2a: In Eastern-Southern sub-region combining firms' losses with asset growth rates, the investment growth subcomponent and/or the accounting distortion subcomponent should lead to a more pronounced effect of all variables on subsequent stock returns, under mispricing.

H2b: In Eastern-Southern sub-region combining firms' profits with asset growth rate and/or the investment growth subcomponent should lead to a more pronounced effect of both variables on subsequent stock returns, whereas combining firms' profits with the accounting distortion subcomponent should lead to its less pronounced effect on subsequent stock returns, under rationality.

3. Data, Sample Formation, and Variable Measurement

3.1. Data and Sample Formation

Our sample consists of non-financial listed firms from 24 European countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom. We collected accounting data and monthly returns from Worldscope and Datastream International files for the period 1988-2020[4].

Common stocks listed on the major stock exchange in each country from both active and defunct data files from Datastream and Worldscope are included to avoid survivorship bias. Closed-end funds, trusts, REITs, ADRs, units of beneficial interest, and other financial firms are excluded from the sample. Firm-year observations that lack valid data needed to calculate asset growth, asset growth components, net income, market capitalization, book-to-market ratio[5] and momentum are excluded from our sample. To mitigate the impact of outliers, we winsorize all accounting variables at the 1% and 99% levels of their distribution. Finally, in order to detect suspicious returns, we exclude from our sample stocks with price returns above 300% or less than 50%[6] that is reversed within one month (Ince and Porter, 2006). These criteria yielded a final sample size of 44,630 firm-year observations for the period 1996-2020[7]. In Appendix B, we provide details on the final sample.

The above mentioned 24 European countries are divided into two major country regions as follows: a) Eastern-Southern country region including Bulgaria, Croatia, Cyprus, Czech Republic, Greece, Hungary, Italy, Poland, Portugal, Russia, Spain and Türkiye and b) Western-Northern country region including Austria,

[4]Since we form one year ahead forward-looking returns, monthly returns are collected for the period of 1988-2022.

[5]Note that firms with negative book value of equity are not considered in the final sample.

[6]Following the proposed methodology, if R_t or R_{t-1} is greater than 300% and $(1 + R_t)(1 + R_{t-1})^{-1}$ is less than 50%, both returns are discarded.

[7]The initial period of 1988-2020 was reduced due to lack of data within certain countries.

Belgium, Denmark, Finland, France, Germany, Ireland, Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. Countries' classification into regions follows Watanabe et al. (2013). However, we also include Bulgaria, Check Republic, Croatia, Cyprus, Hungary and Russia in our Eastern-Southern country region, which have been arbitrarily excluded from previous studies on the field. We also include Türkiye, which is in line with both Watanabe et al. (2013) and Titman et al. (2013). By doing so, we differentiate from recent studies in European settings (Papanastasopoulos, 2017; Artikis et al., 2021; Artikis et al., 2022; Artikis et al., 2023), who focused on 15 EU countries plus Switzerland.

3.2. Measurement of Firm-Level Variables

Asset growth (AG, hereafter) is measured as the annual percentage change in total assets (Worldscope data item 02999) following Cooper et al. (2008). Adopting asset growth decomposition proposed by Artikis et al. (2022), the investment growth component (SG, hereafter) is measured as the annual percentage change in sales (Worldscope data item 01001), whereas the accounting distortions and/or reduced efficiency component (ΔAT, hereafter) is measured as the annual change in the asset turnover ratio (i.e., sales to total assets). Firms are classified as profit or loss firms based on their reported net income (Worldscope data item 01551).

We also employ other well-documented determinants of the cross-section of stock returns (i.e., size, book-to-market ratio and momentum). Firm size (SZ, hereafter) is defined as market capitalization (Worldscope data item 08001) at the end of June of each year (Fama & French, 1992, 1993). Book-to-market (BM, hereafter) is measured by the ratio of the financial year-end book value of equity (Worldscope data item 03501) to the market capitalization (Fama & French, 1992, 1993). Momentum (MOM, hereafter) is defined as the past 11 months' cumulative stock return (excluding the month of portfolio formation), following Fama and French (2008), using the return index provided by Datastream (item RI). Datastream's return index (RI) is defined as the theoretical growth in the value of a share-holding unit of equity at the closing price applicable on the ex-dividend date. The raw equity return for a firm for month j is calculated as: $r_j = RI_{j+1} / RI_j - 1$.

In cross-sectional regressions, our dependent variables are one-year-ahead annual raw stock returns (RET, hereafter) using compounded 12-month buy-and-hold returns. Following Fama and French (1992), to ensure that accounting variables are known, raw stock returns are calculated starting six months after the financial year-end to ensure the latest year-end book values are publicly available. In portfolio analysis, we consider one-year ahead monthly abnormal returns (ARET, hereafter).

Abnormal returns are adjusted for the size effect and the book-to-market effect, using the characteristic-based benchmark approach. Each year, firms are first sorted into quartile portfolios (four equally-sized portfolios) based on size. Firms within each of the resulting quartile portfolios are then sorted into four

additional quartile portfolios based on book-to-market ratio. This procedure leads to 16 benchmark portfolios, while firms within each of these benchmark portfolios are weighted both equally and according to their market capitalization. The abnormal return for a firm is the difference between its raw return and the matching return of the benchmark portfolio to which the firm belongs. Appendix A provides the definition of firm-level variables and stock returns used in our empirical tests.

4. Results

4.1. Summary Statistics on Asset Growth and Asset Growth Components

Table 1 reports summary statistics for asset growth and asset growth components, namely the investment growth (SG) component and the accounting distortions and/or efficiency (ΔAT) component conditional on the sign of earnings, for the pooled sample and for each country region separately (i.e., Eastern-Southern and Western-Northern). Starting with the pooled sample, loss firms exhibit negative median values of AG and SG, whereas the full sample and profit firms exhibit positive values. ΔAT shows the opposite pattern; Negative (positive) median values in the full sample and profit firms (loss firms). Median values of ln (SZ) do not differ much among profit or loss subgroups. Profit firms and the full sample exhibit positive MOM median values, while loss firms carry negative MOM values. Ln (BM) is negative in the full sample and loss subgroup, but positive in the profit subgroup.

Western-Northern region exhibits the same pattern behavior as the polled country sample. Eastern-Southern region has a positive median value of ln (BM) in the full sample and a negative median value of ΔAT in loss firms. In addition, when comparing our main variables of interest (i.e. AG, SG and ΔAT) across the two regions, we observe that:

AG and SG carry greater positive median values in the Western-Northern region (full sample and profit firms). In case of loss firms, the Eastern-Southern region has more negative AG and SG median values. ΔAT is more negative in the Eastern-Southern region in the full sample. The opposite pattern stands for profit firms. Finally, ΔAT's sign is negative for Eastern-Southern loss firms, whereas it is positive for Western-Northern loss firms.

The results from Table 1 suggest that AG increases with SG and decreases with ΔAT. The only exception is Eastern-Southern loss firm subgroup where all three variables carry a negative median value. This finding is consistent with the findings in Artikis et al. (2022) showing that the investment growth component (accounting distortions and/or efficiency component) has a positive (negative) impact on asset growth. Furthermore, as expected loss firms exhibit negative median AG and SG rates. Finally, Western-Northern countries have higher (or less negative) median values of AG and SG, whereas Eastern-Southern countries have more negative median values of ΔAT.

Table 1. Descriptive statistics.

		All Countries			
		Mean	Median	St. Dev.	N. Obs
Full Sample	AG	0.132	0.043	0.547	44,630
	SG	0.139	0.048	0.579	44,630
	ΔAT	−0.089	−0.003	0.575	44,630
	ln (SZ)	11.769	11.504	2.584	44,630
	ln (BM)	0.039	−0.023	2.895	44,630
	MOM	0.150	0.043	0.551	44,630
Loss Firms	AG	0.170	−0.044	1.415	9664
	SG	0.322	−0.016	2.284	9664
	ΔAT	−0.374	0.008	2.141	9664
	ln (SZ)	11.420	11.249	2.301	9664
	ln (BM)	−0.748	−0.730	2.870	9664
	MOM	0.052	−0.036	0.700	9664
Profit Firms	AG	0.130	0.060	0.377	34,966
	SG	0.117	0.060	0.354	34,966
	ΔAT	−0.048	−0.005	0.308	34,966
	ln (SZ)	11.865	11.582	2.648	34,966
	ln (BM)	0.255	0.157	2.866	34,966
	MOM	0.177	0.072	0.504	34,966
		Eastern-Southern			
		Mean	Median	St. Dev.	N. Obs
Full Sample	AG	0.078	0.029	0.322	11,456
	SG	0.081	0.032	0.415	11,456
	ΔAT	−0.085	−0.004	0.525	11,456
	ln (SZ)	11.381	11.193	2.547	11,456
	ln (BM)	0.087	0.141	2.916	11,456
	MOM	0.159	0.021	0.567	11,456
Loss Firms	AG	−0.014	−0.057	0.341	1952
	SG	0.081	−0.065	4.290	1952
	ΔAT	−0.225	−0.010	1.425	1952
	ln (SZ)	11.357	11.313	2.395	1952
	ln (BM)	−0.413	−0.402	2.972	1952
	MOM	0.058	−0.038	0.685	1952

Continued

Profit Firms	AG	0.098	0.048	0.320	9504
	SG	0.106	0.051	0.439	9504
	ΔAT	−0.069	−0.003	0.473	9504
	ln (SZ)	11.386	11.166	2.577	9504
	ln (BM)	0.188	0.226	2.896	9504
	MOM	0.182	0.041	0.566	9504
		Western-Northern			
		Mean	Median	St. Dev.	N. Obs
Full Sample	AG	0.153	0.047	0.659	33,174
	SG	0.166	0.053	0.699	33,174
	ΔAT	−0.094	−0.003	0.627	33,174
	ln (SZ)	11.902	11.620	2.585	33,174
	ln (BM)	0.021	−0.078	2.889	33,174
	MOM	0.148	0.051	0.549	33,174
Loss Firms	AG	0.225	−0.040	1.609	7712
	SG	0.448	−0.002	3.130	7712
	ΔAT	−0.428	0.015	2.510	7712
	ln (SZ)	11.435	11.232	2.279	7712
	ln (BM)	−0.833	−0.816	2.838	7712
	MOM	0.053	−0.034	0.731	7712
Profit Firms	AG	0.143	0.065	0.403	25,462
	SG	0.123	0.063	0.347	25,462
	ΔAT	−0.044	−0.005	0.290	25,462
	ln (SZ)	12.042	11.753	2.654	25,462
	ln (BM)	0.281	0.128	2.853	25,462
	MOM	0.177	0.089	0.490	25,462

Table 1 presents the basic statistics of AG, SG, ΔAT, INTER, ln (SZ), ln (BM) and MOM variables. The first page refers to the All-country sample (pooled sample), whereas the second page refers to country regions. First, we report basic statistics for the Full sample and then separately for Loss and Profit subsamples. Firms are classified as Profit firms if their year-end Net Income is positive, whereas as Loss firms if their year-end Net Income is negative. N. Obs. is the number of firm-year observations. Definition of all variables employed can be found in Appendix A.

4.2. Asset Growth Effect

Mimicking portfolios is a solid ground to examine the way in which average returns differentiate across the levels of the variable under investigation. Thus, we first investigate the stock price performance of portfolios based on the magnitude

of asset growth.

Table 2 reports results for country region portfolios and a portfolio that combines all countries together. Each year, six months after the financial year-end, stocks are allocated into five equally-sized (quintile) portfolios within each region, based on asset growth. Then, we report time-series averages of one-year ahead monthly equally-weighted abnormal returns (adjusted for size and book-to-market ratio, using the characteristic-based benchmark approach) for the lowest portfolio, the highest portfolio and the hedge portfolio (i.e., a long position in the lowest quintile and a short position in the highest quintile). The all-countries portfolio is formed using the same procedure as the country region portfolios, with firms from all countries (i.e., the pooled sample). We also conduct the above-mentioned analysis for profit and loss firms separately. Firms within each region, as well as of the pooled sample, are classified as profit firms if their reported year-end net income is positive and as loss firms if their reported year-end net income is negative.

Monthly risk-adjusted returns for the hedge (long/short) portfolio are positive and statistically significant at 1% level for the pooled sample (first row of Table 2). The full sample and the profit subgroup realize a monthly hedge return of 0.472% and 0.429%, respectively. Monthly hedge return of loss firms is twice as large as profit firms' hedge returns (0.838%). Monthly hedge returns in the Western-Northern region (third row of Table 2) are slightly lower (0.458%) for the full sample but statistically significant at 1% level. The same region conditional on the sign of earnings, exhibits an augmented return difference of 0.486% per month for profit firms and a mitigated return difference—in terms of statistical significance—

Table 2. Stock price performance of portfolios based on asset growth.

	Full Sample			Profit Firms			Loss Firms		
	Low Asset Growth	High Asset Growth	Hedge Asset Growth (L-H)	Low Asset Growth	High Asset Growth	Hedge Asset Growth (L-H)	Low Asset Growth	High Asset Growth	Hedge Asset Growth (L-H)
Eastern-Southern	1.236***	0.742***	0.494***	1.477***	0.982***	0.495***	1.922***	0.662**	1.260***
Western-Northern	0.984***	0.526***	0.458***	0.928***	0.442***	0.486***	0.687**	−0.116	0.803**
All Countries	1.044***	0.572***	0.472***	1.019***	0.589***	0.429***	0.826***	−0.013	0.838***

Table 2 reports one-year-ahead monthly abnormal returns (adjusted for size and book-to-market ratio, using the characteristic-based benchmark approach) of country region portfolios and an all-countries portfolio. Country region portfolios are formed on the magnitude of asset growth over the period 1996-2020. Time-series averages of one-year ahead monthly equally weighted abnormal returns are reported for the lowest portfolio, the highest portfolio and the hedge portfolio (i.e., a long position in the lowest portfolio and a short position in the highest portfolio). The all-countries portfolios are formed using the same procedure as the country region portfolios, with firms from all countries (i.e., pooled sample). Columns of PROFIT and LOSS firms are formed using the same procedure as the country region portfolios, after classifying both the polled sample and the country region subsamples into profit and loss firms based on the reported Net Income. Firms are classified as Profit firms if their year-end Net Income is positive, whereas as Loss firms if their year-end Net Income is negative. The t-statistic for the average monthly abnormal returns is given in parentheses. *, **, *** denotes statistical significance at the 10%, 5%, and 1% level respectively.

for loss firms. Since we observe an augmented return difference on the hedge portfolio when profit firms are considered but a mitigated one when loss firms are taken into account, portfolio analysis initial favors a rational based explanation for more developed economies.

The Eastern-Southern country region (second row of Table 2) exhibits the strongest asset growth effect both in terms of full sample and loss firms as well. For the full sample, monthly risk-adjusted return for the hedge portfolio is 0.494% per month statistically significant at 1% level. In the profit subsample, the return difference remains almost unchanged. However, consistent with the evidence provided by Papanastasopoulos (2017), when firm losses are considered the return difference is augmented to 1.260% per month statistically significant at 1% level.

The aggregation process of portfolio formation might not capture stocks' individual information. Adopting this notion, we investigate the predictive power in terms of raw returns of total asset growth, after controlling for other major determinants of the cross-section of stock returns, at a panel level by employing the OLS regression with clustered standard errors to account for the residual dependence created by the time effect and the firm effect[8].

In particular, we estimate cross-sectional regressions with an Ordinary Least Squares (OLS) approach and clustered standards errors at both the firm level and the year level, of one-year ahead annual raw returns on asset growth, after controlling for size (the natural logarithm of market capitalization), book-to-market ratio (the natural logarithm of the book-to-market ratio) and momentum. To confirm the negative effect of asset growth on subsequent stock returns, we expect the coefficient on AG to be negative and statistically significant. Regressions are estimated for the entire sample of firms, the two country regions and for profit/loss firms. Table 3 reports coefficients for each country region and the coefficients for all countries combined, conditional on firms' earnings sign (Panel A report the results for loss firms whereas Panel B reports the results for profit firms).

As shown in Table 3, we find that the ability of asset growth to predict future returns remains strong within both subgroups. AG's coefficient is augmented within profit subsample for the full sample and the Western-Northern country region. However, the Eastern-Southern country region exhibits its largest AG coefficient when loss firms are considered. In the case of loss firms, the full sample and the Western-Northern region exhibit their weakest AG coefficient even if statistically significant at 1%. We have to note here, that the full sample exhibits results that are closer with the Western-Northern country region rather that the Eastern-Southern country region.

Overall, results in Table 2 and Table 3 confirm the existence of the negative relationship between asset growth and stock returns in European equity markets.

[8]According to Petersen (2009), both OLS and the Fama-MacBeth standard errors are biased downward. Petersen (2009) reports evidence that only clustered standard errors are unbiased as they account for the residual dependence created by the firm effect. Thus, we estimate the OLS regression with clustered s.e. on one-dimensional clustering, i.e. separately for a time effect and a firm effect, as well as on two-dimensional clustering accounting for both a firm and a time effect. The results in all cases are qualitatively the same.

Table 3. Regressions of stock returns on asset growth.

Panel A: Regression Analysis on Loss Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.0690	−0.1701***	0.0155	0.0124	−0.0478*
Western-Northern Loss Firms	0.0676	−0.0395***	0.0044	0.0011	−0.0404*
All Countries Loss Firms	0.0468*	−0.0417***	0.0061	0.0029	−0.0447*
Diff in AG coeff.		0.1306***			
Panel B: Regression Analysis on Profit Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.1874**	−0.1370***	−0.0062	−0.0077	0.0378*
Western-Northern Profit Firms	0.1404**	−0.1238***	−0.0011	−0.0004	0.0169
All Countries Profit Firms	0.1501***	−0.1293***	−0.0021	−0.0023	0.0237*
Diff in AG coeff.		0.0132**			

Table 3 reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. Firms' classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each sub-sample and the polled sample as well). In the last row, we report the difference in AG coefficient from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates are given by: $se(b_H - b_L) = Var(b_H) + Var(b_L) - 2Cov(b_H, b_L)$ where $Cov(b_H, b_L)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is:
$RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} AG_{i,t} + \gamma_{2,t} \ln(SZ)_{i,t} + \gamma_{3,t} \ln(BM)_{i,t} + \gamma_{4,t} MOM_{i,t} + u_{i,t+1}$.

Further, conditioning on the sign of reported earnings, we find that although the asset growth anomaly extends across profit and loss firms, it appears to have a distinct clear pattern within each subgroup. In the case of profit (loss) firms, the Western-Northern (Eastern-Southern) country region exhibits its stronger asset growth effect favoring a risk-based (mispricing-based) explanation of the asset growth anomaly. That being said, our results fail to reject both the *H1* and *H2a* hypotheses.

4.3. Asset Growth Decomposition

After validating that the asset growth anomaly is existent and robust in an international setting consistent with existing evidence (Watanabe et al., 2013; Titman et al., 2013; Artikis et al., 2021; Artikis et al., 2022), but also within profit and loss firm subsamples (Papanastasopoulos, 2017), we move forward with asset growth's

decomposition proposed by Artikis et al. (2022).

We first assess the stock price performance of portfolios based on the magnitude of the asset growth components, namely the investment growth component (SG) and the accounting distortions and/or efficiency component (ΔAT), conditional on firms' earnings sign and conditional on EU country-regions. Notably, we examine the one-year ahead monthly risk-adjusted returns (adjusted for size and book-to-market ratio, using the characteristic-based benchmark approach) earned by country-region portfolios and a portfolio formed by combining all countries together. We also conduct the same analysis separately for profit and loss firms. We report results for the investment growth component in **Table 4** and for the accounting distortions and/or efficiency component in **Table 5**. Portfolio results are based on the equally weighted scheme.

As shown in **Table 4**, monthly equally weighted abnormal returns earned by the hedge portfolios (long the lowest quintile/short the highest quintile) that are based on the magnitude of the investment growth component are positive and statistically significant for the two country regions and for the full sample as well. The all countries hedge portfolio (first row of **Table 4**) earns a return difference of 0.345% per month both in the full sample and in the profit subsample. When loss firms are included, the return difference is mitigated to 0.454% per month statistically significant at 5%. The Western-Northern region exhibits a return difference of 0.352% per month when profit firms are included and 0.463% when loss firms are considered, statistically significant the later at 5% level (qualitatively similar to the full sample).

The Eastern-Southern subgroup exhibits, in general, the lowest investment growth effect on subsequent stock returns. Both in the full sample and the profit subsample, the investment growth hedge return difference is approximately 0.35% per month statistically significant at 5% level. However, when we consider only loss firms, the investment's growth component effect on subsequent stock returns is mitigated at a statistical significance of 10%.

The accounting distortion and/or less efficient use of existing capital subcomponent exhibit a pattern favoring the mispricing aspect of the overall anomaly. The accountings' distortion effect on subsequent stock returns is more pronounced where loss firms are considered. It takes its largest value in the Eastern-Southern country region. In case of profit firms, all hedge monthly abnormal returns are the lowest.

The fact that the combined information of losses heuristic with the investment growth component led to its mitigated effect on subsequent stock returns, it suggests that for both country regions the investment growth component might be in line with rationality. On the other hand, the accounting distortion subcomponent is more pronounced in loss firms. Overall, portfolio analysis suggests that: a) the full sample is driven by more developed economies, since the results are qualitatively similar to those of more developed markets, b) the investment growth component's effect on subsequent stock returns is mitigated under loss firms for

Table 4. Stock price performance of portfolios based on the investment growth component.

	Full Sample			Profit Firms			Loss Firms		
	Low Sales Growth	High Sales Growth	Hedge Sales Growth (L-H)	Low Sales Growth	High Sales Growth	Hedge Sales Growth (L-H)	Low Sales Growth	High Sales Growth	Hedge Sales Growth (L-H)
Eastern-Southern	1.214***	0.846***	0.368**	1.298***	0.916***	0.382**	1.789*	0.499	1.290*
Western-Northern	0.910***	0.552**	0.358***	0.898***	0.546**	0.352***	0.458**	−0.006	0.463**
All Countries	0.967***	0.622***	0.345***	0.956***	0.611**	0.345***	0.532**	0.079	0.454**

Table 4 reports one-year-ahead monthly abnormal returns (adjusted for size and book-to-market ratio, using the characteristic-based benchmark approach) of country region portfolios and an all-countries portfolio. Country region portfolios are formed on the magnitude of sales growth over the period 1996-2020. Each year, six months after the financial year-end, stocks are allocated into five equally sized (quintile) portfolios based on sales growth. Time-series averages of one-year ahead monthly equally weighted abnormal returns are reported for the lowest portfolio, the highest portfolio and the hedge portfolio (i.e., a long position in the lowest portfolio and a short position in the highest portfolio). The all-countries portfolios are formed using the same procedure as the country region portfolios, with firms from all countries (i.e., pooled sample). Columns of PROFIT and LOSS firms are formed using the same procedure as the country region portfolios, after classifying both the polled sample and the country region subsamples into profit and loss firms based on the reported Net Income. Firms are classified as Profit firms if their year-end Net Income is positive, whereas as Loss firms if their year-end Net Income is negative. The t-statistic for the average monthly abnormal returns is given in parentheses. *, **, *** denotes statistical significance at the 10%, 5%, and 1% level respectively.

Table 5. Stock price performance of portfolios based on the accounting distortions component.

	Full Sample			Profit Firms			Loss Firms		
	Low Distortions	High Distortions	Hedge Distortions (H-L)	Low Distortions	High Distortions	Hedge Distortions (H-L)	Low Distortions	High Distortions	Hedge Distortions (H-L)
Eastern-Southern	0.754***	1.084***	0.331***	0.823***	1.167***	0.344***	0.877**	1.345***	0.468***
Western-Northern	0.578**	0.869**	0.292**	0.647**	0.816**	0.169**	−0.049**	0.414**	0.463**
All Countries	0.629***	0.939***	0.310***	0.668***	0.849***	0.226***	0.075*	0.522**	0.447**

Table 5 reports one-year-ahead monthly abnormal returns (adjusted for size and book-to-market ratio, using the characteristic-based benchmark approach) of country region portfolios and an all-countries portfolio. Country region portfolios are formed on the magnitude of accounting distortion and/or efficiency over the period 1996-2020. Each year, six months after the financial year-end, stocks are allocated into five equally-sized (quintile) portfolios based on the accounting distortions and/or efficiency component of asset growth. Time-series averages of one-year ahead monthly equally-weighted abnormal returns are reported for the lowest portfolio, the highest portfolio and the hedge portfolio (i.e., a long position in the highest portfolio and a short position in the lowest portfolio). The all-countries portfolios are formed using the same procedure as the country region portfolios, with firms from all countries (i.e., pooled sample). Columns of PROFIT and LOSS firms are formed using the same procedure as the country region portfolios, after classifying both the polled sample and the country region subsamples into profit and loss firms based on the reported Net Income. Firms are classified as Profit firms if their year-end Net Income is positive, whereas as Loss firms if their year-end Net Income is negative. The t-statistic for the average monthly abnormal returns is given in parentheses. *, **, *** denotes statistical significance at the 10%, 5%, and 1% level respectively.

both country regions and c) the accounting distortions component's effect is augmented under loss firms for both country regions.

Next, we estimate cross-sectional regressions using the OLS approach and

clustered standards errors at both the firm level and the year level, of one-year ahead annual raw returns on these two asset growth components, after controlling for size (the natural logarithm of market capitalization), book-to-market ratio (the natural logarithm of the book-to-market ratio) and momentum.[9] The regressions are estimated for the entire sample of firms and for the two country region subsamples as well, conditional on firms' earning sign. Firms are assigned to the subsample of profit firms if their reported net income is positive and to the subsample of loss firms if their reported net income is negative.

Panel A of Table 6 reports results for loss firms whereas Panel B for profit

Table 6. Regressions of stock returns on asset growth components.

Panel A: Regression Analysis on Loss Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.0370	−0.0162**	0.0391***	0.0148**	0.0134	0.0109	−0.0568*
Western-Northern Loss Firms	0.0912*	−0.0202***	0.0244***	0.0089	0.0025	−0.0010	−0.0424*
All Countries Loss Firms	0.0746	−0.0288***	0.0349***	0.0125***	0.0041	0.0008	−0.0455*
Diff in SG, ΔAT & (SG * ΔA) coeff.		−0.0040**	−0.0147***	−0.0059**			
Panel B: Regression Analysis on Profit Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.2129***	−0.1130**	0.0907**	0.0403	−0.0083	−0.0094	0.03770*
Western-Northern Profit Firms	0.1506**	−0.1361***	0.1248**	0.0355*	−0.0016	−0.0010	0.01629
All Countries Profit Firms	0.1674***	−0.1395***	0.1225**	0.0262	−0.0032	−0.0033	0.02366*
Diff in SG, ΔAT & (SG * ΔA) coeff.		−0.0231**	0.0341**	−0.0048			

Table 6 reports the results from cross-sectional regressions of annualized raw returns on asset growth's decomposition, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. The first classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each sub-sample and the polled sample as well. In the last row, we report the difference in SG, ΔAT and (SG * ΔA) coefficients from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates are given by: $se\left(b_H - b_L\right) = Var\left(b_H\right) + Var\left(b_L\right) - 2Cov\left(b_H, b_L\right)$ where $Cov\left(b_H, b_L\right)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is: $RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} SG_{i,t} + \gamma_{2,t} \Delta AT_{i,t} + \gamma_{3,t}\left(SG_{i,t} * \Delta AT_{i,t}\right) + \gamma_{4,t} \ln\left(SZ\right)_{i,t} + \gamma_{5,t} \ln\left(BM\right)_{i,t} + \gamma_{6,t} MOM_{i,t} + u_{i,t+1}$.

[9]The accounting distortions and/or efficiency component and the interaction term between the investment growth component and the accounting distortions and/or efficiency component enter the regressions with a negative sign since increases (decreases) in them lead to decreases (increases) in asset growth rate.

firms. Last row of Table 6 reports the difference in SG, ΔAT and (SG * ΔA) coefficients from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates are given by: $se(b_H - b_L) = Var(b_H) + Var(b_L) - 2Cov(b_H, b_L)$ where $Cov(b_H, b_L)$ is estimated by multiple-equation OLS.

To be in line with Artikis et al. (2022), we expect that the investment growth component will have a negative relationship with subsequent stock returns, due to either risk or mispricing. On the other hand, the accounting distortions and/or efficiency component should be positively associated with subsequent stock returns, only under a mispricing camp.

In the case of profit firms (Panel B of Table 6), the Western-Northern country region exhibits a more negative coefficient estimate on SG but a weaker on the ΔAT component. The Eastern-Southern country region exhibits the weakest SG component. When loss firms are considered (Panel A of Table 6), coefficients of both asset growth components are of much lower magnitude either from the full sample or the profit subsample. Nonetheless, SG's ability to explain future return is mitigated in both country regions while the strongest ΔAT effect takes place in the Eastern-Southern country region. Finally, the differences in the SG and ΔAT coefficients between the more developed and the less developed markets remain statistically significant in both cases.

Overall, results in Tables 4-6 (portfolio and regression analysis) confirm that both investment growth and accounting distortions and/or reduced efficiency play a significant role in driving the effect of balance sheet growth on stock returns. The investment growth seems to be more consistent with a rational-based explanation of the overall anomaly since it is more pronounced in well developed economies and its effect is mitigated when losses (having the role of a mispricing indicator) are considered. These findings validate our *H1* hypothesis. On the other hand, the accounting distortion effect on future returns is stronger in less developed economies and augmented when firms' losses are taken into account (validating our *H2a* and rejecting *H2b* hypotheses).

5. Robustness Checks

The United Kingdom is by far the largest market in the sample. In addition, Russia is the second largest market in the Eastern-Southern country region and of these European countries arbitrarily excluded from previous studies on the field. Our sample also includes the COVID19 pandemic. The outbreak of COVID-19 pandemic has tremendously affected the financial markets, through a fractal contagion effect (Okorie & Lin, 2021), leading to efficiency decreases (Wang et al., 2021). Thus, in this section, we examine whether our initial results still hold if both the UK and Russia are excluded from the analysis, as well as the COVID-19 pandemic period.

Specifically, Table 7 excludes the UK and Russia, while Table 8 excludes the COVID-19 pandemic. Initial patterns in coefficients are qualitatively the same.

Still, the largest asset growth anomaly takes place in less developed economies and is mitigated in magnitude when more development countries along with firms' losses are considered. Reported results suggest that there is a small decrease in AG's coefficient estimate when loss firms are considered after excluding Russia from the sample (from −0.1701 to −0.1617), but a small increase when loss firms are considered after excluding the COVID-19 pandemic (from −0.1701 to −0.1826).

Table 9 & Table 10 present the results of asset growth's decomposition. Table 9 excludes the UK and Russia, while Table 10 excludes the COVID-19 pandemic. Results are consistent with the ones provided in the initial sample. SG's explanatory power is the strongest when more developed countries are considered and mitigated when loss firms are considered. ΔAT' s effect is more pronounced in less developed countries and mitigated when profit firms are considered.

Table 7. Regressions of stock returns on asset growth excluding Russia and the United Kingdom.

Panel A: Regression Analysis on Loss Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.0852	−0.1617***	0.0175	0.0151	−0.0529*
Western-Northern Loss Firms	0.1523	−0.0314**	−0.0019	−0.0005	−0.0202
All Countries Loss Firms	0.0962	−0.0340**	0.0027	0.0032	−0.0336*
Diff in AG coeff.		0.1303**			
Panel B: Regression Analysis on Profit Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.2110**	−0.138***	−0.0072	−0.0106	0.0384*
Western-Northern Profit Firms	0.1246*	−0.1295***	0.0002	0.0016	0.0243
All Countries Profit Firms	0.1515***	−0.1316***	−0.0019	−0.0022	0.0297*
Diff in AG coeff.		0.008**			

Table 7 reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. From the initial sample, we have excluded for robustness purposes Russia and the United Kingdom. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. Firms' classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each sub-sample and the polled sample as well). In the last row, we report the difference in AG coefficient from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates are given by: $se\left(b_H - b_L\right) = Var\left(b_H\right) + Var\left(b_L\right) - 2Cov\left(b_H, b_L\right)$ where $Cov\left(b_H, b_L\right)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is: $RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} AG_{i,t} + \gamma_{2,t} \ln\left(SZ\right)_{i,t} + \gamma_{3,t} \ln\left(BM\right)_{i,t} + \gamma_{4,t} MOM_{i,t} + u_{i,t+1}$.

Table 8. Regressions of stock returns on asset growth excluding the COVID19 pandemic.

Panel A: Regression Analysis on Loss Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.1983	−0.1826***	0.0248	0.0208	0.0002
Western-Northern Loss Firms	−0.0437	−0.0329**	0.0117	0.0106	0.0587
All Countries Loss Firms	−0.0703	−0.0353**	0.0140	0.0122	0.0504
Diff in AG coeff.		0.1497**			
Panel B: Regression Analysis on Profit Firms					
	Intercept	AG	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.1619*	−0.1362***	−0.0060	−0.0075	0.0815**
Western-Northern Profit Firms	0.1055	−0.1251***	−0.0013	−0.0017	0.1139*
All Countries Profit Firms	0.1195**	−0.1344***	−0.0023	−0.0032	0.1032*
Diff in AG coeff.		0.0111**			

Table 8 reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. From the initial sample, we have excluded for robustness purposes the COVID19 period. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. Firms' classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each sub-sample and the polled sample as well). In the last row, we report the difference in AG coefficient from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates are given by: $se\left(b_H - b_L\right) = Var\left(b_H\right) + Var\left(b_L\right) - 2Cov\left(b_H, b_L\right)$ where $Cov\left(b_H, b_L\right)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is: $RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} AG_{i,t} + \gamma_{2,t} \ln\left(SZ\right)_{i,t} + \gamma_{3,t} \ln\left(BM\right)_{i,t} + \gamma_{4,t} MOM_{i,t} + u_{i,t+1}$.

Table 9. Regressions of stock returns on asset growth components, excluding Russia and the United Kingdom.

Panel A: Regression Analysis on Loss Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.0492	−0.0154**	0.0375***	0.0139**	0.0149	0.0136	−0.0615
Western-Northern Loss Firms	0.1870	−0.0268***	0.0268***	0.0068*	−0.0044	−0.0030	−0.0196
All Countries Loss Firms	0.1297	−0.0327***	0.0349***	0.0097***	0.0004	0.0009	−0.0326
Diff in SG, ΔAT & (SG * ΔA) coeff.		−0.0114**	−0.0107**	−0.0071*			
Panel B: Regression Analysis on Profit Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.2417**	−0.1579**	0.1165**	0.0662*	−0.0097	−0.0127	0.0388*
Western-Northern Profit Firms	0.1365**	−0.1525***	0.1160**	0.0473**	−0.0004	0.0009	0.0235

Continued

All Countries Profit Firms	0.1751***	−0.1662***	0.1276**	0.0299	−0.0034	−0.0037	0.0298*
Diff in SG, ΔAT & (SG * ΔA) coeff.		0.0054*	−0.0005*	−0.0189			

Table 9 reports the results from cross-sectional regressions of annualized raw returns on asset growth's decomposition, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. From the initial sample, we have excluded for robustness purposes Russia and the United Kingdom. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. The first classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each subsample and the polled sample as well. In the last row, we report the difference in SG, ΔAT and (SG * ΔA) coefficients from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates is given by: $se(b_H - b_L) = Var(b_H) + Var(b_L) - 2Cov(b_H, b_L)$ where $Cov(b_H, b_L)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is: $RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} SG_{i,t} + \gamma_{2,t} \Delta AT_{i,t} + \gamma_{3,t} (SG_{i,t} * \Delta AT_{i,t}) + \gamma_{4,t} \ln(SZ)_{i,t} + \gamma_{5,t} \ln(BM)_{i,t} + \gamma_{6,t} MOM_{i,t} + u_{i,t+1}$.

Table 10. Regressions of stock returns on asset growth components, excluding the COVID19 pandemic

Panel A: Regression Analysis on Loss Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Loss Firms	−0.1684	−0.0704*	0.1022***	0.0695	0.0228	0.0192	−0.0074
Western-Northern Loss Firms	−0.0181	−0.0182***	0.0173**	0.0066*	0.0095	0.0082	0.0569
All Countries Loss Firms	−0.0410	−0.0302***	0.0296***	0.0119***	0.0119	0.0098	0.0486
Diff in SG, ΔAT & (SG * ΔA) coeff.		0.0522*	−0.0849***	−0.0629			
Panel B: Regression Analysis on Profit Firms							
	Intercept	SG	ΔAT	(SG * ΔA)	ln (SZ)	ln (BM)	MOM
Eastern-Southern Profit Firms	0.1864**	−0.1272**	0.0987**	0.0555	−0.0081	−0.0092	0.0814**
Western-Northern Profit Firms	0.1164*	−0.1447***	0.1205**	0.0430**	−0.0018	−0.0023	0.1133*
All Countries Profit Firms	0.1357***	−0.1483***	0.1205**	0.0336*	−0.0033	−0.0042	0.1032*
Diff in SG, ΔAT & (SG * ΔA) coeff.		−0.0175**	0.0218**	−0.0125			

Table 10 reports the results from cross-sectional regressions of annualized raw returns on asset growth's decomposition, after controlling for size, book-to-market ratio and momentum. Annual cross-sectional regressions are estimated over the period 1996-2020 using OLS with clustered standard errors. From the initial sample, we have excluded for robustness purposes the COVID-19 period. The regressions are estimated for the entire sample of firms, for the subsample of eastern-southern firms and for the subsample of western-northern firms. We report separate coefficients for each country region and coefficients for all countries combined. The all-countries row is formed with firms from all countries (i.e., pooled sample). Panel A reports the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and

momentum, conditional on firms' classification into Loss firms, whereas Panel B the results from cross-sectional regressions of annualized raw returns on asset growth' decomposition, after controlling for size, book-to-market ratio and momentum conditional on firms' classification into Profit firms. The first classification into Profit and Loss firms is based on firm's year-end Net Income. If firm's Net Income is positive (negative), the firm is classified as a Profit (Loss) firm. The classification takes place within each subsample and the polled sample as well. In the last row, we report the difference in SG, ΔAT and (SG * ΔA) coefficients from cross-sectional regressions between country region subgroups (i.e. Western-Northern/Eastern-Southern). Standard errors for coefficient' differences estimates is given by: $se(b_H - b_L) = Var(b_H) + Var(b_L) - 2Cov(b_H, b_L)$ where $Cov(b_H, b_L)$ is estimated by multiple-equation OLS. ***, **, * represent statistical significance at 1%, 5%, and 10% level, respectively (one-tailed). Regression estimated is: $RET_{i,t+1} = \gamma_{0,t} + \gamma_{1,t} SG_{i,t} + \gamma_{2,t} \Delta AT_{i,t} + \gamma_{3,t} (SG_{i,t} * \Delta AT_{i,t}) + \gamma_{4,t} \ln(SZ)_{i,t} + \gamma_{5,t} \ln(BM)_{i,t} + \gamma_{6,t} MOM_{i,t} + u_{i,t+1}$.

Tabulated results suggest that SG's power to explain future returns is augmented (mitigated) by excluding either the UK or the COVID-19 period, when we consider both more developed (less developed) markets and profit (loss) firms. ΔAT's coefficient is augmented when we exclude Russia from the Eastern-Southern under profit firms. Its increase is even larger when we exclude the COVID-19 period under loss firms. On the other hand, although ΔAT's explanatory power remained almost unchanged when we excluded the UK from the Western-Northern country region, its power is mitigated in terms of magnitude and statistical significance when we excluded the COVID-19 period.

6. Conclusion

Compared to previous studies on a global asset growth effect, this research employed less aggregated data to provide new insights into its underlying origins. We employ Artikis et al. (2022) asset growth decomposition as well as losses as a heuristic to disentangle between a mispricing-bases and a risk-based explanation behind its occurrence. In addition, we examine both asset growth subcomponents, conditional on earnings' sign, for more developed and less developed European economies.

The findings from portfolio and regression analysis suggest that both country regions exhibit a robust asset growth effect. Based on existing literature (Watanabe et al., 2013; Titman et al., 2013), an asset growth effect in the Western-Northern country region is more aligned with a risk-based explanation. This finding is also supported by the fact that the asset growth effect is augmented when profit firms are considered. On the other hand, an existent asset growth anomaly in the Eastern-Southern country region rejects a combined q-theory and market discipline story. An asset growth effect in the Eastern-Southern region, which is augmented when loss firms are considered, is favoring a market inefficiency story.

In addition, our results are in line with Artikis et al. (2022) asset growth decomposition. Both components seem to account for the overall market puzzle in both country regions. The investment growth (accounting distortion) component is more pronounced in more developed (less developed) economies and mitigated (augmented) when loss firms are considered. Our initial results and inference remain robust when we exclude the United Kingdom and Russia or the COVID19 pandemic period from our analysis.

Founding

This work has been partly supported by the University of Piraeus Research Center.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix A: Definition of Firm-Level Variables

Variable	Measurement[a]
Total Assets (*TA*)	*W*02999
Asset Gr. Rate (AG)	Annual percentage change in total assets (W02999) See Cooper et al. (2008).
Av. Total Assets (Av.TA)	Average value of total assets (W02999)
Lag. Total Assets (L.TA)	Lagged value of total assets (W02999)
Net Income (NI)	W01551
Market Cap. (MV)	W08001 (measured six months after financial year-end) See Fama and French (1992); Fama and French (1993).
Book-to-Market Ratio (BM/MV)	W03501/W08001 See Fama and French (1992); Fama and French (1993).
Nat. Log. Market Cap. (SZ)	ln(W08001)
Nat. Log. of Book-to-Market Ratio (BM)	ln(W03501/W08001)
Sales (SA)	W01001
Sales Gr. (SG)	Annual percentage change in sales (W01001)
Asset Turnover Ratio (ATR)	SA/TA
Acc. Distortion (ΔAT)	Annual change in asset turnover ratio (ATR)
Monthly Raw Ret.	Monthly return data are obtained from Datastream (item RI), representing closing prices at the last trading day of the month.
Momentum (MOM)	MOM is defined as the past 11 months' cumulative stock return (excluding the month of portfolio formation) using the return index provided by Datastream (item RI)
Ann. 1-Year Ahead Raw Ret.	It is calculated using compounded 12-monthly buy-and-hold returns. The return cumulation period begins six months after financial year-end.
Monthly Size-Beme Adj. Ret.	For measuring abnormal returns, we use the characteristic-based benchmark approach, adjusting for size and book-to-market effects. Each year, firms are sorted into quartiles based on size, then by book-to-market ratio, forming 16 benchmark portfolios. Firms within these portfolios are weighted equally and by market capitalization. The abnormal return for a firm is its raw return minus the benchmark portfolio's return to which it belongs.

[a]Note: "W" denotes that the relevant data item comes from Worldscope.

Appendix B: Sample Details

Country	% of Participation	Time Period	Country Region
ITALY	4.92%	1996-2020	Eastern-Southern
RUSSIAN	4.32%	1998-2020	Eastern-Southern
TÜRKIYE	4.09%	1996-2020	Eastern-Southern
POLAND	2.64%	1996-2020	Eastern-Southern

Continued

SPAIN	2.35%	1996-2020	Eastern-Southern
BULGARIA	2.26%	2006-2020	Eastern-Southern
GREECE	2.08%	1996-2020	Eastern-Southern
HUNGARY	0.78%	1996-2020	Eastern-Southern
CROATIA	0.68%	2006-2020	Eastern-Southern
CZECH REPUBLIC	0.61%	1996-2020	Eastern-Southern
PORTUGAL	0.57%	1996-2020	Eastern-Southern
CYPRUS	0.33%	2006-2020	Eastern-Southern
UNITED KINGDOM	22.81%	1996-2020	Western-Northern
GERMANY	16.29%	1996-2020	Western-Northern
FRANCE	9.82%	1996-2020	Western-Northern
SWEDEN	6.63%	1996-2020	Western-Northern
SWITZERLAND	4.19%	1996-2020	Western-Northern
NORWAY	3.34%	1996-2020	Western-Northern
DENMARK	2.57%	1996-2020	Western-Northern
NETHERLANDS	2.50%	1996-2020	Western-Northern
FINLAND	2.12%	1996-2020	Western-Northern
BELGIUM	1.87%	1996-2020	Western-Northern
AUSTRIA	1.33%	1996-2020	Western-Northern
IRELAND	0.87%	1996-2020	Western-Northern

Appendix B presents basic information of the sample by country. % of Participation is the percentage participation of each country in the overall sample. Time Period is the beginning and ending year of participation in the sample.