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From Traditional to Sustainable Growth

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Abstract

This article is a 360-degree analysis of the growth investment concept. Academics generally circumscribed it to a mere anti-value status. We show that growth-oriented stocks not only present the characteristic of being expensive and over-priced. They can be found in any field, but tend to operate in newer and faster-growing industries that feature disruptive innovation. They are overrepresented in the United States and are not confined to a particular size segment. Growth stocks also have in common being related to all traditional equity risk factors. They are defined first as opposed to value but also have significant exposure to quality, volatility, dividend yield and momentum. And finally, they carry a significant amount of idiosyncratic risk. Therefore, we do not consider growth as to be an equity factor. From a macro-economic point of view, we find that growth strategies tend to perform well when inflation and long-term interest rates are at subdued levels, and when the yield curve is flat or sloping slightly upward.

We also revisit growth investing from a sustainable angle by integrating social and environmental dimensions into our analysis. For this, we consider the companies' net contribution towards addressing each of the 17 Sustainable Development Goals (SDGs). We show that imposing a sustainability constraint on North American growth portfolios leads to structural changes in growth investing and distorts some of its most prominent characteristics. Conversely, European portfolios are hardly impacted, which testifies to the high sustainability standards of European companies.

Keywords: Growth, Value, Factor investing, Sustainability

JEL classification: C30, G11, G12

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1 Introduction

Growth investing has been a popular strategy for several decades. The underlying concept is very intuitive. It consists in investing in companies or sectors that grow at a rate that is higher than the market average and are expected to continue expanding over a meaningful amount of time. Historically, the growth investment concept has always been considered the opposite of value investing. The dichotomy can be traced back to the seminal research of Fama and French (1992) in which the authors define value and growth characteristics on the basis of a common valuation metric: the book to price ratio. They then formalized the method in two renowned papers (Fama and French, 1998, 2007). The practice subsequently benefited from the financial community's growing interest in factor investing in general, and in the value factor in particular. It is today unanimously shared by academic researchers (Lakonishok *et al.*, 1994; Van der Hart *et al.*, 2003; Fama and French, 2021). In the end, growth has gradually been confined to an anti-value status. It has failed to mainstream the very closed circle of factor investing and, despite its popularity among investors, little research has been dedicated to the strategy. In this article, we aim to restore its legitimacy by performing a 360-degree analysis of this investment concept. We dissect its characteristics and biases and question its confinement to the role of an anti-value strategy. Beyond the status conferred on growth investing, we also question its inevitable mutation. In a world where tackling climate change and social inequalities and preserving natural capital are of paramount importance, we explore the possibility of transforming growth into sustainable growth.

Popularity does not necessarily mean universality. Two views coexist in terms of how to capture companies' growth features. On the one hand, practitioners generally select growth stocks based on a traditional fundamental approach. It begins with identifying major shifts in consumer behaviour that will direct the business landscape in the long-term. Companies that establish or benefit from disruptive business models must then be identified and analyzed. Growth is typically quantified as the historical or expected rate of growth of various accounting variables, such as sales and earnings. On the other hand, academics consider that growth is inextricably related to value. Specifically, they deem the two investment approaches to be at opposite ends of the investment spectrum. At one end stand the value companies that are considered unattractive by investors and trade at prices below their intrinsic value. At the other end are growing companies that exhibit an expensive profile that is supposed to reflect their growth potential. Assigning a company to one or the other of these two categories is therefore based solely on valuation.

Positioning value and growth at opposite ends of a single and continuous spectrum makes growth an anti-value strategy in theory. In order to test this hypothesis and define the main characteristics associated with growth investing, we jointly analyze the characteristics of two growth portfolios over a 24-year period. The first portfolio replicates the construction method generally adopted by academics. Growth-oriented stocks are therefore defined as those that trade at a high price with regard to information from accounting reports (book value, earnings, cash flows, etc.). This portfolio is, by construction, the exact opposite of the value port-

folio. The second portfolio seeks to reflect the construction methodology adopted by practitioners. However, since there is no universally accepted methodology for identifying growth stocks, we rely on the methodologies of index providers who tend to favor historical and prospective growth indicators.

Analyzing these two portfolios shows that growth-oriented companies have notable characteristics. In addition to a very strong regional prism focused primarily on the United States, they tend to operate in faster-growing industries (information technology, consumer discretionary and healthcare). From a risk factor point of view, they are defined first as opposed to value (high valuation) but also borrow from other traditional risk factors already identified by the academic community. Growth stocks are therefore characterized by a multi-factor exposure. They tend to be volatile and move with the strength of momentum. Their exposure to the quality factor is, on the other hand, more contrasted, depending on the region in which they operate (high quality in North America, neutral in the Eurozone). They further carry a significant proportion of idiosyncratic risk. These last two elements alone explain why growth has never succeeded in mainstreaming into the club of traditional equity factors. Additionally, we demonstrate that the relative scarcity of growth companies in the market exposes investors to a strong diversification risk during growth rallies, when investors' flows concentrate massively on this investment style. Finally, we show that growth strategies tend to perform well when inflation and long-term interest rates are at subdued levels, and when the yield curve is flat or sloping slightly upward.

While the two portfolios exhibit a growth-oriented profile, in line with the characteristics cited above, significant differences can be observed between them. From a general perspective, growth features are more pronounced in practitioners' portfolios. Geographic and sector biases are accentuated. The same applies to factor exposures, with the notable exception of the value factor. Practitioners' portfolios are indeed significantly less negatively exposed to the value risk factor, and are consequently valued at a discount to those of academics. These differences result in low levels of overlap and correlation between two strategies intended to target the same assets. In the end, growth investing as defined by practitioners cannot be reduced to a simple anti-value strategy, and therefore should not reasonably be approximated in this way. Interestingly, the only times the two definitions of growth really converge are when speculative bubbles form in these assets. Buying pressure then triggers a self-fulfilling prophecy from the perspective of academics, making growth assets the most expensive assets in the market.

In a final section, we address the social and environmental issues associated with growth. Long ignored, they are now an integral part of the growth equation. Over the past century, human society has made economic growth a dogma. However, the perpetual quest for growth has led to unreasonable mass consumption without taking into account the negative externalities associated with it. Henceforth, a host of social and environmental issues are threatening the smooth functioning of our societies for the foreseeable future. Among these are global warming, loss of biodiversity, scarcity of resources, poverty, social inequality, etc. Because economic,

social and environmental challenges are fully interconnected, they require a global response. Sustainability is where these challenges meet. This involves a fundamental shift in how growth is perceived and valued. Sales and earnings growth prospects can no longer serve as the sole reference. The quality and composition of growth must also come under close scrutiny. In order to encompass the environmental and societal dimensions in our thinking, we use the MSCI SDG Alignment database. It aims to provide a holistic view of companies' net contribution towards addressing each of the 17 Sustainable Developments Goals (SDGs). As part of this exercise, we set sustainability constraints where a company can only integrate a growth portfolio if its contribution to sustainable objectives is positive.

How is growth investing impacted by the integration of sustainability constraints? Our study shows that sustainability is not universal. While European companies' sustainability standards are very high, among the best in the world, North American compagnies' are lagging behind. In particular, nine of the United States' top ten firms by market capitalization made a negative contribution to the SDGs at the end of 2021. To the extent that these behemoths are sometimes closely associated with growth, the North American portfolio is amended accordingly. From a risk factor perspective, we observe that exposure to the quality factor is by far the most impacted. The high-quality profile of growth-oriented stocks is sacrificed in the name of sustainability and morphs into a low-quality profile as the constraint of sustainability increases. Surprisingly, exposure to growth decreases only moderately, in the same proportions as that affecting momentum. Conversely, exposure to liquidity and volatility increase slightly, which is partly explained by the lower representation of US mega caps. These results confirm the previously highlighted multi-factor profile of growth investing. With regard to sector exposures, the sustainability filter has the effect of accentuating the bias observed in technology companies, and of causing a shift from the consumer discretionary to the healthcare sector. In comparison, the Eurozone portfolio is hardly impacted by the sustainability filter, due to the leadership of European authorities in this area.

This paper is organized as follows. In Section 2, we review academic literature on growth investing. Section 3 details definition of growth investing from academic and practitioner perspectives. Section 4 is dedicated to a 360-degree analysis of these two perceptions of growth. We dissect their dominant biases and characteristics and the underlying risks associated with them, and demonstrate that growth cannot and should not be circumscribed to an anti-value definition. In Section 5, we revisit growth investing from a sustainable angle by integrating social and environmental dimensions into our framework. Finally, Section 6 offers some concluding remarks.

2 Literature review

Thomas Rowe Price, Jr. is known as the "father of growth investing". He founded his investment firm in 1937, putting a strong long-term emphasis on fundamental research. He was in a way the counterpoint to Graham and Dodd (1934) who introduced the concept of value investing a few years before. However, the academic

interest in value and growth investment came much later. It can be traced back to the Fama and French (1992)'s seminal research in which they provide evidence of the empirical failures of the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965). In this study, they document that value stocks have higher average returns than growth stocks and that size and book-to-market equity (BM), associated to the market Beta, can better predict the cross-section of stock returns on U.S. markets than the market Beta alone (CAPM). They also demonstrate that BM explains most of the anomalous differences in future stocks returns. This influential article marks the starting point of an extensive research on the value factor, which has become one of the most documented topics in modern finance. Roca (2021) identified 400 academic works published in the field of value investing between 1965 and 2020. Among these, Fama and French (1998) lay the foundations of the value–growth opposition.

It may seem surprising to make an article on value the starting point for academic research on growth. The explanation lies in the fact that the two research topics are totally intertwined: the academic community generally defines value and growth characteristics according to a common criterion, which is price related to a fundamental such as book value, earnings or cash flow. In the end, value and growth stocks lie at opposite ends of a single and continuous spectrum built on the basis of this valuation criterion. Value stocks are undervalued securities, trading at prices below their fundamental value and growth stocks display the contrary characteristic, showing expensive profiles. Value, however, enjoys a primacy over growth due to its risk factor status, which does not benefit growth. This has contributed greatly to the fact that growth exists primarily as opposed to the value factor, but also in its shadow. Indeed, following the article written by Fama and French (1992), a very large number of studies have documented the ability for the value characteristic to provide a description of what drives equity returns. First highlighted in the U.S. markets due to easier access to accounting and financial data (Basu, 1977; Fama and French, 1992, 1993, 1996; Lakonishok *et al.*, 1994; Israel and Moskowitz, 2013), research on the value risk factor then expanded to other developed and emerging financial markets (Chan *et al.*, 1991; Fama and French, 1998; Arshanapalli *et al.*, 1998; Van der Hart *et al.*, 2003; Hou *et al.*, 2011). Ultimately, the academic community came to agree on the existence of a pervasive value-premium that compensates investors for taking non-diversified risk, especially over long time periods. On a shorter time horizon, it should be noted however that the value premium may fail to materialize. This has been the case, for example, since the 2008 Global Financial Crisis (GFC), which corresponds to a very favourable period for growth equities. The very strong underperformance of value stocks compared to their growth counterparts, especially in the late 2010s and early 2020s, has led many market observers to argue that value was dead. Several studies have refuted this idea. Fama and French (2021) and Arnott *et al.* (2021) demonstrate that the recent performance of the value factor is still well in the range of variation than can be expected statistically. Stagnol *et al.* (2021) analyze the empirical relationships between the value factor and the standard economic risk factors and emphasize that the normalization of the eco-

nomic environment, with higher inflation and tightening credit spread levels, could greatly support the factor performance. On their side, Blitz and Hanauer (2020) resurrect the value premium by considering a more sophisticated value investment strategy.

Much less consensus exists, however, about the underlying reasons for the existence of a value premium. There are three distinct sources of explanations put forward by researchers, that provide elements of understanding of growth, by mirror effect. The first of these relies on risk-based explanations, stating that value stocks are more risky than growth stocks and that value premium exists to compensate investors for these risks. The nature of the risks differs according to the studies. For some, it is inherent in the low capacity of value companies to adapt their production tool to varying economic conditions (Fama and French, 1993; Cooper, 2006; Gulen *et al.*, 2011; Novy-Marx, 2011). For others, it is due to the relative financial distress of value companies (Fama and French, 1995, 1996; Vassalou and Xing, 2004). Roncalli (2017) likens it to a skewness risk premia, as opposed to market anomalies. On their side, Campbell *et al.* (2010) assert that firms' systematic risks are determined by the properties of their cash flows. While growth stocks are exposed to a "good beta" reflecting news about the market's discount rates, value stocks show a higher exposure to a "bad beta" reflecting news about the market's future cash flows. Authors explain the outperformance of value stocks by the higher price of risk the "bad beta" inherently carries.

The second source of explanations favors irrational behavior of investors resulting in the mispricing of assets. In this view, the term "glamour" is often preferred to that of "growth", because of its subjective connotation. According to this interpretation, the mispricing stems from investors' overextrapolation of past performance and/or from excessively optimistic analysts' forecasts, resulting in stock prices that are too high for growth firms and too low for value firms. The value premium arises from the correction of these investors' judgmental biases. Proponents of this view include Graham and Dodd (1934), Bauman and Dowen (1988), Lakonishok *et al.* (1994), La Porta (1996), Barberis *et al.* (1998) and Harris (1999). The agency factors of investment management are also frequently associated to this view, insofar as sell side analysts may have considerable incentives in recommending popular stocks.

Finally, the third source of explanation is part of a more general context related to data and data processing. They therefore apply to the value factor but potentially also to all the anomalies identified by academic research. Numerous studies argue that many supposed anomalies are simply the results of an extensive data-snooping exercise (Black, 1993; MacKinlay, 1995; White, 2000) or the consequences of other biases related to data (Conrad and Kaul, 1993; Ball *et al.*, 1995; Kothari *et al.*, 1995; Conrad *et al.*, 2003). Several studies point out, however, that no bias of this type can on its own call into question the amount of evidence provided by the academic literature for decades (Markowitz and Xu, 1994; Chan *et al.*, 1995). In the end, the academic community is still far from reaching a consensus on the origins of the value premium that they unanimously observe.

Beyond this deep body of research solely focused on the value-growth opposi-

tion, there is also an academic literature, much more limited however, specifically dedicated to the subject of growth investing. French (2022) shows that analysts' forecasts are a better predictor of future earnings growth than price multiples. Recent studies analyze trajectories of key accounting data to determine whether it can help predict future returns. The underlying idea is that an accounting ratio is an incomplete picture of the firm's prospects for future profitability and that it must be complemented by more dynamic information. Akbas *et al.* (2017) investigated the profitability dimension, following on from the work of Novy-Marx (2013) and Fama and French (2006, 2015) on the subject. They contribute to the literature by showing that the recent trajectory of a firm's gross profits predicts future profitability and stock returns on the U.S. markets. On their side, He and Narayanamoorthy (2020) analyze the implications of earnings acceleration for future stock returns, once again on the U.S. markets. They show that the quarterly change in earning growth, defined as the quarter-over-quarter change in earnings growth has significant explanatory power for future expected returns. They also demonstrate that these future excess returns are not related to the Post-Earnings Announcement Drift anomaly (PEAD, Bernard and Thomas, 1990), of which Martineau (2021) recently announced the disappearance. According to He and Narayanamoorthy (2020), the implementation of a strategy based on earnings acceleration requires however a strong reactivity from investors because trading windows start two days after an earnings announcement. And even if the significant excess returns persist — albeit less consequential — with a trading strategy involving calendar month rebalancing, transaction costs generated by a monthly rebalancing frequency cannot be ignored.

3 Measuring growth

A growth stock is any share in a company that is anticipated to grow at a rate significantly above the average growth for the market. If it is widely acknowledged that growth-based investment strategies aim to capture this growth potential, the question becomes less straightforward, however, when it comes to defining it. Two schools of thought coexist, each fuelling the other. On the one side we find the academic researchers and on the other side we have the practitioners. As part of this study, we will mimic the methodology for defining the growth feature of the two parties in order to better grasp their specific characteristics, but also to better compare them. We begin by describing what each of these definitions consist of.

3.1 The academic approach

The common presumption is that financial markets are efficient and that market prices reflect all available, relevant information. It therefore integrates the growth and expansion potential of firms, their earnings power, their ability to generate profit, but also the systematic and specific risks inherent in their activity. Academics combine the market price with accounting data to obtain valuation ratios that are measures of a company's future growth opportunities relative to its accounting value. Value stocks are undervalued securities, trading at prices below their fundamentals

and growth stocks display the opposite characteristic, showing expensive profiles. Therefore, a simple valuation ratio makes it possible to distinguish value stocks from growth stocks within a given universe. The approximation made by the academics leads to consider that growth stocks are the strict opposites of value stocks from a valuation point of view. Or in other words, they are *anti-value* stocks.

The most commonly accepted valuation ratio is book to price (Fama and French, 1992, 2007, 2012; Cakici *et al.*, 2013), but similar ratios combining a fundamental measure such as earnings, cash-flows or sales with price are also frequently adopted (Fama and French, 1998; Hou *et al.*, 2011; Israel and Moskowitz, 2013). Enterprise value based multiples have further been the subject of academic research (Loughran and Wellman, 2011; Gray and Vogel, 2012; Pätäri *et al.*, 2016). These multiples have the advantage of being comparable across firms with diverging leverage. While value stocks and, by extension, growth stocks are in the vast majority of cases identified on the basis of a single metric, some researchers have chosen to combine these value indicators to obtain a composite value criterion. This objectively may add extra information if these metrics are not highly correlated. For example, Chan and Lakonishok (2004) examined the efficacy of combining traditional valuation metrics (B/P, E/P, S/P and CF/P)[1]. The importance of combining several value metrics was defended, for example, by Asness *et al.* (2015) and more recently by Blitz and Hanauer (2020). We share that view. First because we believe that the information carried by all valuation ratios is not necessarily the same. Second because the probability of misclassifying stocks by using a single indicator is higher. In this study, we define the academic metric as a combination of B/P and E/P for financials, to which is added the CF/P metric for non-financial companies.

3.2 The practitioner approach

On the practitioner side, there is no universal definition of growth investing, either. A major difference, however, opposes them to academics: expensiveness is not a criterion used to identify growth-oriented stocks. Practitioners usually combine several indicators to obtain a global growth score. The objectives pursued by both sides are not the same. While academics try to limit as much as possible the interactions that may arise from the combination of several indicators, investors pursue a more practical objective, which is to capture the entire dimension of a feature, here the growth. Any biases that may be unwittingly embedded in the global score can usually be mitigated or even sometimes eliminated, if necessary, during the portfolio construction process. Given the multitude of existing practices, an objective way to proceed with the definition of the growth characteristic is to look at index providers' methodologies. Indeed, several major index providers offer traditional style indexes that are designed to represent broad market segments based on investment styles (growth and value, large and small). Investment managers usually use them for benchmarking purposes. In Table 1, we list the company characteristics retained by

[1] B/P, E/P, S/P and CF/P refer to book to price, earnings to price, sales to price and cash flow to price ratios, respectively.

five providers to define their growth style indexes[2].

Table 1: Growth factor definition by major index providers

Index provider	Measures defining growth	Label
MSCI	Long-term fwd EPS growth	LT fwd EPS gth
	Short-term fwd EPS growth	ST fwd EPS gth
	Current internal growth	Internal gth
	Long-term hist. EPS growth trend	Slope 5Y EPS
	Long-term hist. SPS growth trend	Slope 5Y SPS
S&P	3-Yr net chg in hist. EPS / Current price	3Y PEG
	3-Yr hist. SPS growth	CAGR 3Y SPS
	12-Mth price momentum	Price momentum
FTSE	2-Yr fwd EPS growth	MT fwd EPS gth
	5-Yr hist. SPS growth	CAGR 5Y SPS
CRSP	Long-term fwd EPS growth	LT fwd EPS gth
	Short-term fwd EPS growth	ST fwd EPS gth
	3-Yr hist. EPS growth	CAGR 3Y EPS
	3-Yr hist. SPS growth	CAGR 3Y SPS
	Current investment to assets	Invt to assets
	Return on assets	ROA
Russell	2-Yr fwd EPS growth	MT fwd EPS gth
	5-Yr hist. SPS growth	CAGR 5Y SPS

Source: MSCI, S&P, FTSE, CRSP, Russell

The analysis of Table 1 shows that index providers overwhelmingly associate the growth characteristic of companies with the growth of sales and earnings, based on historical or forward-looking data. From a historical point of view, the growth in sales by shares (SPS) is unanimously considered by all five providers, but not necessarily on the same time-horizon. Historical growth in earnings per share (EPS) is rarely associated with it[3]. MSCI has also included EPS and SPS measures, but prefers to take into account their long-term trend rather than their growth rate. From a prospective point of view, only EPS growth is adopted. While MSCI and CRSP favor a combination of short- and long-term projections of EPS growth, FTSE and Russel promote the medium-term forecast. For its part, S&P does not include any prospective measure. Some providers supplement these historical and prospective growth indicators with other descriptors: internal growth for MSCI, price momentum and price earnings to growth (PEG) ratio for S&P and fundamental measures relative to investment intensity and profitability for CRSP. Ultimately, the indicators that providers have elected to characterize the growth feature shows

[2]Since FTSE Group combined with Russell in May 2015 to form the brand name FTSE Russell, they share a common methodology on creating style indices.

[3]From our point of view, the low representation of the "historical growth in EPS" metric can be explained by two factors: (i) EPS are subject to accounting manipulations, (ii) growth rates calculation on EPS can be awkward due to outliers and negative base year values. Conversely, these arguments cannot be held against SPS.

some disparity. Since our goal is to characterize growth in the way that practitioners do, we assume that all the indicators displayed in Table 1 are relevant. Nevertheless, we have chosen to remove the price momentum and the PEG ratio from the practitioner list. The price momentum is recognized as being a risk factor in its own right since Carhart (1997). And while it as been well established that there is some overlap between growth and momentum (since growth stocks usually have good momentum), we see momentum more as an outcome than an intrinsic characteristic that defines growth stocks. With regard to PEG, the ratio is the worthy representative of the growth at a reasonable price (GARP) equity investment strategy. It combines tenets of both growth investing and value investing to select individual stocks and cannot – in our view – be considered a pure growth characteristic. It is in a way the counterpart of Piotroski (2000) and Novy-Marx (2013) in the value field when they tried to enhance the value premium of existing value strategies by tilting them on profitability or general accounting-based characteristics.

It would be pointless to keep all the metrics displayed in Table 1 because it is highly likely that some of them carry analogous information. To empirically study whether these growth indicators are similar or complementary, we have created individual portfolios associated with each of them and examine the pairwise correlations of their excess returns in Table 2. The analysis covers the period from December 2008 to March 2022. Very similar results are obtained by extending the observation period to the late 1990s, except for the long-term forward EPS growth metric which was often missing in the early 2000s, leading to highly concentrated portfolios and distorting the results. Shortening the observation period makes it possible to circumvent the problem linked to this single metric without modifying the results relating to the other metrics. Our analysis has furthermore focused on the MSCI North America index due to the very strong regional prism observed on growth stocks. We will discuss this point in Section 4. As might be expected, historical indicators calculated on EPS on the one hand, on SPS on the other are strongly correlated with each other, even when the number of fiscal years used in the calculation is not strictly the same. For example, the trend of SPS over 5 consecutive years is 96% correlated to the 3-year SPS growth and 93% to the 5-year SPS growth. In the context of our study, and in order to circumvent the recurring problems related the calculation of growth rates (outliers and negative base year values), we will focus on slopes rather than growth metrics. With regard to EPS growth forecasts, while short- and medium-term EPS growth are strongly redundant, the long-term projections seem to bring different information. We will therefore associate the short- and long-term EPS growth forecasts. Regarding internal growth and return on assets (ROA), they provide information on the ability of companies to generate future growth and are strongly correlated, making it unnecessary to keep both. We choose to hold the internal growth metric. With respect to the last three indicators, we keep the investment to assets ratio due to its weak correlation with others metrics and, as explained before, we choose to remove the price momentum and the PEG ratio from our final practitioner's list.

Table 2: Correlation matrix of excess returns computed on style index growth metrics (Dec 2008 – March 2022)

	CAGR 3Y EPS	CAGR 3Y SPS	CAGR 5Y SPS	Slope 5Y SPS	Slope 5Y EPS	3Y PEG	ST fwd EPS gth	MT fwd EPS gth	LT fwd EPS gth	Internal gth	ROA	Invt to assets	Price momentum
CAGR 3Y EPS	1.00												
CAGR 3Y SPS	0.64	1.00											
CAGR 5Y SPS	0.58	0.91	1.00										
Slope 5Y SPS	0.63	0.96	0.93	1.00									
Slope 5Y EPS	0.82	0.78	0.73	0.77	1.00								
3Y PEG	0.12	-0.11	-0.22	-0.09	0.03	1.00							
ST fwd EPS gth	0.21	0.45	0.53	0.44	0.35	-0.18	1.00						
MT fwd EPS gth	0.25	0.49	0.55	0.51	0.38	-0.12	0.92	1.00					
LT fwd EPS gth	0.54	0.83	0.81	0.82	0.72	-0.23	0.60	0.63	1.00				
Internal gth	0.48	0.64	0.66	0.63	0.51	-0.25	0.06	0.01	0.50	1.00			
ROA	0.37	0.48	0.51	0.46	0.37	-0.35	-0.09	-0.16	0.35	0.94	1.00		
Invt to assets	0.41	0.54	0.53	0.54	0.53	-0.03	0.38	0.42	0.48	0.24	0.13	1.00	
Price momentum	0.12	0.42	0.45	0.40	0.30	-0.49	0.46	0.37	0.53	0.38	0.35	0.14	1.00

Source: Authors' calculations, Amundi Institute

Note: For each indicator, we form a dedicated non-sector-neutral (unconstrained) portfolio by breaking the investment universe (MSCI North America) into quintiles from high growth (Q_1) to low growth (Q_5). With stocks in the highest-growth quintiles (Q_1), we form long-only factor-mimicking portfolios. Portfolios are value weighted, based on the free-float market capitalization from MSCI, and quarterly rebalanced. Performances are calculated in U.S. dollars with reinvested dividends. The correlation matrix is built on the basis of weekly excess returns that we measure by subtracting the performance of the MSCI North America from the performance of each of the long-only portfolios.

Finally, we define the practitioners' view of the growth characteristic as a combination of six measures, of which two are historical (slope 5Y on EPS and SPS), two are forward-looking (short- and long-term forward EPS growth), and two are based on the last reported fiscal statements (internal growth and investment to assets). We further choose to equally weight the six indicators, thus giving an overweight to historical and prospective metrics, consistent with what we observe in index provider methodologies. We summarize in Table 3 the final metrics we retain to replicate the growth definitions of academics and practitioners.

Table 3: Final metrics

Metrics	Academics	Metrics	Practitioners
#1	Book to Price	#1	Long-term Hist. EPS Growth Trend
#2	Earnings to Price	#2	Long-term Hist. SPS Growth Trend
#3	Cash Flow to Price*	#3	Short-term Fwd EPS Growth
		#4	Long-term Fwd EPS Growth
		#5	Current Internal Growth
		#6	Current Investment to Assets

* For non-financial companies only

Source: Amundi Institute

4 A 360-degree view of growth

Is there a regional prism associated with the growth investment concept? What are the risk characteristics of growth? How different are the academic and practitioner definitions? Can growth be reduced to an anti-value factor, as academic studies suggest? Is growth a premium factor? How the growth style behaves in different market phases? These are the questions we aim to answer in this section.

First, and in accordance with what is usually retained in academic literature, we build value and growth portfolios based on a single value/growth score (VGS). VGS is the result of the aggregation between the B/P and E/P indicators for financial companies, to which we add the CF/P metric for non-financial companies. In any case, a company can only apply for inclusion in a value or growth portfolio if the B/P and E/P ratios are available and positive. Indeed, while negative ratios could be associated with expensive firms, they cannot be interpreted as reflecting expected growth rates. The CF/P ratio is an additional indicator, combined with the other two for non-financial corporations, provided it is positive. Individual value metrics are then equally weighted to form the final VGS. Second, we create growth portfolios more in line with the practices of asset managers, creating a growth score (GS) independent of the value feature. GS aggregates the six individual indicators we previously selected, through an equally weighted scheme. By doing so, we give an overweight to historical and prospective measures, as we observe in the index provider methodologies. When one or more metrics are not available for a given asset, the equal weighting is performed based on the available metrics.

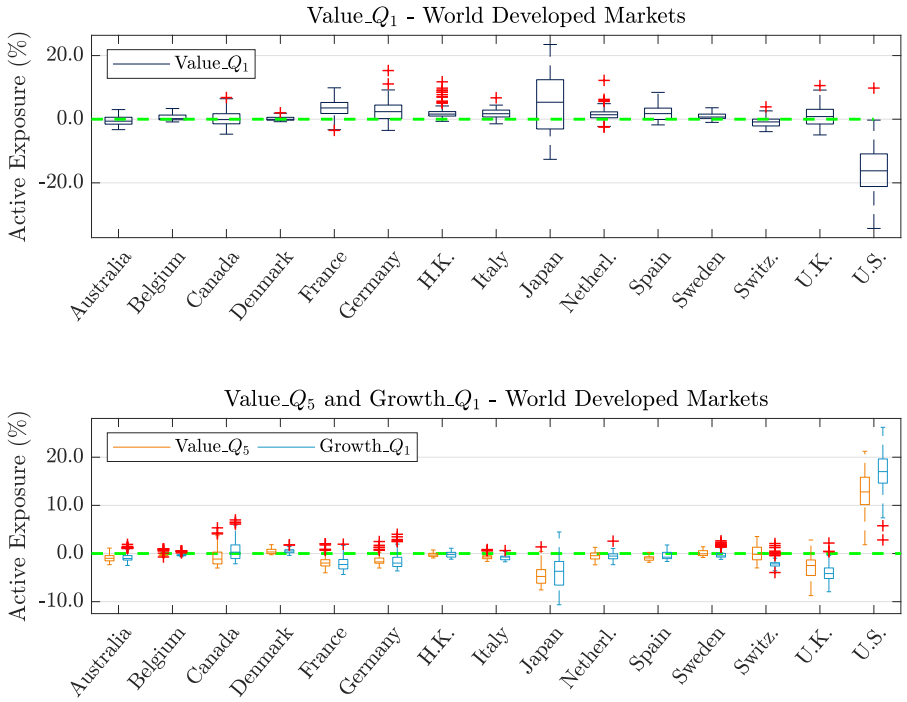
In order to gain a comprehensive view of the growth feature, our simulations relate to different investment universes which correspond to the official MSCI standard indices. We present results on developed and emerging markets, which we complement with a regional focus on North America and Eurozone. Fundamental data comes from the FactSet Fundamentals database. At each quarterly rebalancing date of our portfolios, we seek to use the latest published data (quarterly, semi-annual or yearly data). Because the FactSet Fundamentals database is not point in time, we apply an automatic three-month lag to the data we use to account for publication and integration delays. Projective data comes from the FactSet Estimates database.

For each investment universe, we form five value weighted portfolios based on VGS and GS. We rebalance them on a quarterly basis. The market capitalizations we consider in our portfolio construction process are the free float-adjusted market capitalizations from the MSCI database. The first quintile (Q_1) is the best-in-class portfolio that contains the securities with the highest scores according to the targeted feature. In order to clearly identify what each strategy refers to in our article, Value_Q_1 is systematically associated with the cheapest securities of a given universe. Conversely, Value_Q_5 refers to the most expensive stocks in this same universe, and therefore to the growth definition of academics. Finally, Growth_Q_1 relates to companies with highest growth according to the practitioners' view.

4.1 A very pronounced regional prism

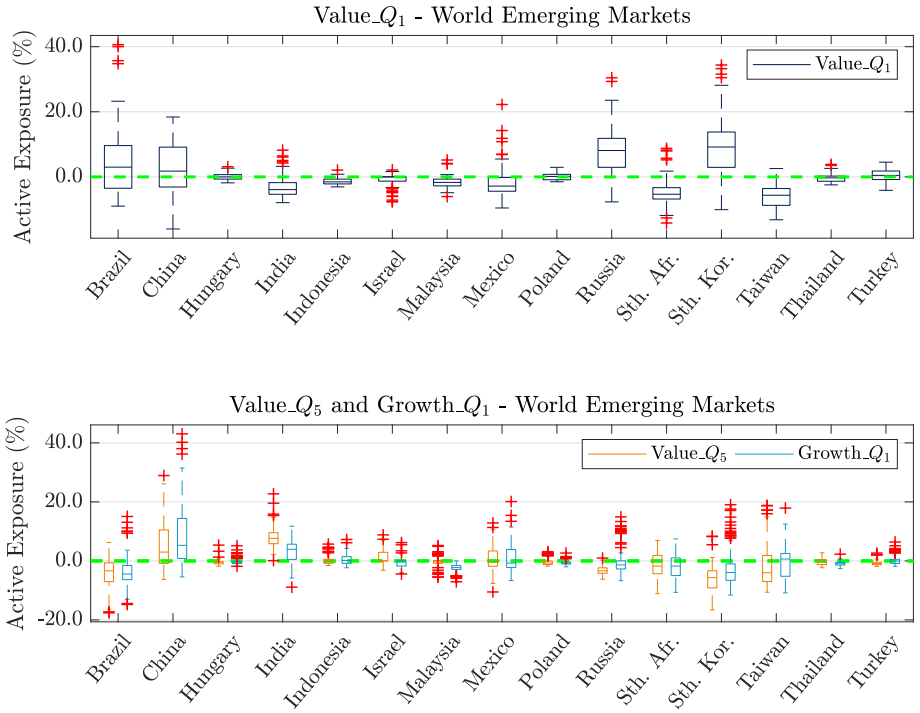
We focus first on the geographical specificities of growth investing. We show in Figures 1 and 2 the active exposure of our three portfolios in terms of countries, respectively for developed and emerging markets. By active exposure, we mean the additional risk exposure the portfolios carry relative to their parent indices, the MSCI World Developed Markets and the MSCI Emerging Markets. Not constraining portfolios from a geographical point of view makes it easy to detect whether there is a regional prism in one or the other of these investment universes. The calculations are made over the period March 1998-March 2022 and come from the Barra's GEMLT model. For the sake of readability, we have kept in the figures only the countries whose relative exposures are significantly different from zero. With regard to developed markets, we observe an absolute hegemony of U.S. companies in the field of growth. It is the only developed country to display such consistency over the past 24 years. We also notice a certain symmetry between value and growth from a geographical point of view. The countries structurally associated with the value characteristic (France, Germany, Italy, Japan) are largely underrepresented within the growth portfolios, and vice versa. Finally, a comparison of the academic and practitioner versions shows that the latter tends to accentuate the over-representation of North American companies within the growth portfolio. This is particularly the case for U.S. companies whose average active exposure goes from 12.9% in the academic version to 16.9% in the practitioner version. Since the North American region is closely associated with the growth characteristic, we will mainly focus on this region in the body of this study. We will present in Appendix A.2 the results relating to the Eurozone.

Figure 1: Active country exposure of value and growth portfolios in DM



Source: MSCI, Barra, Authors' calculations, Amundi Institute

Figure 2: Active country exposure of value and growth portfolios in EM



Source: MSCI, Barra, Authors' calculations, Amundi Institute

When it comes to emerging markets, the growth characteristic seems more evenly distributed across countries. While China and India are the main representatives, their dominance is much less than that of the United States in the developed markets. In addition, other countries such as Mexico and Taiwan regularly show active exposures above zero. However, this more equitable distribution of the growth characteristic is partly explained by the lower stability inherent in emerging economies. The boxplot associated with China, which is characterized by a wide interquartile range and by large whiskers, is an obvious marker of this low stability over time. Others are the numerous outliers in all emerging countries that are plotted individually using the "+" symbol or the extended scale of the y-axis.

4.2 A multi-exposure to style factors

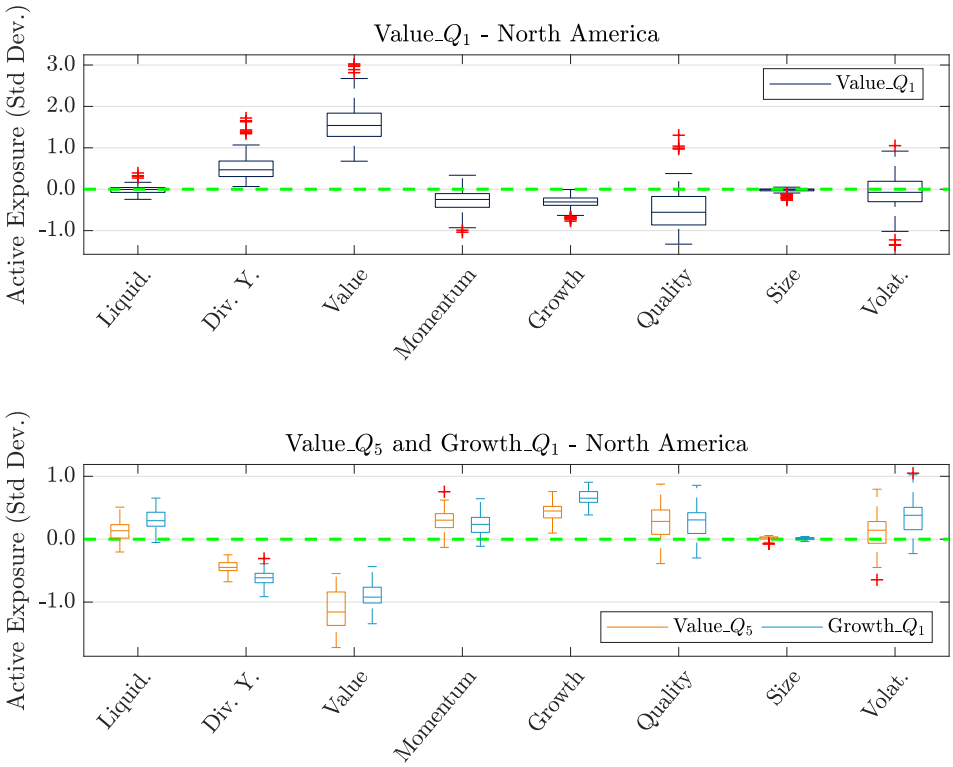
Figure 3 shows the active exposure of our three North American portfolios to all style factors. It should be noted that the Barra's fundamental equity factor model GEMLT includes growth as one of the style factors. It is defined as a combination of three descriptors: earnings per share growth, sales per share growth and predicted earnings growth. This definition is very close to that adopted by practitioners, which introduces an obvious analytical bias: the portfolio mimicking the practitioners' approach will logically be more exposed to the growth factor than its academic counterpart. However, our objective here is not to specifically measure the exposure of our portfolios to the growth factor, but to assess the magnitude and direction of the portfolio's biases across all common style factors.

At a first glance, the two growth portfolios exhibit quite similar active style exposures. They display negative exposure to value and dividend yield, and positive exposure to growth, quality, momentum, volatility and liquidity. Negative exposure to value outweighs positive exposure to growth style, which is a notable feature. This means that the growth style is defined first and foremost as opposed to value. However, when subjected to closer scrutiny, it is apparent that the practitioners' definition of growth helps to mitigate this feature, reducing value exposure on the one hand and increasing growth exposure on the other. At the same time, it translates into an increase in exposure to liquidity, dividend yield and volatility styles. We also observe that none of our three portfolios displays a size bias compared to the MSCI North America. It is likely that this statement would have been more nuanced if we had considered a broader investment universe such as the MSCI North America Investable Market Indexes (IMI) that also includes small-cap securities. Ultimately, compared to growth portfolios, the value portfolio displays more assertive characteristics (the y-axis scale in the upper part of the figure, which relates to the Value_Q_1 portfolio, is much larger than in the lower part, which relates to its growth counterparts). It is primarily exposed to the value style factor and exposure to other factors is quite contained, making the value a purer style factor than growth. For more information on the evolution of active exposures on growth portfolios over time, we display them in Appendix A.1.1 in the form of time-series (Figures 18 and 19).

We also carry out the same analyses on the Eurozone, which we display in Ap-

pendix A.2.1 (Figures 22 to 24). While the growth characteristic is not as present in the Eurozone as in North America, growth portfolios nevertheless display a very comparable exposure to market styles. The only noticeable difference is that growth in the Eurozone is less exposed to the quality factor than in North America. We can therefore say that, from a style exposure perspective, growth shows a relative homogeneity across regions.

Figure 3: Active style exposure of value and growth portfolios in North America



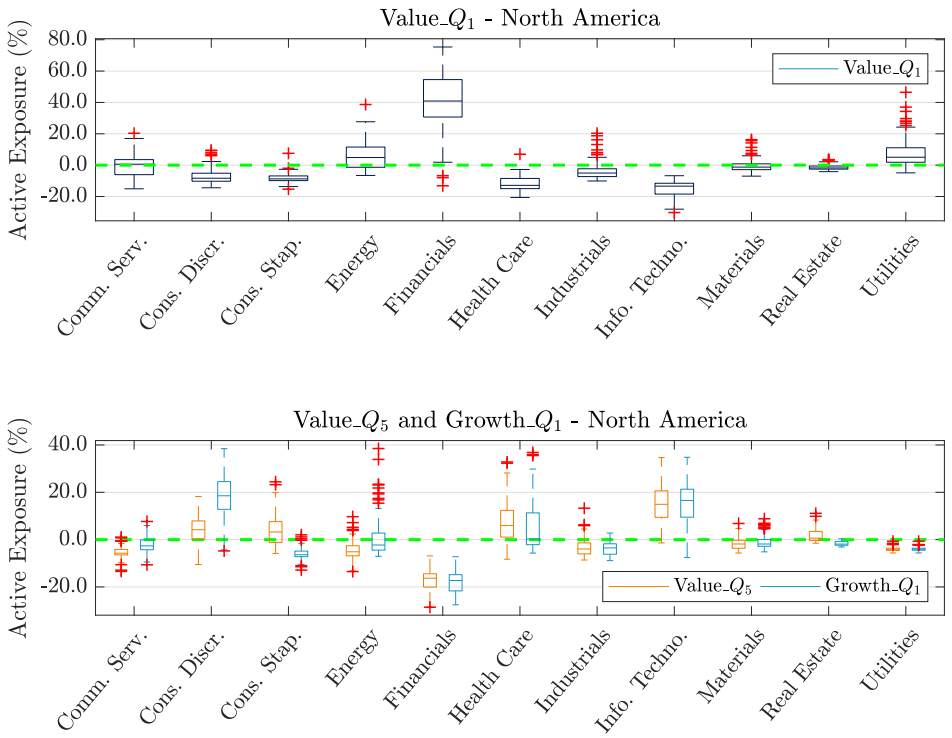
Source: MSCI, Barra, Authors' calculations, Amundi Institute

4.3 A concentration on a few industries

From a sectoral point of view, we observe in Figure 4 that the two growth-oriented portfolios overweight companies that tend to operate in faster-growing industries (information technology, consumer discretionary and healthcare). In this, growth investing differs from most other styles and market factors, which generally display greater transversality across economic sectors. Quality or momentum, for example, are not the prerogative of a handful of sectors. The concentration of the growth feature within these three sectors therefore testifies to its relative scarcity, giving it the status of a niche strategy. We also witness that growth portfolios are in perfect opposition to the value factor, which overweights the financials, utilities and energy sectors. Once again, we observe notable differences between the growth portfolio of

practitioners and that of academics. In particular, the practitioners' growth portfolio significantly overweights the consumer discretionary sector, traditionally associated with growth due to its strong luxury orientation. On the other hand, we note that, compared to the Value_Q_5 portfolio, Growth_Q_1 significantly underweights the consumer staples sector which is by nature defensive. These differences in the sector allocations tend to reinforce the idea that growth as defined by practitioners generates portfolios that are sometimes significantly different from those constructed by academics. And to the extent that these differences are expressed by a greater concentration in growth-oriented sectors, it appears that the practitioner version manages better to grasp the growth dimension at the firm level.

Figure 4: Active GICS sectors exposure of value and growth portfolios in North America



Source: MSCI, Barra, Authors' calculations, Amundi Institute

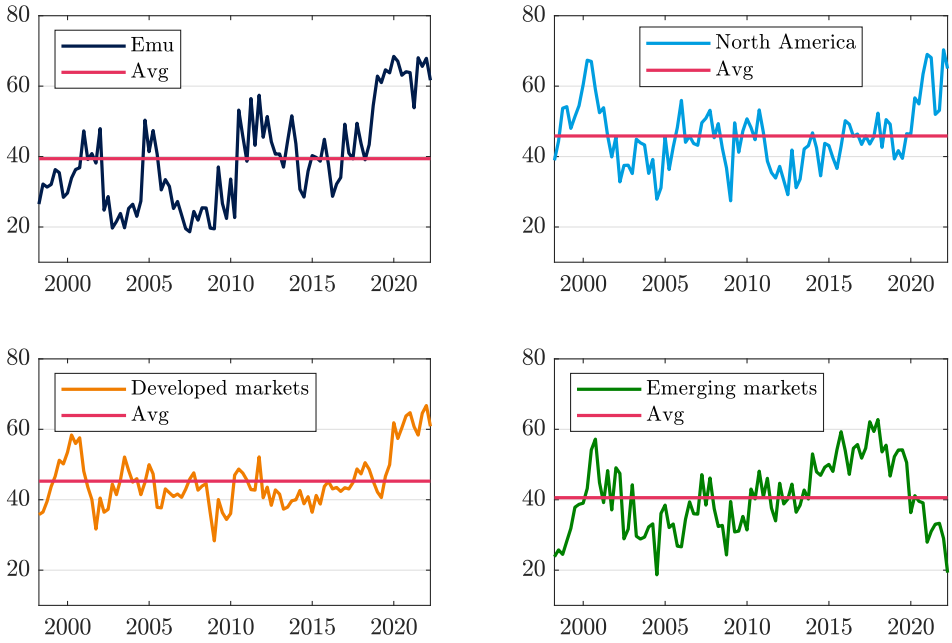
In a similar way to what we produced in the section relating to styles, we complete this analysis by displaying in Appendices A.1.2 and A.2.2 the time-series of sector exposures on growth portfolios in the North America region (Figures 20 and 21), as well as an analysis on the Eurozone region (Figures 25 to 27). Again, similar conclusions can be drawn for both regions. This is all the more surprising since the two parent indices from which the growth portfolios are based have very different sector compositions. While the weights of sectors related to technology and health-care are predominant in North America, Eurozone is more represented by financials,

industrials and consumer discretionary. These results demonstrate that the growth characteristic is closely related to the sector of activity: some sectors are by nature growth-oriented, regardless of the geographical area considered or the importance of these sectors in the local economy. This remark also applies to the value factor which is very largely represented by financials.

4.4 Two definitions of growth that lead to two different portfolios

We have previously analyzed the active exposures of growth portfolios (i.e. versus their respective benchmark) in terms of countries, styles and sectors. Another viewpoint allowing to appreciate the similarities and differences between two financial portfolios consists in analyzing the compositions of the growth portfolios at the stock level. Figure 5 shows the overlap between the portfolios built on the basis of the academics' definition and those built on the basis of the practitioners' definition.

Figure 5: Value_Q_5 and Growth_Q_1 overlap by region (%)



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

Different observations can be drawn from these graphical representations. First and foremost, the observed overlap levels are surprisingly low for two strategies that are supposed to target the same assets. It is on average around 40% in the Eurozone region and in the emerging markets, compared to around 45% in the North America region and in the developed markets. Second, we observe a fairly strong trend over the last 3 or 4 years, but it is not the same depending on the region to which we refer. In developed markets, the trend is upwards and while the overlap has never been so high in the Eurozone (68% at the end of 2021), it is close to the peaks

reached in the early 2000s in North America (70% at the end of 2021). Conversely, the trend is downward in emerging countries, with a recovery level of less than 20%, which also corresponds to the historical minimum reached in June 2004. We are therefore witnessing a form of decoupling between developed markets on the one hand and emerging markets on the other. Indeed, from a historical point of view, we observe that the level of overlap between the growth portfolios of a given region is positively correlated to the attractiveness of investors for growth-oriented stocks. We note for example that the dot.com bubble peak coincides with a historically high level of overlap between the two versions of the growth portfolios, for all regions, including emerging markets. Similarly, the post-GFC period, conducive to growth stocks, generated an increase in all observed overlap levels. However, the end of 2017 marks a break in this positive correlation for emerging markets.

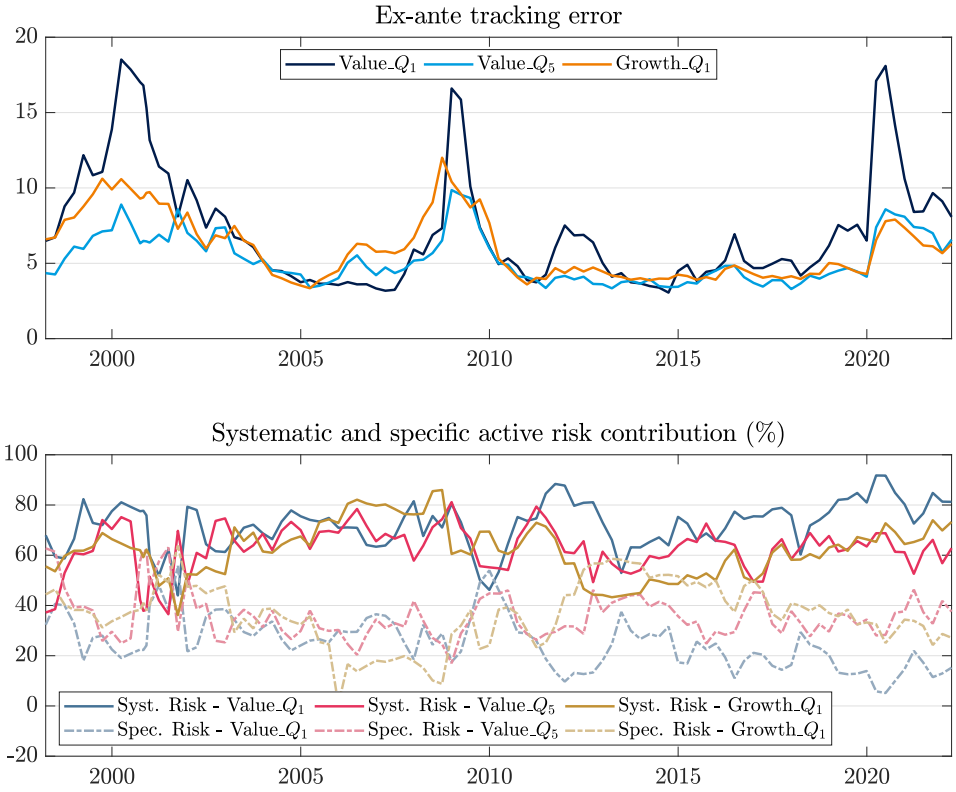
How to interpret such a decoupling between developed and emerging markets? Increasing overlap is an easy process to explain. When capital inflows are massively oriented towards growth-oriented stocks, this generates an increase in the valuation of these assets. As the valuation increases, this makes them assets falling within the scope of the definition of growth investing as formulated by academics. This generates a self-perpetuating process that increasingly values growth assets and increases the overlap level between the two growth portfolios. In the end, the valuation-based proxy used by academics to identify growth stocks is never so similar to the practitioners' approach as when a speculative bubble forms in those assets. This mechanism did not work as expected over the 2017-2020 period for emerging markets, even though it was conducive to growth-oriented stocks. The only rational explanation is that from the end of 2017, market participants favored certain assets more than growth assets making them gradually more expensive from a relative point of view. This is a perfect illustration of the danger of opposing value and growth stocks solely on the basis of their valuation. Buying expensive firms does not always guarantee that they will be associated with growth.

4.5 The growth style from a risk perspective

The risk of an investment strategy can be analyzed from different angles. Each brings its own perspective to better understand the overall risk. In what follows, we first study the ex-ante risk measures of North American value and growth portfolios over time, then we will analyze the risks inherent in concentration. Figure 6 shows the tracking error (TE) volatility of the three portfolios against their parent index. Results are consistent with the risk-based explanations of the value premium (Fama and French, 1995; Vassalou and Xing, 2004; Roncalli, 2017): on the top panel, the Value_Q_1 portfolio exhibits a significantly higher TE than growth portfolios, especially during periods of intense market stress (bursting of the dot.com bubble, GFC, Covid-19 pandemic). With regard to growth portfolios, they show fairly similar active risk on the last thirteen years. However, in the decade prior to this period, Growth_Q_1 very occasionally displayed a higher level of risk than Value_Q_5. In the end, the average level of tracking error displayed by our growth portfolios is 5.3% for Value_Q_5 and 6% for Growth_Q_1. This remains relatively contained given the

construction methodology used in the context of our study (unconstrained portfolios comprising one-fifth of the investment universe).

Figure 6: Active risk measures – North America



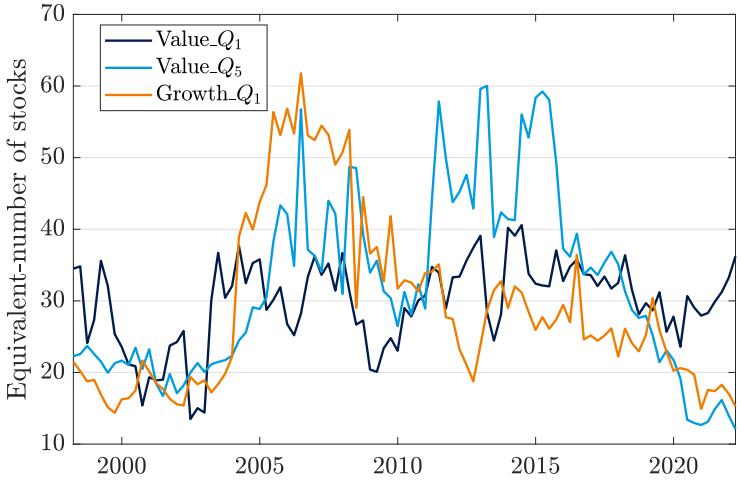
Source: MSCI, Barra, Authors' calculations, Amundi Institute

We further display the breakdown of the TE between its systematic and specific components in the bottom panel of the chart. It indicates that the proportion of active risk explainable by the common risk factors (namely size, value, momentum, quality, growth, industries, countries, etc.) is on average 10% higher in the Value_Q_1 portfolio than in the Value_Q_5 and Growth_Q_1. We can deduce from this that the growth characteristic carries more idiosyncratic risk than the value factor. This is all the more noteworthy since the Barra's risk model introduced the "growth" factor as a common factor, even though academic research has never recognized this status. We also note that the active risk decomposition of the two growth portfolios shows very similar profiles. We can therefore conclude from Figure 6 that despite the numerous differences that we have highlighted in the previous sections, the two portfolios born from the academic definition for one, from the practitioner definition for the other, display very comparable ex-ante risk measures. We performed the same analysis on the Eurozone region (Figure 28 in Appendix A.2.3). While we note that the active risk of the Value_Q_5 portfolio is slightly higher than that of the Growth_Q_1 portfolio, the overall analysis leads to similar results.

The results obtained in this section must be qualified. They are dependent on the portfolio construction methodology applied. For example, an alpha investment strategy that would focus on growth would result in a much more concentrated portfolio around a limited number of stocks given the scarcity of the growth segment that we previously highlighted. The TE would then be significantly higher, as would also be the proportion of idiosyncratic risk. The choice of the risk model is also of some importance because the results can sometimes differ from one model to another.

Diversification is an essential dimension to assess when building an investment strategy. While this aspect may appear secondary when mimicking a market style or factor, it nevertheless seems appropriate to compare our two growth portfolios on the basis of this feature, in order to detect any distortions linked to one or the other growth-related definitions. In what follows, we consider the inverse Herfindahl-Hirschman Index (HHI) as a measure of diversification, also known as the effective number of parties. Originally, the HHI is a commonly accepted measure of market concentration within a given industry. It is calculated by squaring the market share of each firm competing in a given market and then summing the resulting numbers. It can range from close to zero to $10,000$, moving from a huge number of very small firms to a single monopolistic producer. When inverted, it becomes an equivalence measure that tells us the number of companies that would represent if these companies were evenly distributed in the observed sample. It is therefore perfectly suited to the analysis of concentration within a portfolio.

Figure 7: Inverted Herfindahl-Hirschman Index



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

Over the long-term, the three portfolios show quite similar average inverted HHIs (29.7 stocks for Value_Q_1, 32 for Value_Q_5 and 29 for Growth_Q_1). However, we observe in Figure 7 that the path leading to this measure of central tendency is very different depending on whether the portfolios are value- or growth-oriented. We first observe that the inverted HHI evolves in a narrower range over time for the Value_Q_1

portfolio than for its two growth counterparts. It is also noteworthy that growth portfolios exhibit very high levels of concentration during periods when the market particularly favors growth stocks (at the end of the 1990s and at the very beginning of the 2020s decade), which represents a strong diversification risk. To illustrate our point, we display in Table 4 the cumulative weight of a pool of companies that are in the MSCI U.S. Growth Index, namely the FAANGs[4], combined with Tesla and Microsoft. In the space of 10 years, the cumulative weight of these successful companies has multiplied by more than 4, rising from 12% to 49.1% of the growth style index. Our portfolios are obviously not immune to this growth-oriented stock concentration. This phenomenon of concentration is a very strong specificity of the growth stocks segment dominated by a handful of behemoths. It could easily be circumvented by the adoption of alternative weighting schemes (equal weighting, equal risk contribution, etc.), but these would result in significant levels of tracking errors.

Table 4: Cumulative weight of best-performing growth stocks in MSCI U.S. Growth Index

End of Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Cum. Weight (%)	12.0	12.4	13.0	17.1	17.7	24.3	29.7	33.5	45.6	49.1

Source: MSCI, Authors' calculations, Amundi Institute

Apart from these periods of high concentration, growth portfolios exhibit sometimes significant quarterly variations that we explain by the turnover associated with the largest growth firms in the investment universe. For the record, the sorted-portfolio method that we have applied consists of classifying companies according to one or more criteria, and then distributing them within five portfolios. This type of methodology induces side effects which can be easily circumvented within a traditional portfolio management framework, but that we do not apply here. When a company such as Apple or Microsoft leaves the targeted portfolio, sometimes to re-enter it the following quarter, this causes strong variations in the composition of a value-weighted portfolio, and in the resulting inverted HHI. In addition, we have measured the rate of turnover of the three North American portfolios and Value_Q_1 remains by far the portfolio most subject to significant variations, with an average rate of turnover of nearly 80% (one-way measure), compared to 55% and 43% respectively for the Value_Q_5 and Growth_Q_1 portfolios. We display in Appendix A.2.3 the same analysis, carried out on the Eurozone region. The conclusions are essentially the same, except for the Value_Q_1 portfolio whose inverted HHI measure evolves in a similar range over time than the two growth portfolios.

The joint analysis of ex-ante risk and diversification shows the importance of considering risk from different angles. In this case, the TE level of growth strategies only tells us about relative risk. It quantifies the potential deviation of a portfolio

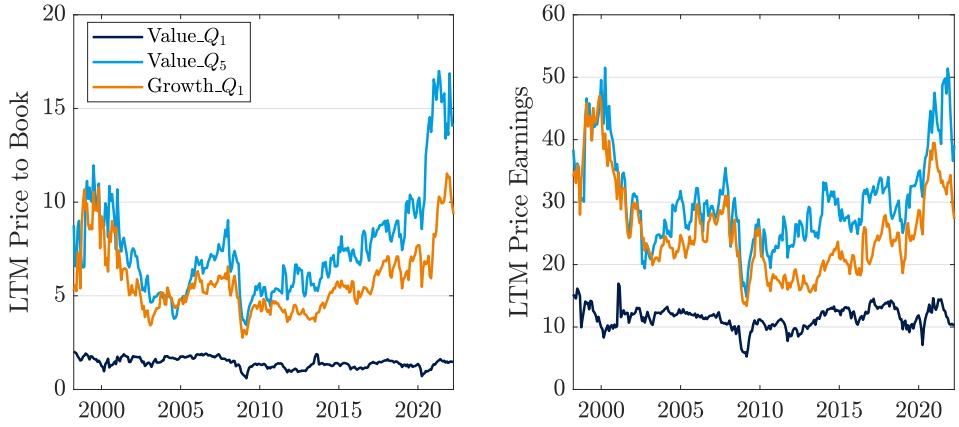
[4]FAANG is the acronym for five of the most successful U.S. technology stocks in the market: Meta (formerly Facebook), Apple, Amazon, Netflix, and Alphabet (formerly Google).

from its benchmark. Thus, at the end of March 2022, the two growth portfolios posted TE very slightly above their historical average. Nothing alarming, then. On the other hand, the risk analyzed from the angle of diversification shows that, from this point of view, we are at levels very close to that of the dot.com bubble of the early 2000s. Which ended in a stock market crash and an economic recession.

4.6 An academic version of growth valued at a premium to its practitioner counterpart

Do growth portfolios built on the basis of the academic definition present levels of valuation similar to those built on the basis of the practitioner definition? If so, it would mean that the price of assets perfectly reflects the growth prospects of firms and that it is therefore an effective proxy for the growth feature.

Figure 8: Valuation of North American portfolios



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

We display in Figure 8 monthly aggregated valuation measures on Value_Q_1, Value_Q_5 and Growth_Q_1 in North America. On the left panel, we show the last twelve month (LTM) price to book ratio. On the right panel, we disclose the LTM price earnings. As previously mentioned, these are two of the metrics most commonly used by academics to discriminate value from growth stocks. As expected, the Value_Q_1 portfolio is very cheap on the basis of both metrics. When it comes to growth portfolios, several lessons can be drawn from Figure 8. First, the two growth portfolios have recently reached valuation levels comparable to or higher than those reached during the dot.com bubble. We should note in particular the spectacular inflation displayed by the price to book ratio of the Value_Q_5 portfolio, which is more expensive by 40% in April 2021 than in June 1999, its historical maximum for our analysis period. Second, the Value_Q_5 portfolio is almost systematically valued at a premium to the Growth_Q_1 portfolio, both on a price to book and on a price earnings basis. The premium is not constant over time. It is part of an upward trend, oscillating in a range between 0 and 30% during the 2000s, then in a range of 20 to

60% during the 2010s. We also note a peak above 100% reached on the price to book ratio during the last quarter of 2020, a token of investors' buying frenzy for U.S. growth stocks at the very beginning of the 2020 decade. This peak is very interesting because it occurs when the market is strongly growth-oriented, at a time when the measured overlap between the two portfolios is at a very high level, as we pointed out in Section 4.4. Insofar as the two portfolios are composed of a comparable number of securities, corresponding to one fifth of the investment universe, we can therefore deduce that the valuation premium is mainly caused by the securities being present in the Value_Q_5 portfolio, but absent from the Growth_Q_1 portfolio. In the end, we obtain a result consistent with the definition of academics, which is based on the premise that valuation ratios are efficient proxies of a company's future growth opportunities. The overlaps that we have previously calculated show that it partially achieves the expected result. However, the valuation analysis demonstrates that it also generates purchases of very highly valued stocks that do not improve the growth profile of the portfolio, as evidenced by our analysis in Section 4.2. Finally, these different elements demonstrate without ambiguity that, from a valuation point of view, the two portfolios are not the same either.

Beyond the differences we observe between the academic and practitioner versions of growth, it is obvious that growth stocks as a whole have benefited from a very favorable backdrop over the period from mid-2007 to late 2020. The valuation levels reached during the last quarter of 2020 are reminiscent of the exuberance we experienced during the dot.com bubble. Valuations of many stocks skyrocketed, without the fundamentals justifying such excess. It seems that investors have bought the so-called growth-oriented stocks, without distinction, whether their growth prospects were realistic and sustainable or purely speculative. Tesla is an evocative example of excessive growth stock valuations. Between the beginning of 2020 and March 2022, the share price multiplied by nearly 13 times. In the space of just a few months, the market capitalization of the automobile manufacturer has climbed into the top 5 of the S&P500 index, at the height of US tech giants. Tesla's market capitalization represented at the end of March 2022 more than all other global developed car manufacturers combined, even though the company accounted for less than 2% of 2021 developed world car sales and does not have a monopoly situation on the global electric vehicle market. Yet, although (too) highly valued, Tesla has the notable characteristic of being profitable, something a large cohort of unprofitable stocks trading at extreme valuations cannot claim.

Once again, the results we obtain in North America find some echo in the Eurozone region, as pointed out in Figure 30 in Appendix A.2.4. However, there is a notable difference between the absolute valuations posted by the growth portfolios of the two regions: price to book ratios are nearly twice as high for North American companies compared to companies in the Eurozone region. In reality, this element illustrates very well the regional prism we highlighted in Section 4.1. Indeed, growth stocks operate in creative and disruptive industries that require a lot of investment in intangible capital. The costs of internally generated intangible assets, such as a patent developed through research and development, are recorded as expenses when

incurred, but do not appear on the balance sheet. American companies, due to their status as the main representative of the growth style in developed countries, are much more affected by this phenomenon because they invest more in intangible assets than do their European counterparts.

4.7 Performance and ex-post risk measures of growth portfolios

We have observed in the previous sections that the definitions of growth of academics and practitioners could ultimately lead to substantial differences in the resulting portfolios. In this section, we focus our attention on how these differences translate in terms of performance and ex-post risk measures. Table 5 displays key indicators calculated on our three portfolios and their benchmark for the period March 1998 to March 2022. From a risk-only perspective, the Growth_Q_1 portfolio has a riskier profile than the Value_Q_5 portfolio. Volatility, beta and maximum drawdown measures are indeed closer to the Value_Q_1 portfolio than they are to its academic counterpart. In other respects, however, the two growth portfolios are very similar. They display a high correlation with their parent index, associated with more contained levels of tracking error and turnover compared to the value portfolio. Moreover, while the three weekly return distributions are skewed to the left, the two growth portfolios are more prone to large negative returns than is the value portfolio. We also note that the annual alpha of 1.9% posted by the practitioners' growth portfolio is significantly higher than that of its peers.

Table 5: Performance and ex-post risk measures

	MSCI North America	Value Q1	Value Q5	Growth Q1
Annualized return (%)	8.01	9.13	8.54	10.41
Volatility (%)	18.1	22.4	19.1	21.4
Sharpe ratio	0.33	0.31	0.34	0.39
Information ratio		0.10	0.07	0.30
Alpha (%)		1.2	0.9	1.9
Beta		1.07	0.98	1.10
Skewness	-0.59	-0.29	-0.49	-0.49
Kurtosis	6.3	9.4	3.6	4.8
Tracking error (%)		11.4	7.2	7.9
Correlation		0.87	0.93	0.93
Turnover (% - one way)		79.4	54.9	42.9
Max Drawdown (%)	-55.1	-63.6	-60.9	-63.8

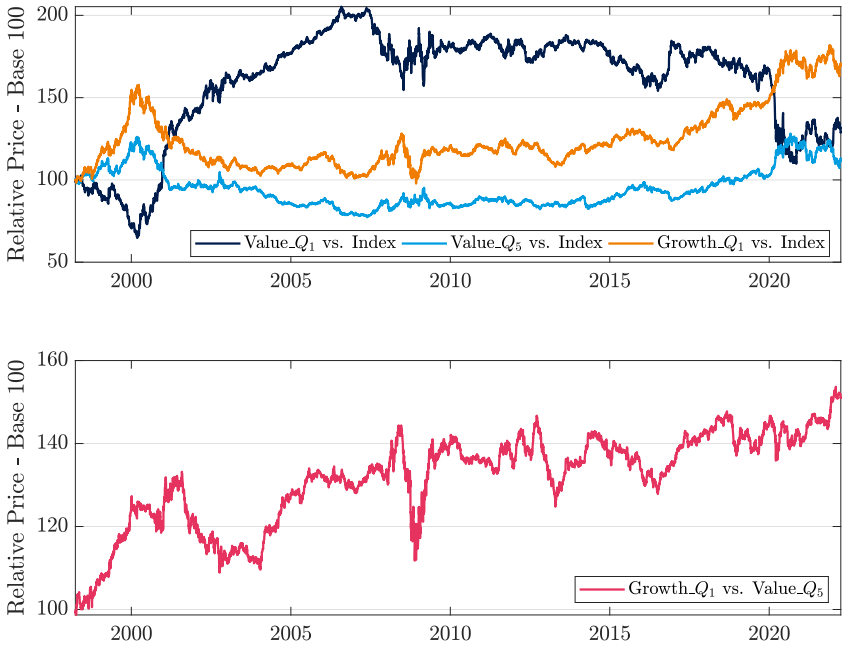
Source: MSCI, FactSet, Authors' calculations, Amundi Institute

From a performance[5] perspective, the version resulting from the practitioners' definition outperforms the academic variant by 187 annual basis points. Adjusted for the beta effect, the annual outperformance is 70 basis points. However, this

[5]Transaction costs and management fees are not included in the context of these performance simulations.

information is not in itself of crucial importance. What matters are the periods during which this outperformance is concretely characterized. To this end, we compare in the upper part of Figure 9 the three portfolios' returns with the return yielded by their parent index, the MSCI North America. As expected, value and growth styles are negatively correlated. This is particularly noticeable in the strong performance phases of either of the two styles. In the lower part of the figure, we plot the performance of the Growth_Q_1 portfolio against the Value_Q_5 portfolio. First, it is interesting to note that the practitioners' portfolio seems to better capture the rallies inherent in growth phases. This is obviously an important characteristic since the essential quality of a portfolio that mimics a market style is to mirror the performance of this style as much as possible. Second, the outperformance of the Growth_Q_1 portfolio against Value_Q_5 is not restricted to growth rally periods. For example, we notice that the practitioner version of growth also outperforms its academic counterpart during the value rally. In particular, we observe that the Growth_Q_1 portfolio shows greater resilience during the phases succeeding the growth rallies, in 2001 and 2021, when the markets were sharply bearish. Third and last point, the Growth_Q_1 portfolio was much more impacted than Value_Q_5 by the GFC, both during the very sharp market decline phase and in the recovery phase that followed, confirming the high beta level of the strategy outlined in Table 5.

Figure 9: Relative performance of simulated portfolios – North America



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

A similar analysis conducted on the Eurozone (see Table 15 and Figure 31 in Appendix A.2.5) shows somewhat different results, which is not really surprising for a market dominated by value-oriented sectors, such as financials and industrials.

Thus, the risk characteristics of the Growth_Q_1 portfolio are in this case much more comparable to those of the Value_Q_5 than they are of the Value_Q_1 portfolio due to the much riskier profile of the value representative.

In order to better understand the performance catalysts of growth investing and the relations that may exist with market equity factors commonly recognized by the financial community, we display in Table 6 the correlation matrix of their excess returns, computed on the whole history of our study. We also measure in Figure 10 the 1-year rolling correlations between these excess returns. The correlation between the two growth portfolios is 60%. This level is quite low for two theoretically comparable portfolios. We deduce however from their respective correlations to the value factor that academic and practitioner definitions of growth converge to a very similar result when investors' appetite for growth stocks is very strong. It was the case in the late 1990s and early 2020s. It is at this precise moment that the buying pressure triggers a self-fulfilling prophecy for academics, making the growth assets the most expensive assets in the market. It is therefore at this precise moment that a growth investment strategy can be approximated by an anti-value portfolio. But it cannot be restricted to that definition alone. We witness that correlations measured between Growth_Q_1 and market equity factors are generally high. This attests that the growth style consists for a large part of a combination of existing equity factors, as previously pointed out. The analysis also confirms that the Growth_Q_1 portfolio is negatively correlated to the value factor, and positively correlated to the momentum and quality factors.

Table 6: Correlation matrix of excess returns computed on equity factors (March 1998 – March 2022)

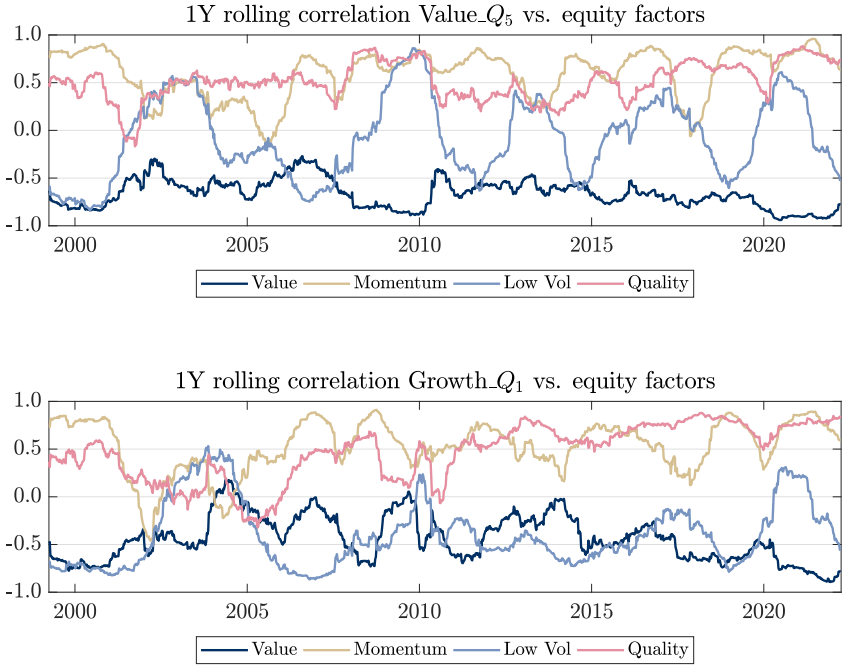
	Value_Q_5	Growth_Q_1	Value_Q_1	Momentum	Low Vol	Quality
Value_Q_5	1.00					
Growth_Q_1	0.60	1.00				
Value_Q_1	-0.73	-0.50	1.00			
Momentum	0.65	0.56	-0.50	1.00		
Low Vol	-0.04	-0.43	0.01	-0.16	1.00	
Quality	0.54	0.44	-0.51	0.34	0.07	1.00

Source: MSCI, FactSet, Authors' calculations, Amundi Institute

The ex-post approach also highlights new elements that we had not previously identified. First, the correlations to the value, momentum and quality factors are much more volatile over time for the practitioner version of growth than for its academic counterpart. This means that growth as defined by practitioners shows a more complex profile, reacting more strongly to various economic and financial conditions. This results in larger correlation amplitudes for Growth_Q_1. This is particularly notable for the value factor, whose correlations with Value_Q_5 are circumscribed in negative territory, ranging from -95% to -27%. Conversely, its correlation with the Growth_Q_1 portfolio has regularly flirted with 0% and even reached a level of $+19\%$ in May 2004.

With regard to the low volatility factor, the situation is different. The correlations we measure fluctuate a lot over time. They are actually closely linked to valuation levels measured by the LTM price earnings ratio (see Section 4.6). Each valuation peak coincides with a low point in the correlation curve with the low volatility factor. Conversely, each reversion to the mean that follows a valuation peak coincides with a high point. This behavior makes sense. According to the mean reversion theory which applies to the price returns of financial assets, if excessive optimism drives prices above intrinsic values, periods of high sentiment should be followed by low returns, as market prices revert to fundamental values. In phases of high valuation, growth portfolios therefore tend to behave in the opposite way to that of a market factor mimicking the low volatility feature. And vice versa. Not surprisingly, the Value_Q_5 portfolio, by nature more exposed to high valuations, is also more impacted by the fluctuations we observe in correlations.

Figure 10: 1Y rolling correlation of excess returns of North American growth portfolios



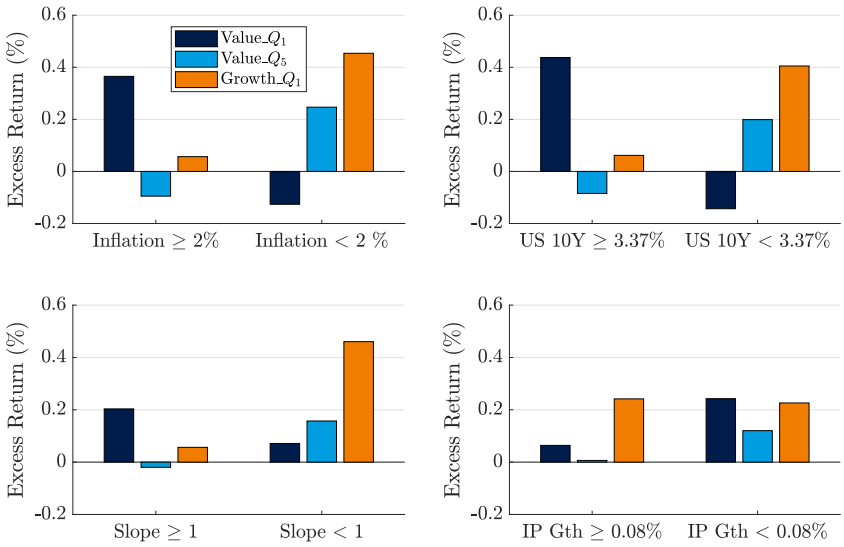
Source: MSCI, FactSet, Authors' calculations, Amundi Institute

4.8 Growth investing across macro-economic regimes

In this section, we evaluate the performance of the value portfolio and its two growth counterparts according to various macro-economic environments. More specifically, we seek to determine how the three portfolios behave with respect to inflation, long-term interest rates, yield curve and economic growth. From a methodological

point of view, we begin by setting a threshold for each macro-economic data. The threshold set for inflation is 2%, which corresponds to the medium-term objective set by the Fed's mandate. We set the threshold for the 10-year rate at 3.37%. It is its average monthly value over our observation period. With regard to the yield curve shape, we measure the slope between the 10-year and 2-year maturity bonds and consider a threshold of 1, which is close to its historical average. Regarding economic growth, we consider the Industrial Production Index from the FRED database. It is an excellent proxy for economic activity and has the advantage of being updated on a monthly basis. The threshold that we use is the average of the monthly growth of the industrial production index observed over the period, i.e. 0.08%. We then calculate the average monthly excess return of our three portfolios depending on whether the level of a given macro-economic indicator is below or above the set threshold. Excess returns are calculated versus the MSCI North America Index and plotted in Figure 11.

Figure 11: Excess return across macro-economic regimes



Source: MSCI, FactSet, FRED, Authors' calculations, Amundi Institute

We witness that growth portfolios tend to perform well when inflation and long-term interest rates are at subdued levels, and when the yield curve is flat or sloping slightly upward. This is consistent with economic theory because growth stocks are by definition very sensitive to the rate environment. First, they are highly dependent on cheap and easy capital to finance their future growth. Second, interest rates have a direct impact on companies' cost of capital, which serves as a discount rate for future cash flows to determine their present value. At the same level of growth, the value created will be greater when interest rates are low (which makes the present values higher) than when interest rates are high. We also observe that the practitioner version of the growth portfolio performs better than the academic version in all macro-economic backdrops, whether favorable or not. Regarding the

value portfolio, it reacts in diametrically opposite ways, performing in inflationary environments, with higher interest rates and upward sloping yield curve backdrop.

The behavior of value and growth portfolios with regard to the level of the industrial production shows a less readable message. Figure 11 shows that the Growth_Q_1 portfolio performed in both environments, and that Value_Q_1 and Value_Q_5 portfolios performed better in low economic activity backdrop. However, breaking down the industrial production brackets into smaller ranges allows us to qualify our observations. Thus, we note that the two growth portfolios outperformed the MSCI North America index the most over periods when the level of industrial production growth was negative. This may be due to the fact that growth stocks are more desirable in periods when economic activity is low, because growth is scarce. It is also interesting to note that unlike the Value_Q_5 portfolio, the Growth_Q_1 portfolio also behaves very well in high activity environments. In fact, the only environment where Growth_Q_1 underperformed its benchmark was when industrial production growth was flat or weakly positive. These results hint at non-linearities between growth portfolio performance and industrial production. For his part, the Value_Q_1 portfolio outperformed when growth in industrial production was negative or reasonably high.

In the end, it seems that the Growth_Q_1 investment strategy has a greater ability to adapt to different economic environments. While it is true that low inflation, low interest rates and low credit spread are particularly favorable to the strategy, it still manages to do well in less supportive environments. This distinctive "all weather" feature opposes it to the Value_Q_5 strategy.

The first conclusion stemming from our 360-degree analysis is that growth investing is an investment strategy with very specific characteristics. In addition to a strong regional prism focused primarily on the United States, we noticed an obvious concentration of the growth feature in a few economic sectors, namely technology, healthcare and consumer discretionary. We also highlighted that growth investing borrows from all the risk factors already identified by the academic community and to which practitioners commonly refer (size, value, momentum, low volatility and quality), and that it carries at the same time a significant proportion of idiosyncratic risk. The combination of these two elements alone explains why growth has not been able to integrate the very restricted circle of equity factors from an academic point of view. Furthermore, the main feature to which an investor is exposed through a growth strategy is diversification. Growth investing is indeed a niche strategy, concentrated around a limited number of companies, which are generally either technology behemoths or much smaller companies. This risk is therefore extremely worrying during growth rally phases, when investors flows concentrate massively on this investment style. The relative scarcity of growth companies on the market with regard to the significant liquidity invested in the past decade has the effect of creating speculative bubbles, overvaluing companies, and causing major diversification risks. Finally, we showed that growth strategies tend to perform well when inflation and long-term interest rates are at subdued levels, and when the yield curve is flat or sloping slightly upward.

The second obvious conclusion we draw from this section is that growth investing as defined by practitioners cannot be reduced to a simple anti-value strategy, and therefore should not reasonably be approximated in this way. The simultaneous creation of two growth portfolios, one based on the definition of academics, the other on that of practitioners shows that many elements distinguish them from each other. First, growth features are more pronounced in the practitioners' portfolios. They are on average more exposed to the growth style, which makes it an essential argument, but also to the volatility, liquidity and dividend yield styles and are, on the other hand, significantly less negatively exposed to the value. The major geographic bias observed in developed markets in favour of the United States is also reinforced, as are the exposures to the most growth-oriented sectors. These differences result in low levels of overlap and correlation between two strategies intended to target the same assets. The valuation of strategies is also impacted: the one designed by academics is systematically valued at a premium to that of practitioners. In the end, growth cannot be summarized by a valuation ratio. The most expensive assets are not necessarily the assets with the greatest growth prospects, and assuming that valuation ratios are efficient proxies of a company's future growth opportunities can be misleading.

But how to explain such differences between academic and practitioner definitions when they are supposed to be relatively close to each other? Academics and practitioners have in common to consider fundamental data to label the growth-orientation of stocks. The price component, on the other hand, is a variable that is only considered by academics. It's interesting to look at the information conveyed by each family of indicators.

With regard to the company stock price, whether expressed per share or globally, it is determined by a multitude of factors. First, the price is meant to reflect the worth of the company, which can be determined by several valuation models (dividend discount model, discounted cash flow model, valuation multiples, etc.). These models leave a lot of room for interpretation and the assumptions made can cause the valuation of the company's price to vary considerably. There are probably as many estimations of a firm's fair valuation as there are investors, each with his own set of assumptions. Beyond the valuation method, many factors can drive a stock's price up or down. Some are company-specific (estimated earnings, profitability, management change, anticipated takeover or merger, etc.), while others result from factors external to the company, including industry performance, investor sentiment, economic factors, political events, war, environmental changes, etc.). Price can therefore be affected by factors with no direct link to the company's fair value. This is for example the case when a speculative bubble forms and the buying frenzy prevails over rationality. A company's price is therefore not only the sum of its future cash flows discounted at a rate reflecting its cost of capital. It may increase (decrease) without its growth opportunities being positively (negatively) affected, making valuation ratios indicators of growth not always reliable.

On the side of the fundamental metrics, book value and earnings measurements are not fully efficient as they may be affected by earnings manipulations or intangi-

ble assets. Estimates generally suffer from the same imperfection since they rely on accounting documents published by companies. Regarding earnings manipulations, they take different forms. While accrual-based earnings management (Dechow *et al.*, 1995) seeks to mask true economic performance by changing accounting methods or estimates within the framework of generally accepted accounting principles, real earnings management alters the execution of real business transactions (Roychowdhury, 2006). Ultimately, earnings manipulations can consist of inflating revenues (or deflating expenses) to improve profitability, but also of decreasing them (or increasing expenses) in order to pay less corporate tax. In this, they impact the book value of companies. With regard to intangible assets, the increasing digitization of society we have known since the beginning of the 2000s has resulted in a continued expansion of investments in intangible capital (i.e. intellectual property, R&D, software, technology, human capital). These investments are often considered as operating expenses, resulting in deflated earnings. At the same time, the intangible assets created do not appear on the balance sheet, resulting in a downward bias in the recorded book values of invested capital (Gutiérrez and Philippon, 2016; Crouzet and Eberly, 2019). And because they evolve in creative and disruptive environments that require a lot of investment in intangible capital, growth stocks are among the most impacted by this accounting deficiency (Lev and Srivastava, 2019). In the end, earnings manipulation and intangibles have the effect of distorting the financial reality of companies.

Finally, the two families of metrics considered in defining a growth stock may be biased and may not reflect the real growth potential of companies. It is however obvious that the bias impacting academics and practitioners is not of the same magnitude. Indeed, while the definition of growth used by academics is affected both by price and by the inefficiencies observed in fundamental data, that of practitioners is only affected by the latter. This therefore constitutes a first limit to the reliability of the growth proxy used by academics, to which practitioners escape. Furthermore, the accounting aspect does not have the same repercussions within the two frameworks. While it is very difficult to quantify the relative importance of earnings manipulation and intangibles in company accounts, the fact remains that the former are an epiphenomenon compared to what the latter represent. To illustrate, a dedicated study (Ponemon Institute LLC, 2019) quantifies the weight of intangible assets at 84% of the total value of assets in 2018 for S&P 500 companies, while it was only 68% in 1995 and 32% in 1985. These figures can of course be discussed, but they relate to a reality which cannot be ignored. And, here again, this inefficiency has a greater impact on the academic definition of growth than on the practitioner's definition. Indeed, book value is, as previously underlined, the measure most favored by academics to discriminate value from growth companies. It is also the measure most impacted by intangibles.

5 Sustainable growth

Beyond the purely economic and financial considerations addressed in the previous section, growth is increasingly called into question for the negative externalities it generates. Among these, we can for example cite global warming, loss in biodiversity, scarcity of resources, poverty, social inequality, etc. Economic, social and environmental challenges appears to be fully interconnected and they require a global response. This section explores the path of sustainability and sheds light on the integration of sustainability dimensions within the framework of growth management.

5.1 Two contemporary conceptions of growth

Sustainable growth is not an emerging idea. However, the scope of this concept has changed dramatically over the last few decades. For a long time, sustainable simply meant *repeatable*. A company's sustainable growth rate was a financial indicator that measured the maximum growth rate that the company could achieve without having to increase its leverage level. In other words, the metric provided an indication of the growth rate a company could expect in the long-term. This purely financial indicator is still widely used by practitioners in their management processes. In this respect, the ratio is part of the list of indicators used by MSCI to identify growth stocks, as discussed in Section 3.2. Although the index provider prefers the name internal growth rate to that of sustainable growth, these two denominations in fact refer to the same concept. It is also a required input in several discounted cash flows models, such as the Gordon model (Gordon and Shapiro, 1956), which are very popular in financial analysis. From a practical point of view, the metric can be calculated by multiplying a company's earnings retention rate by its return on equity.

Transposed at a macro-economic level, the notion of sustainable growth as defined above assumes that the aggregate economy will grow forever. This is a view shared by most of economists, whose origins date back to the 18^{th} century. The underlying idea is that innovation, which is an integral part of human nature, drives economic growth and social well-being. Schumpeter was among the first to conceptualize this link. First through his theory of economic cycles (Schumpeter *et al.*, 1939), which provides a theoretical interpretation to Nikolaï Kondratieff's work on the subject (Kondratieff, 1926). Then, when he introduced the concept of "creative destruction" (Schumpeter, 1942), which he explicitly derived from Marxist thought (Marx, 1867). This notion refers to the process continually at work in economies which produces the creation of new economic activities at the same time as the disappearance of some others. In short, the emergence of new activities is made possible by the introduction of new disruptive productive combinations, based on new technologies, new organizations of work or new communication tools. It results in decline or even disappearance of established companies that enjoyed some degree of monopoly power derived from previous technological, organizational, regulatory, and economic paradigms. The idea that growth is somehow perpetual has subsequently greatly fueled economic thinking (Solow, 1956; Lucas Jr, 1988; Romer, 1986,

1994; Barro, 1990). Many economists and politicians are today largely inspired by this theory and see in technical progress the solution against the "evils" of capitalism. In this respect, economic growth has been elevated to dogma by political leaders and central banks who have all made it a dominant objective.

Yet, this way of thinking is not universal. Some illustrious representatives of the classical school already predicted in the 19th century that growth could not be infinite. Malthus (1803, 1836), Ricardo (2009) and Mill (1848) were convinced that, in the long run, capitalism was doomed to a stable state. They have long been among the few to object to the widespread belief of existence and the benefits of perpetual growth. However, a new mindset emerged in the 1970s, with the appearance of criticism of the productivist growth policy. The Club of Rome, founded by manufacturers in 1968, is the precursor. In a report commissioned at the Massachusetts Institute of Technology (MIT), the international think tank predicted the inevitable collapse of a civilization whose population, economic activity and environmental impacts would be in perpetual growth (Meadows *et al.*, 1972). The publication, officially named "The Limit to Growth", but better known as the "Meadows Report", is often considered to be the forerunner of the debates that drive our modern societies. It questions stakeholders on the compatibility between economic growth and environmental protection. This fundamental questioning has given rise to two bodies of thought that share the same conviction about the need for action, but that disagree on the means to do so.

The first relates to *sustainable development*. It is based on the view that respect for the environment, economic growth and social progress must and can be reconciled. Such current of thought was formally initiated in 1987 when the World Commission on Environment and Development, a sub-organization of the United Nations, has made a major contribution to the modern meaning of sustainability by defining sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). This helped considerably bring sustainability into the mainstream policy discourse and popularize the concept of sustainable development. From that point on, the scope of the term *sustainability* has grown considerably. Its field of action has gradually expanded from the lexical field of finance to that of ethics, and then social and environmental responsibility. Subsequently, many initiatives have been undertaken at the international level to promote green and sustainable finance. In addition to the SDGs which provide a very solid blueprint for countries to achieve a more sustainable future (we will further develop this point in the next section), United Nations also launched in 2006 the Principles for Responsible Investment (PRI) to help investors incorporate ESG factors into their investment and ownership decisions. Later, at European level, the European Commission published the Action Plan on Financing Sustainable Growth with the aim of reorienting capital towards sustainable investment. The Commission also published in June 2019 guidelines on reporting climate-related information, and has developed a taxonomy for environmentally-sustainable economic activities. From an academic point of view, the sustainable approach has been scrutinized by numerous academic

researches, such as Hickel and Kallis (2020) who question the relevance of a green growth strategy or Söderholm (2020) who investigates the challenges of technological change for sustainability.

The second stream of thought is more radical and advocates the *degrowth*. Degrowth is a political, economic, philosophical and social concept. Its roots can be traced back to Georgescu-Roegen (1971). Founder of bioeconomic theory, he was the first to establish the relationship between economic activity and the physical limitations of the planet. Over time, degrowth has become an extremely large and versatile field of research, giving rise to multiple interpretations. D'Alisa *et al.* (2014) provide an extensive review of the main topics and issues of degrowth in modern times. The 2008 Paris Conference[6] marked a turning point in the history of the degrowth movement, making it a mainstream topic and resulting in a proliferation of academic literature on the subject. The analysis of this literature shows, however, that this stream of thought is still under construction. In a comprehensive inventory of degrowth proposals, Fitzpatrick *et al.* (2022) conducted a systematic mapping and thematic synthesis of the degrowth literature published between 2005 and 2020. The authors concluded that the vast majority of these proposals focus more on what a policy is supposed to achieve (objectives) rather than how it is supposed to achieve it (instruments). Some credible alternatives are emerging, as the circular economy concept (Ghisellini *et al.*, 2016) or the supply chain management (Rajeev *et al.*, 2017). They range from new forms of living, producing and consuming in common to new institutions that can secure the livelihoods of all without growth. It can however be opposed to these alternatives that most of them are studied in isolation, without taking into account interactions with other proposed alternatives. Moreover, only a small number of published studies design or discuss dedicated degrowth metrics that would allow the construction of investment scenarios taking degrowth objectives into account. Ultimately, further research is therefore needed, as well as the definition of a unified conceptual framework encompassing all aspects of degrowth.

Defenders of the sustainable solution object to *degrowthers* that implementing their ideas would make the recession permanent. For their part, advocates of degrowth see in sustainable growth an ideology used by governments and international organisations to greenwash ineffective climate policies. The growth debate that began more than 30 years ago between proponents of sustainable growth and those of degrowth is not about to end. What we want to emphasize here is their concomitance on a time scale that obviously reflects the absolute necessity to think differently about growth. Our purpose is not to take sides in any of these currents of thought. However, as part of this article dedicated to growth, we explore in this section what a growth-oriented equity portfolio would look like if we imposed sustainability constraints on it. The lack of metrics relating to the measurement of degrowth does not allow us to extend our analysis to this second stream of thought.

[6]The 2008 Paris Conference was the first International Conference on Degrowth for Ecological Sustainability and Social Equity (ICDESS). It was the starting point for a cycle of international conferences that will then be held every two years around the world .

5.2 How to evaluate the sustainability of a firm?

At first sight, it does not seem obvious to characterize the sustainable dimension of a firm. For example, this is not information that can be directly found in the accounting statements of companies' annual reports. Sustainability can be summed up as a score or a rating, as is ESG, but these are usually the result of a complex evaluation process. Firstly, it requires the collection of a considerable amount of heterogeneous information, both structured and unstructured, through the use of various technologies (NLP, scraping, etc.). Then the data must be processed, structured and analyzed using a combination of quantitative techniques and qualitative expertise to obtain the final score or rating.

Of course, we could have considered using ESG criteria, that we have used on previous studies to quantify the relationship between financial performance and ESG scores (Bennani *et al.*, 2018; Drei *et al.*, 2019; Lepetit *et al.*, 2021). However, it is important to be aware that ESG scores cannot be easily transposed to assess sustainability. First, because while the two terms have overlapping meanings and are sometimes used interchangeably, they do not refer to the same thing. ESG is a very precise framework that refers to a specific set of quantifiable criteria. It aims to help stakeholders understand how an organization is managing risks and opportunities related to extra-financial factors. In comparison, sustainability refers to a broader concept that encompasses all of a company's efforts to minimize its negative impact on the world. Both focus on environmental and social aspects, but while ESG sees governance as the third pillar, sustainability focuses on the economy. In the end, although ESG is sometimes perceived as a quantifiable assessment of sustainability, this assessment remains imperfect. Second, a key drawback of ESG scoring-based approach to assessing sustainability is the sector neutrality aspect that most ESG scoring methodologies onboard. Sector neutrality means that every sector includes the full range of ESG scores, from the highest to the lowest. This implies, for example, that within the energy sector, which is highly polluting by nature, the most virtuous company on environmental issues will be assigned the highest score on the E pillar, just like a 100% renewable company from the utilities sector. Yet, it is very likely that the environmental standards of the company exploiting fossil fuels are far below those of the company exploiting renewable energies. This best-in-class approach is justified by the philosophy of socially responsible investment, which aims not to favour or exclude any sector of the economy. But while sector neutrality is highly desirable in a purely ESG context, it can be very misleading to appreciate the sustainability aspect of a company, sometimes resulting in counter-intuitive outcomes. Another possible distortion related to ESG scores is that they often exhibit a size bias that gives larger firms better ESG scores on average. This bias is due to the fact that larger companies have more resources to develop and report on their ESG policies and activities.

To avoid any misinterpretation in the assessment of the sustainable profile of firms, we therefore decided to explore a database whose purpose is precisely to quantify the sustainable profile of companies. While the first structured data on ESG emerged in the 2000s, the appearance of databases collecting structured sus-

tainability data are of more recent design. It was largely supported by the creation of the Sustainable Development Goals (SDGs) in 2015, which provided them with an essential standardized supporting framework. This obviously does not mean that data relating to sustainability did not exist before, but that they were at the same time more confidential, more scattered, less structured and therefore less easily exploitable from a quantitative point of view.

In the next section, we explore a MSCI database specifically dedicated to sustainability. We conduct a detailed analysis of its content and analyze how our investment universes and growth portfolios could be impacted by taking into account sustainable criteria.

5.3 The MSCI SDG Alignment database

The MSCI SDG Alignment database aims to provide a holistic view on companies' net contribution towards addressing each of the 17 SDGs defined by the United Nations in September 2015. For the record, the SDGs are a collection of 17 interlinked global goals that aim to end poverty, hunger and inequality, while tackling climate change, improving health and education, and strengthening institutions globally. Figure 12 is the simplified graphical representation of the 17 goals. They have been formally adopted by 193 countries and must be achieved by 2030. They reflect the three dimensions of sustainable development: the economic, social and ecological dimensions and are supposed to be universally applicable. From a practical point of view, SDGs are defined in a list of 169 SDG targets and progress towards these targets is agreed to be tracked by 232 unique indicators.

Figure 12: UN Sustainable Development Goals (SDGs)

Source: United Nations (UN)

The database provides an assessment of companies' alignment with each of the 17 SDGs. This score, called SDG Net Alignment, consists of a numeric score ranging

from −10 to +10. It is measured through two dimensions. The first dimension captures the sustainability characteristics of a company's products and services. It aims to quantify the portion of revenues with a positive impact on society and the environment and the portion of revenues with potentially negative impacts on the achievement of the SDGs. The second dimension captures the sustainability characteristics of the operations of a firm. By operations, MSCI means all ESG practices, targets and internal policies; trends in quantitative performance metrics (e.g. carbon emissions intensity, water withdrawals), and also any controversies arising from operations and events involving the firm. In the end, a company's SDG Net Alignment score is the arithmetic mean of the *product-based* score (first dimension) and the *conduct-based* scores (second dimension). It therefore provides a 360-degree viewpoint on companies' net contribution towards addressing each of the 17 SDGs.

As part of our study, however, this scoring has a small drawback. It breaks down sustainability information according to each of the SDGs to which a company is exposed to. It therefore does not fully address our need, which is to qualify the sustainable profile of companies as a whole, through a single and synthetic score. Aggregating these scores expressed by SDG is not trivial due to their multi-dimensionality. If the scores were based only on the economic activity of firms, we could weight the 17 individual scores by the proportion of activity allocated to each SDG. But adding operational practices and involvement in controversies makes this method ineffective. The implementation of a new social policy or the increase (decrease) in carbon emission reduction targets cannot be evaluated in the same way as sustainability characteristics of a company's products and services. We have therefore chosen to calculate a sustainability score for each company by averaging the individual net SDG alignment scores for which MSCI has identified an interaction, whether positive or negative. This is equivalent to considering that a given company contributes equally to each of these SDGs. This solution has the advantage of being transparent.

In what follows, we analyze the MSCI SDG Alignment data as of 12/31/2021, both for developed and emerging markets. The recent creation of this database does not allow us to extend our analysis over long periods, as we did in Section 4 to characterize traditional growth. Our objective here is to measure how the implementation of sustainability-based filters could affect our initial investment universes. The first point requiring our attention relates to the coverage rate of the database. The MSCI SDG Alignment database is designed to leverage existing datasets such as MSCI ESG Ratings, MSCI ESG Controversies or MSCI Business Involvement Screening. With respect to revenues associated with sustainable or unsustainable activities, MSCI provides estimates instead of missing data. The other inputs come from MSCI databases relating to ESG measures and controversies, which can now be considered as standard data, benefiting from broad coverage. In the end, the coverage rate of the database is very close to 100% and in no way distorts our investment universes.

Developed markets universe We first analyze in Table 7 how companies in the MSCI World Developed Markets are distributed according to their average SDG Net Alignment score level. This score is a continuous variable within the range [−10,+10]. However, we present in this table only a restricted range of scores, from −2 to +2, covering 93.4% of the index's securities and 95% of the free float market capitalization. For each threshold, we indicate the proportion of companies meeting the set criteria, both in equally- (EQW) and market capitalization-weighted (MCW) terms. 83.9% of the companies in the index have an average Net SDG Alignment score above 0, threshold from which we can consider that they have a sustainable profile. Insofar as these companies represent only 62.6% of the total weight of the index, we can deduce that the sustainability feature – as defined within the framework of this study – is strongly associated with a size bias, namely small companies are on average more sustainable than their large counterparts. At higher threshold levels, the number of companies that comply the set constraints decreases considerably when the sustainability score is above 1.5.

Table 7: DM – Distribution of companies according to the average net SDG alignment score (12/31/2021)

		Avg Net SDG Alignment Score						
		> -2	> -1	> 0	> 0.5	> 1	> 1.5	> 2
# of companies	1,546	1,490	1,430	1,297	1,127	685	227	46
EQW	100.0%	96.4%	92.5%	83.9%	72.9%	44.3%	14.7%	3.0%
MCW	100.0%	96.1%	90.5%	62.6%	51.6%	31.4%	9.3%	1.1%

Source: MSCI, Authors' calculations, Amundi Institute

As part of our study, we seek to identify companies that have a net positive contribution to SDGs' achievement. To the extent that companies with a score greater than 0 meet this criterion, we focus on this sample. In Table 8, we measure the geographic impact of applying this filter to the developed markets universe. Again, the analysis is conducted both on equally- and market cap-weighted universes to identify potential size biases. Deviations from benchmarks, which are themselves equally- and market cap-weighted, are represented via a simplified signage based on mathematical operators (a reading table giving precise details of the signage is provided in Table 16 in Appendix A.3.1). All deviations to which we refer in this section are calculated in absolute terms (weight in the investment universe minus the weight observed in the benchmark). The analysis shows that US large caps are heavily penalized by the sustainability filter, which, on the other hand, benefits all the other regions, Pacific ex-Japan excepted. Further analysis at the single name level shows that nine of the top ten firms by market capitalization in the developed markets have a negative average Net SDG score, and that these firms are all American. Regions that score best on sustainability aspects are therefore the Eurozone, Europe ex-Emu and Japan. All three are positively impacted by the filter implementation, both in number and weight.

Table 8: DM – Country deviation considering only positive sustainable score

	Avg Net SDG Alignment Score	
	EQW	MCW
NthAm	−−	− − −
Us	−	− − −−
Canada	−	+
Eurozone	+	++
France	=	+
Allemagne	=	+
Italy	=	=
Pays-Bas	=	+
Espagne	=	=
Europe Ex-Emu	+	++
Great Britain	=	=
Switzerland	=	+
Sweden	=	+
Japan	+	++
Pacific ex-Japan	=	=

Source: MSCI, Authors' calculations, Amundi Institute

Table 9: DM – Sector deviation considering only positive sustainable score

	Avg Net SDG Alignment Score	
	EQW	MCW
Energy	−−	−−
Materials	−	+
Industrials	+	+
Consumer Discretionary	=	−
Consumer Staples	=	=
Health Care	+	++
Financials	+	+
Information Technology	+	=
Communication Services	=	−−
Utilities	−	=
Real Estate	+	+

Source: MSCI, Authors' calculations, Amundi Institute

A similar analysis of the sectoral deviations also reveals some structural changes. In Table 9, we observe that healthcare is the main beneficiary of the exclusions recorded on the investment universe, and that the energy and communication services sectors are the most penalized. Some marked size effects should also be noted, both for materials (over-representation of large caps) and communication services (over-representation of small and mid caps) sectors. They are also noticeable for the consumer discretionary, technology and utilities sectors, even if on a smaller scale. On the other hand, we see little impact on the consumer staples sector. Sectors with strongest sustainable scores are therefore healthcare, industrials, financials and real

estate.

In order to complete our analysis, we display in Table 10 the deviations in terms of market capitalization size. We divide the initial index into four subgroups, based on the size of the firms at the end of 2021. The first and the tenth decile designate the mega caps and the small caps respectively. The remaining eight deciles are equally divided between large caps and mid caps. From a purely arithmetic point of view, we observe that small and mid caps are over-represented among companies with a positive sustainability score. In a market capitalization-weighted version, this results in a sharp drop in the weight allocated to mega cap, offset by that of mid and large caps. The eviction of nine of the top ten firms by market capitalization in developed markets largely explains these results.

Table 10: DM – Size deviation considering only positive sustainable scores

	Avg Net SDG Alignment Score	
	EQW	MCW
Small caps	+	=
Mid caps	++	++
Large caps	−	+++
Mega caps	−	−−−−

Source: MSCI, Authors' calculations, Amundi Institute

Emerging markets universe With regards to emerging markets, 79.6% of companies have a positive sustainability score at the end of 2021, accounting for 72.3% of the index's total market capitalization. The small- and mid- cap bias of companies identified as being sustainable is therefore common to both universes. However, it is less pronounced in emerging markets, which only have four companies that do not pass the sustainability filter among the top ten firms by market capitalization.

Table 11: EM – Distribution of companies according to the average net SDG alignment score (12/31/2021)

		Avg Net SDG Alignment Score						
		> -2	> -1	> 0	> 0.5	> 1	> 1.5	> 2
# of companies	1,420	1,301	1,239	1,130	890	392	126	38
EQW	100.0%	91.6%	87.3%	79.6%	62.7%	27.6%	8.9%	2.7%
MCW	100.0%	94.1%	85.2%	72.3%	57.7%	32.6%	7.7%	1.8%

Source: MSCI, Authors' calculations, Amundi Institute

Two other features are worth noting. First, the distribution of scores calculated on the emerging universe is more negatively skewed than that calculated on the developed universe. Second, the weight of so-called sustainable companies in emerging

countries is 10% higher than that displayed in developed countries (62.6%). Furthermore, similar to what we have observed in developed markets, a constraint greater than 1.5 seems difficult to implement given the very high selectivity it entails.

We observe in Table 12 that the exclusion of companies with an average Net SDG Alignment score less than or equal to zero does not generate striking geographical deviations compared with the official benchmark. The two most affected countries are Taiwan, which is reinforced both in relative number of representatives and in weight, and Korea which is subject to the opposite outcome. The other two countries most represented in the emerging index – China and India – show more measured deviations, but nevertheless marked by significant size biases. Indeed, we find that Chinese small and mid caps and Indian large caps tend to be favored by the average Net SDG Alignment score.

Table 12: EM – Country deviation considering only positive sustainable score

	Avg Net SDG Alignment Score	
	EQW	MCW
Brazil	=	−
China	+	−
India	−	+
Indonesia	=	=
Korea	−	−−
Malaysia	=	=
Mexico	=	=
Russia	−	−
Saudi Arabia	=	=
South Africa	=	+
Taiwan	+	++
Thailand	=	=
United Arab Emirates	=	=

Source: MSCI, Authors' calculations, Amundi Institute

The analysis of sectoral deviations carried out in Table 13 shows that it is from this perspective that deviations from benchmark indices are the most significant. Based on our sustainability indicator, a clear dichotomy emerges between the most polluting sectors (energy, materials and utilities) and the other sectors. The representatives of the most carbon-intensive sectors are indeed significantly reduced in number and weight. While all the other sectors are positively impacted, financials are by far the main beneficiary.

Table 13: EM – Sector deviation considering only positive sustainable score

	Avg Net SDG Alignment Score	
	EQW	MCW
Energy	−−	− − −
Materials	−−	−
Industrials	+	+
Consumer Discretionary	+	=
Consumer Staples	+	+
Health Care	+	+
Financials	++	+ + +
Information Technology	+	+
Communication Services	+	−
Utilities	−	−
Real Estate	+	+

Source: MSCI, Authors' calculations, Amundi Institute

Finally, the analysis of deviations in terms of market capitalization in Table 14 shows that the MSCI SDG Alignment database tends to heavily penalize mega caps to the benefit of other size segments, as already observed in developed markets.

Table 14: EM – Size deviation considering only positive sustainable scores

	Avg Net SDG Alignment Score	
	EQW	MCW
Small caps	+	=
Mid caps	−	++
Large caps	+	+ + +
Mega caps	−	− − −−

Source: MSCI, Authors' calculations, Amundi Institute

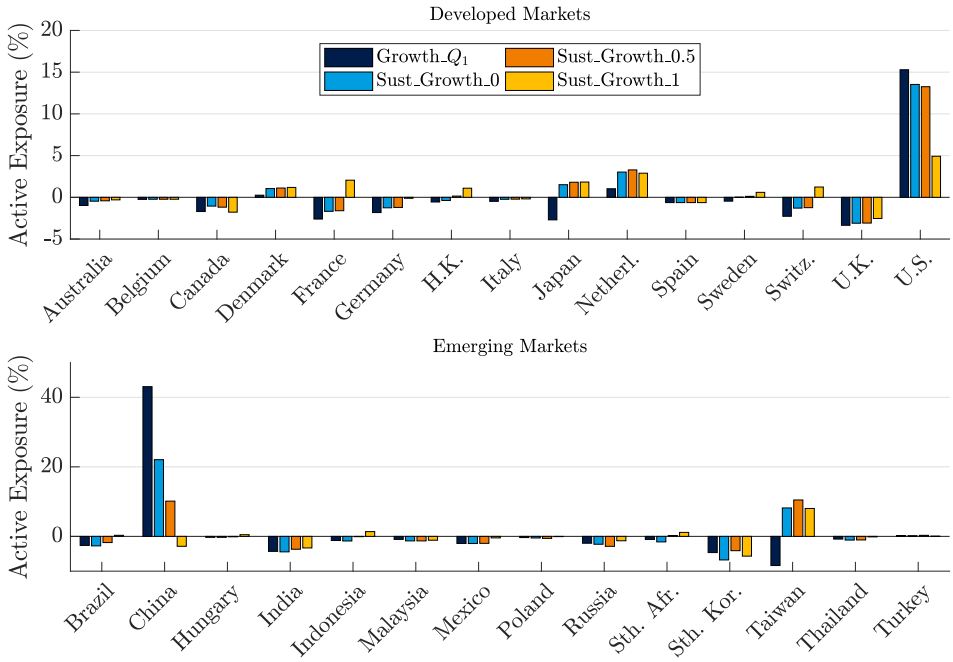
In the end, 79.6% of emerging companies and 83.9% of developed ones meet the minimum sustainability threshold at the end of 2021. The mega caps segment is primarily under pressure and leads to significant geographical and sectoral distortions of the investment universes compared to benchmarks. American firms, and therefore the developed markets, are the most impacted by this size effect.

5.4 Creating sustainable growth portfolios

How does the sustainability filter affect investment portfolios? This is the question we propose to answer in this section. For this purpose, we build new portfolios within a very similar framework to the one we implemented in Section 4. The growth characteristics of companies are therefore identified from the same set of metrics (see Section 3.2). The main difference lies in the initial investment universes, which are purged of companies with sustainability scores below given thresholds. In order to assess the effects induced by an increasing level of sustainability requirement, we

select three different thresholds. The first corresponds to the minimum threshold, and therefore excludes all companies with an average Net SDG Alignment Score less than or equal to zero. The other two thresholds we use in our study are 0.5 and 1. We pointed out in the section dedicated to the analysis of the MSCI database that beyond this threshold, the durability constraint becomes too strong, inevitably leading to distortion and scalability problems for the resulting portfolios. In what follows, sustainable portfolios will be compared with their traditional counterparts we developed in Section 4. In this context, we constrain our various sustainable growth portfolios to hold a number of assets strictly equivalent to that observed in standard growth portfolios, i.e. 20% of the initial investment universe.

Figure 13: Active country exposure of growth portfolios



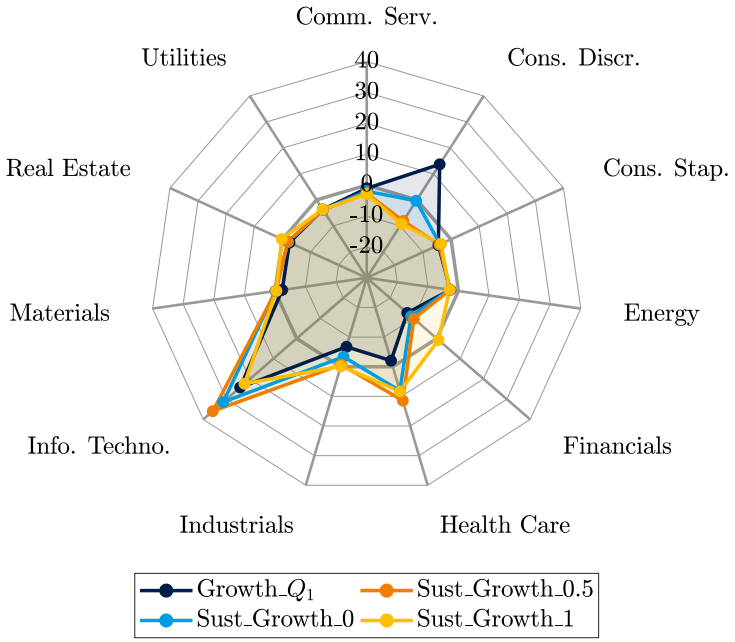
Source: MSCI, FactSet, Authors' calculations, Amundi Institute

First, we analyze how the geographic biases we highlighted within traditional growth portfolios are impacted by the sustainability constraint. As before, we assess these biases through the construction of portfolios based on MSCI's Developed and Emerging markets indices. Not constraining these portfolios from a geographical point of view makes it easy to detect the countries most exposed to the growth characteristic in each of these two markets. In Figure 13, we therefore compare the country active exposures of our traditional growth portfolios and their sustainable counterparts at the end of 2021. By active exposure, we mean the additional exposure the portfolios carry relative to their parent indices, the MSCI World Developed Markets and the MSCI Emerging Markets[7]. The upper part of the figure relates to

[7]As previously, these risk measures come from the Barra's GEMLT model.

developed markets. We note that the very strong exposure to the United States, which is the main geographic bias that we had previously identified, is mitigated by the implementation of the sustainability filter. In concrete terms, it is reduced from 15.3% for the Growth_Q_1 portfolio to 13.5% for the Sust_Growth_0 portfolio, whose investment universe is limited to companies with a positive average Net SDG Alignment score. A threshold raised to 0.5 makes it possible to attenuate this bias a little more to 13.3%, but it is only from the threshold set at 1 that the active exposure drops drastically, to reach 4.9%. All the other developed countries benefit from this lower active exposure to the United States, and especially Japan, Netherlands, Switzerland and France, in decreasing order. In the lower part of Figure 13, we observe that, in emerging markets, the dominant bias identified on China is corrected to an even greater extent. It is first halved at the minimum sustainability threshold. The active exposure even becomes negative when the threshold of 1 is reached, reflecting the rather low sustainability situation of Chinese growth companies.

Figure 14: North America – active sector exposure of growth portfolios



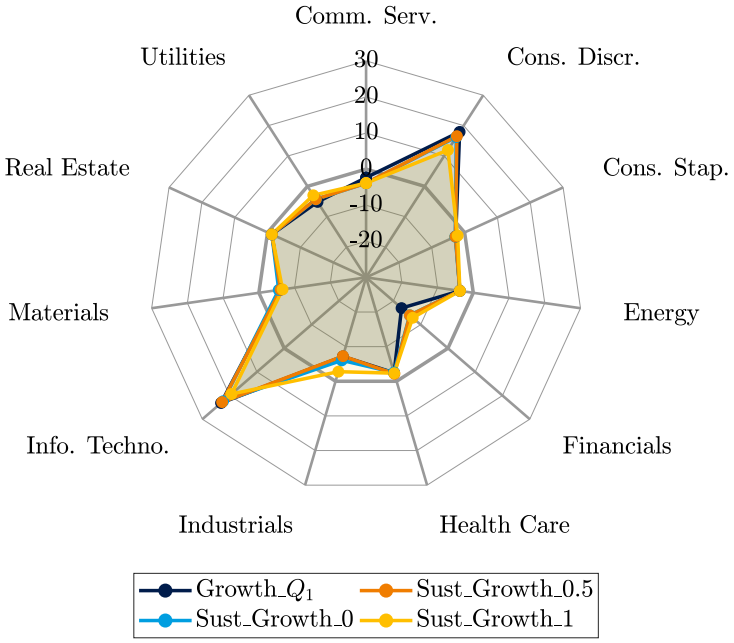
Source: MSCI, FactSet, Authors' calculations, Amundi Institute

In Figure 14, we analyze the sectoral transformations arising from the implementation of the sustainability filter on growth portfolios in North America. Initially, the traditional practitioners' portfolio was heavily overweighted in the consumer discretionary and information technology sectors and conversely displayed a strong negative bias on financials. In its least restrictive version, the sustainability filter has the effect of accentuating the bias observed on technology companies, and of operating a shift between the consumer discretionary and the healthcare sectors. Consumer discretionary companies, although associated with a strong growth profile

in North America, are therefore sacrificed in the name of sustainability. Healthcare is the logical beneficiary since the sector is the most favorably exposed to sustainability and is in the top 3 of the most growth-oriented sectors in the region. While industrials and materials also benefit from this reallocation to a lesser extent, the other sectors are hardly impacted.

It is furthermore interesting to observe the way in which the increase in the level of sustainability constraint applied to growth portfolios translates in sector exposures. We note, for example, that the active exposure of the consumer discretionary sector has again been reduced in Sust_Growth_0.5 and Sust_Growth_1, and is now in negative territory. This suggests that the sector as a whole is generally poorly sustainable. Conversely, the active exposure of healthcare is maintained despite the increase in the constraint, indicating that companies in the sector have rather high sustainability standards compared to their counterparts in other sectors. This is a characteristic that can also be associated with the technology sector because it continues to progress within Sust_Growth_0.5 and remains largely overweighted in Sust_Growth_1 while several behemoths in the sector do not pass the filter of minimum sustainability. The case of financials is also of interest because it is a structurally value-oriented sector. Logically underweighted as part of a growth strategy, the share of capital allocated to the sector becomes neutral when the sustainability threshold is set at its highest level. This is a clear signal indicating the sharp deterioration in the growth profile of the portfolio in favour of the sustainable dimension.

Figure 15: Eurozone – active sector exposure of growth portfolios



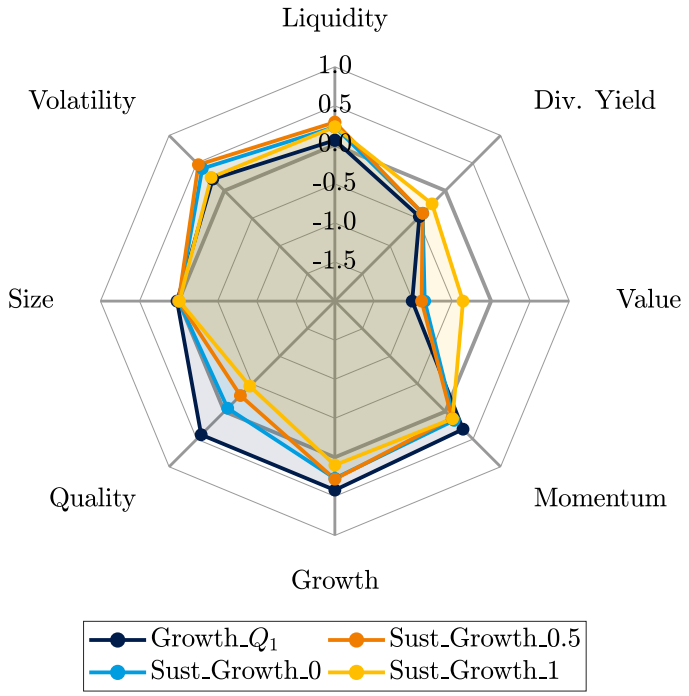
Source: MSCI, FactSet, Authors' calculations, Amundi Institute

We perform a similar analysis on the Eurozone in Figure 15. The results are significantly different from those obtained for the North America region. We indeed observe a strong similarity in the sectoral active exposure displayed by the traditional portfolio Growth_Q_1 and by its three constrained variants Sust_Growth_0, Sust_Growth_0.5 and Sust_Growth_1. The four curves overlap, leaving only slight differences in a few sectors. In detail, these changes translate into slight increases in allocation to the financials and industrials sectors, offset by slight reductions in the consumer discretionary and communication services ones. This is a very interesting result which tells us about the high level of sustainability exhibited by companies in the Eurozone. Even at the threshold of 1, which can be seen as a high level of sustainability, the parameter is not constraining for investors wishing to invest in growth companies. This is a peculiarity specific to Europe because of its leadership in terms of sustainable development. For instance, in response to the commitments made under the Paris Agreement concluded in 2015 and COP 21, the European Commission has developed a regulatory framework that is unique in the world to promote green finance and sustainable finance. The level 1 of the Sustainable Finance Disclosure Regulation (SFDR) entered into force during the first quarter of 2021, followed by the Taxonomy Regulation at the very beginning of 2022. They provide an expected field of action and opportunities to better meet investor's needs and create a fertile ground for sustainable initiatives.

How are the factor exposures of our portfolios impacted by the integration of a sustainability constraint? Figure 16 shows that at the end of 2021, the unconstrained Growth_Q_1 portfolio built on the North American region is, when compared to its benchmark, positively exposed to growth (+0.42), quality (+0.42), momentum (+0.32) and volatility (+0.21) factors. On the other hand, it is negatively exposed to value (−1.01) and dividend yield (−0.47). It therefore presents features in line with our analysis conducted in Sections 4.2 and 4.7: growth is characterized by a multi-factor exposure, which makes it a complex investment concept. With regard to sustainable portfolios, we first note that their active exposure to the growth factor is moderately reduced for the first two threshold levels. In concrete terms, it goes from +0.42 for the Growth_Q_1 portfolio to +0.27 then +0.28 for its sustainable counterparts. The Sust_Growth_1 portfolio is however more impacted, with an active exposure reduced to +0.10. We also observe that the impact of the sustainability constraints is much more pronounced on the quality risk factor, which is a main marker of growth in the region from a risk factor perspective. The active exposure on the quality factor thus goes from +0.42 for the Growth_Q_1 portfolio to −0.06, −0.29 and −0.46 for the constrained portfolios, displayed in increasing order of constraint. The high quality profile associated with growth in North America is therefore neutralized from the minimum threshold of sustainability, and turns into a low quality profile as the constraint intensifies. For its part, the negative exposure of sustainable growth portfolios to the value style is reduced from −1.01 to −0.85, −0.89 and −0.36, respectively. The other noteworthy factor developments, although less pronounced, translate for constrained portfolios into a drop in their exposure to momentum and an increase in volatility. Surprisingly, the eviction of a number

of mega caps associated with unsustainable growth does not result in an increase in the bias size, but is however transcribed by a reinforced active exposure to the liquidity factor, which testifies to a lower liquidity of the portfolios.

Figure 16: North America – active style exposure of growth portfolios

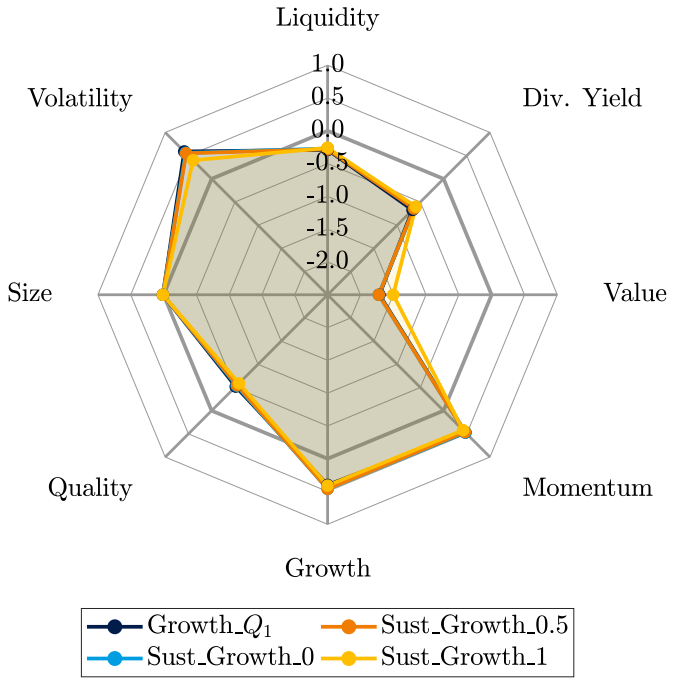


Source: MSCI, FactSet, Authors' calculations, Amundi Institute

With regard to the Eurozone, we note in Figure 17 that sustainable versions of growth are almost unaffected by the different thresholds considered. The only changes observed are minor and are related to exposure to value and volatility factors, on the most sustainability-compliant portfolio. This therefore confirms our previous analysis: the standards of European companies in terms of sustainability are probably the highest in the world, and explain the low impact of the criteria imposed within the framework of this study.

There is no unified definition of sustainability. However, evaluating the sustainability of companies according to their alignment with the SDGs seems quite relevant because the seventeen objectives cover all economic, social and environmental issues defined by the United Nations and have been validated by the international community. MSCI database analysis shows that there is a large geographical disparity in terms of sustainability. While European companies exhibit very high standards, North American ones are lagging. Insofar as the United States is the undisputed leader of growth in developed countries, imposing a sustainability constraint is not without consequence for a growth-oriented strategy. Many growth players, sometimes major ones, are excluded from the scope of investment, leading to structural

Figure 17: Eurozone - active style exposure of growth portfolios



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

changes in growth investing and distorting some of its most prominent characteristics. However, this is not a fatality. The example of Europe shows that growth and sustainability are not mutually exclusive. An appropriate regulatory framework makes it possible to combine growth with sustainability objectives. The movement must therefore above all be initiated by political decision-makers. From an economic point of view, there is no doubt that sustainability can also be a strong growth driver. It can create value for all stakeholders while providing solutions to environmental and social challenges.

6 Conclusion

The common presumption about growth is that it is the opposite of value. To confine growth to a simple anti-value status is tantamount to ignoring the complexity of growth as an investment concept. Growth-oriented stocks are indeed much more than just expensive and over-priced stocks. They have also in common being related to all traditional equity risk factors and carrying a significant amount of idiosyncratic risk. This multi-factor profile of growth is undoubtedly a key characteristic that investors must absolutely master. It requires exposures to equity market factors that are controlled for in the design of portfolio and are diligently monitored thereafter. Otherwise, future performance could be hurt by unintended exposures.

But that is not the only challenge growth investors face. From the 2008 GFC to late 2020, the growth investment strategy benefited from an accommodative monetary policy resulting in low (and even negative) interest rates and financial markets'

being supported by central banks quantitative easing policies. The economic context was therefore ideal for companies that are highly dependent on cheap and easy capital to finance their future growth. The end of 2020 marked a new turning point. We have entered a new era of higher inflation and interest rates following the geopolitical shock from Russia's invasion of Ukraine and from the coronavirus pandemic. The macro-economic environment has turned back in value's favour.

Growth investors are also facing an ecological crisis of unprecedented anthropogenic origin, whose urgency to address is increasingly glaring. There is now a higher awareness of the necessity to address social and environmental issues jointly. The situation requires a fundamental shift towards more sustainable modes of production and consumption. This is a real paradigm shift that all actors in human society (investors, companies, asset managers, policy makers, regulators, NGOs and civil society) must tackle. Some will see it as a universe of constraints and regulations. We prefer to see it as a great new normal, offering multiple opportunities.

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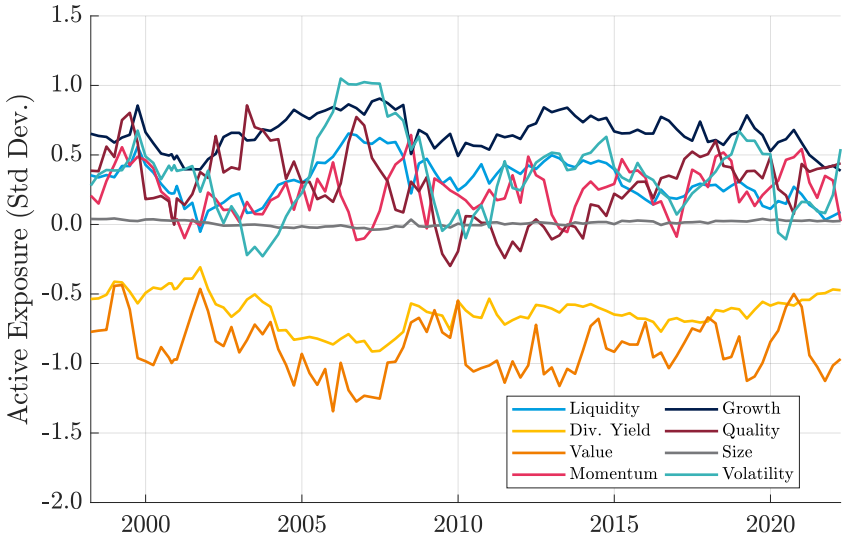
A Complementary materials

A.1 Active exposures of growth portfolios in North America

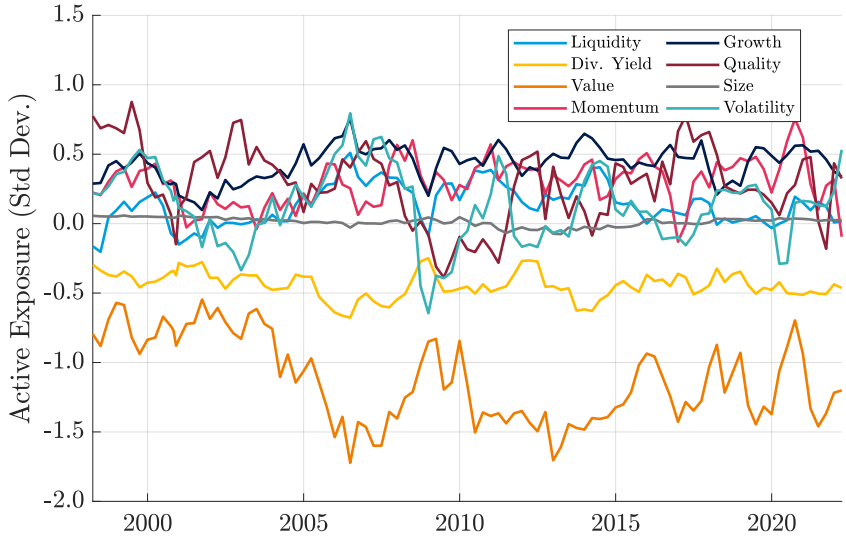
A.1.1 Active style exposures of growth portfolios

Figure 18: Active style exposure – Growth_Q_1 – North America



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

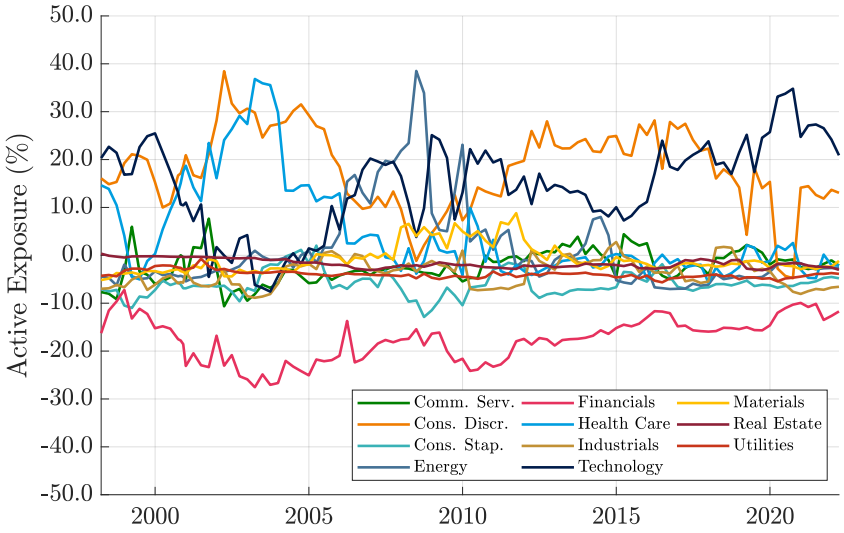
Figure 19: Active style exposure – Value_Q_5 – North America



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

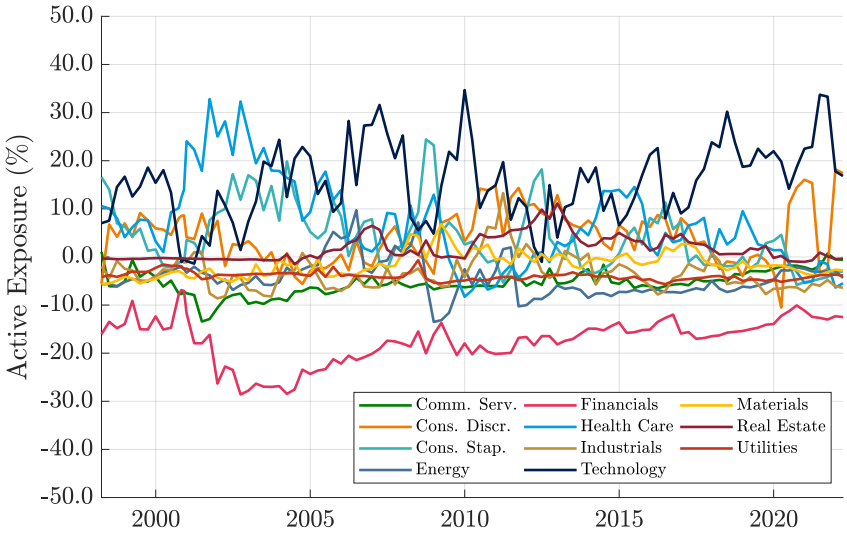
A.1.2 Active sector exposures of growth portfolios

Figure 20: Active sector exposure – Growth_Q_1 – North America



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

Figure 21: Active sector exposure – Value_Q_5 – North America

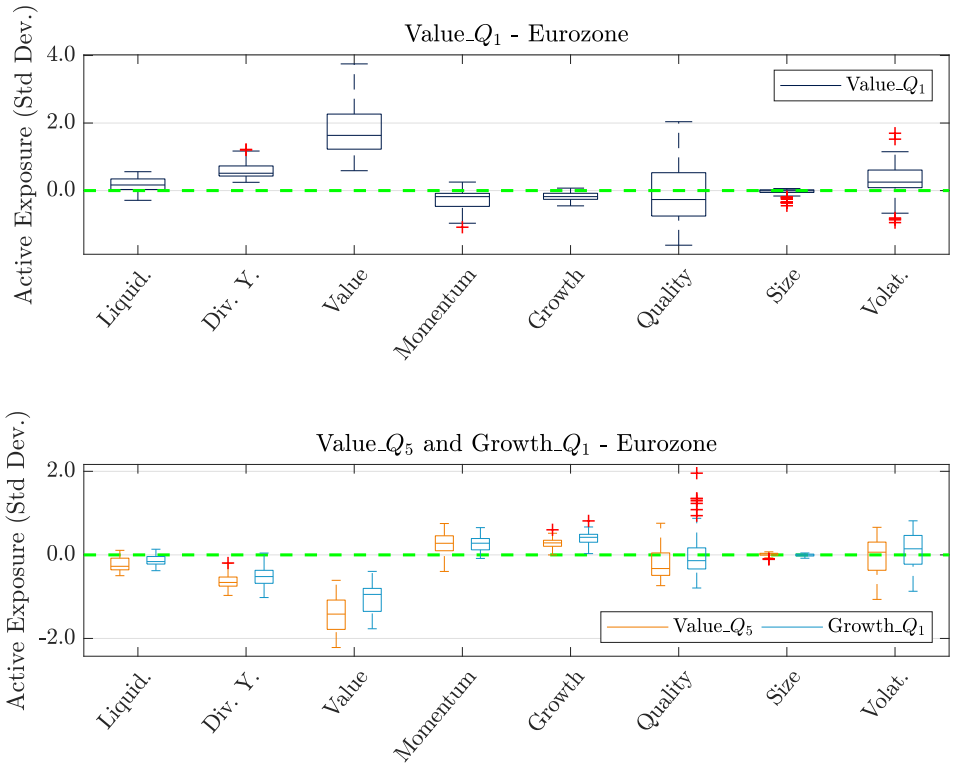


Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

A.2 Active exposures of growth portfolios in Eurozone

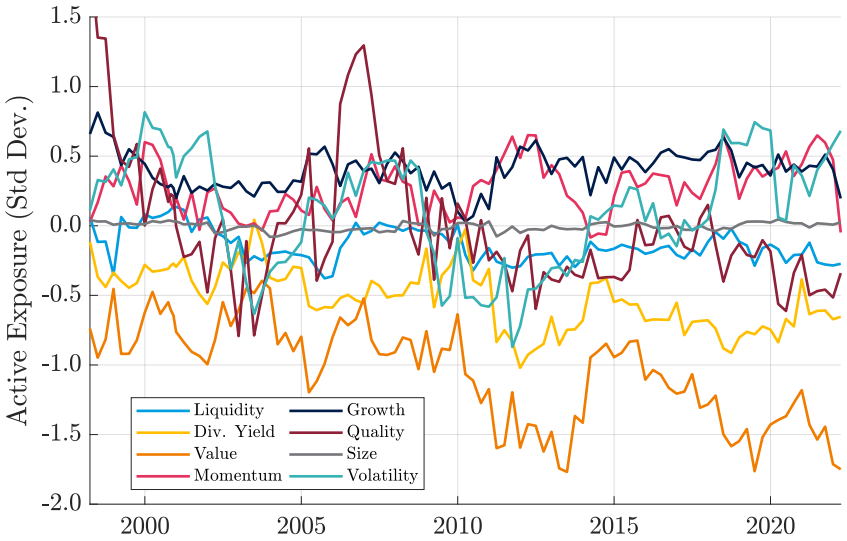
A.2.1 Active style exposure of portfolios

Figure 22: Active style exposure of value and growth portfolios – Eurozone



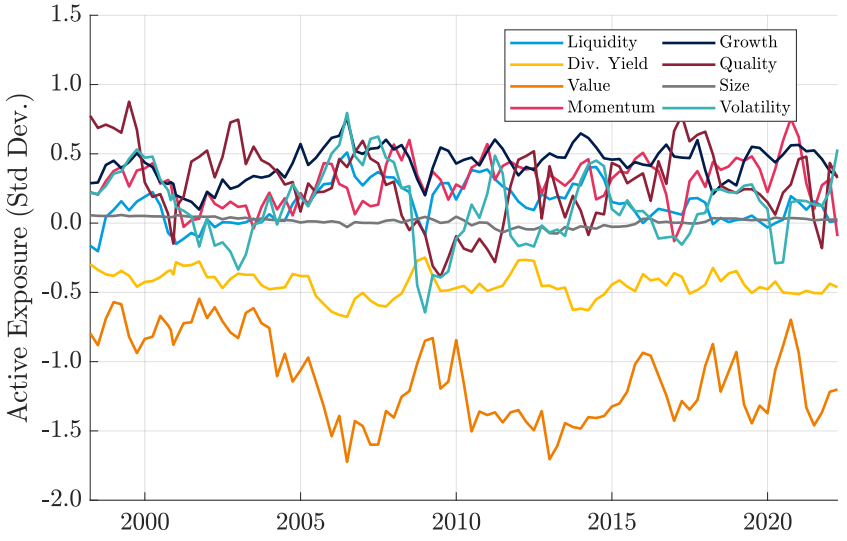
Source: MSCI, Barra, Authors' calculations, Amundi Institute

Figure 23: Active style exposure – Growth_Q_1 – Eurozone



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

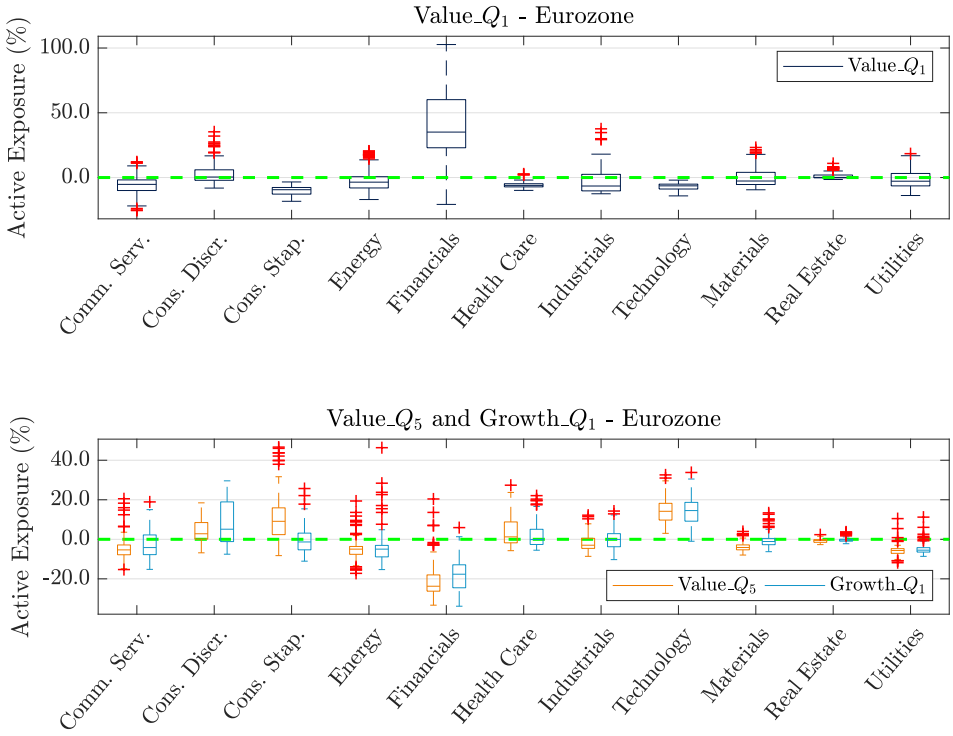
Figure 24: Active style exposure – Value_Q_5 – Eurozone



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

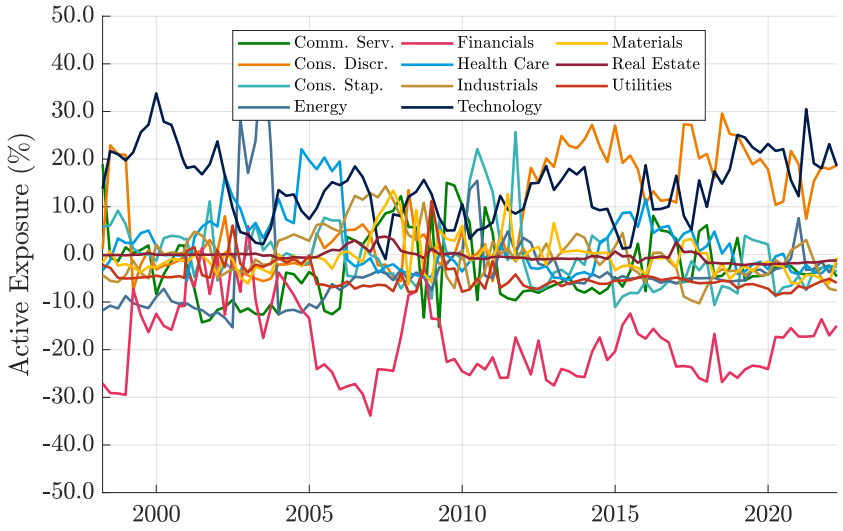
A.2.2 Active sector exposure of portfolios

Figure 25: Active sector exposure of value and growth portfolios – Eurozone



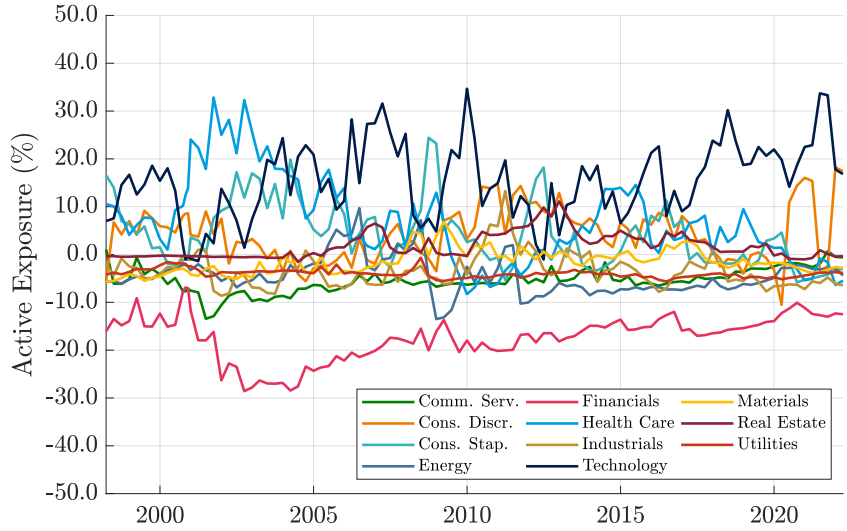
Source: MSCI, Barra, Authors' calculations, Amundi Institute

Figure 26: Active sector exposure – Growth_Q_1 – Eurozone



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

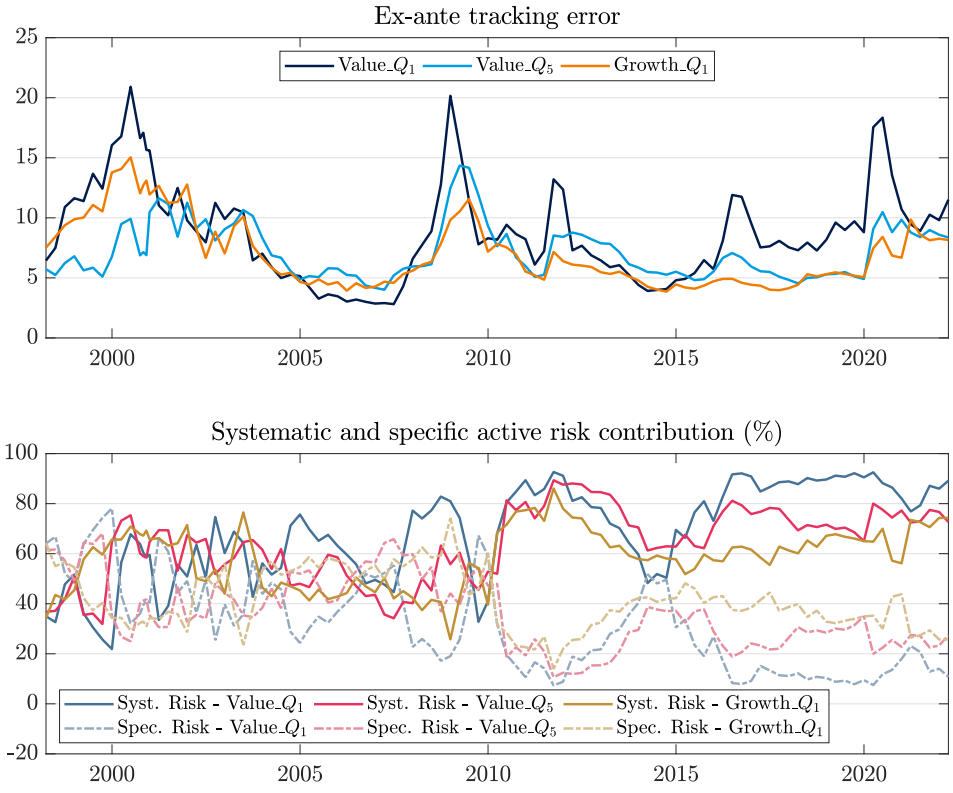
Figure 27: Active sector exposure – Value_Q_5 – Eurozone



Source: MSCI, Barra, FactSet, Authors' calculations, Amundi Institute

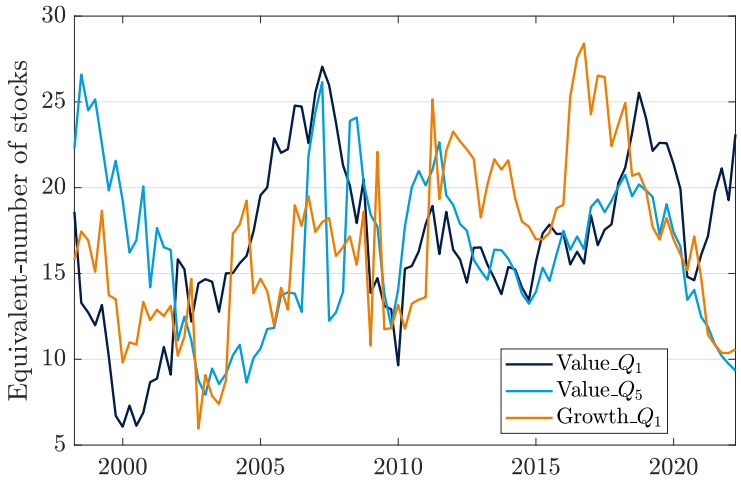
A.2.3 Active risk measures of portfolios

Figure 28: Active risk measures – Eurozone



Source: MSCI, Barra, Authors' calculations, Amundi Institute

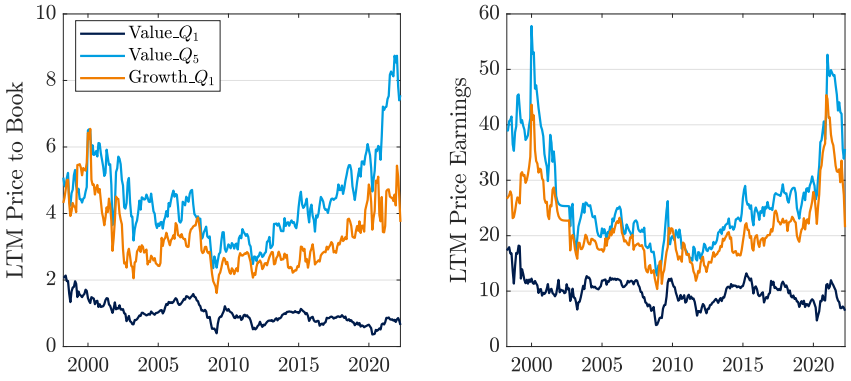
Figure 29: Inverted Herfindahl-Hirschman Index – Eurozone



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

A.2.4 Valuation measures

Figure 30: Valuation of the Eurozone portfolios



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

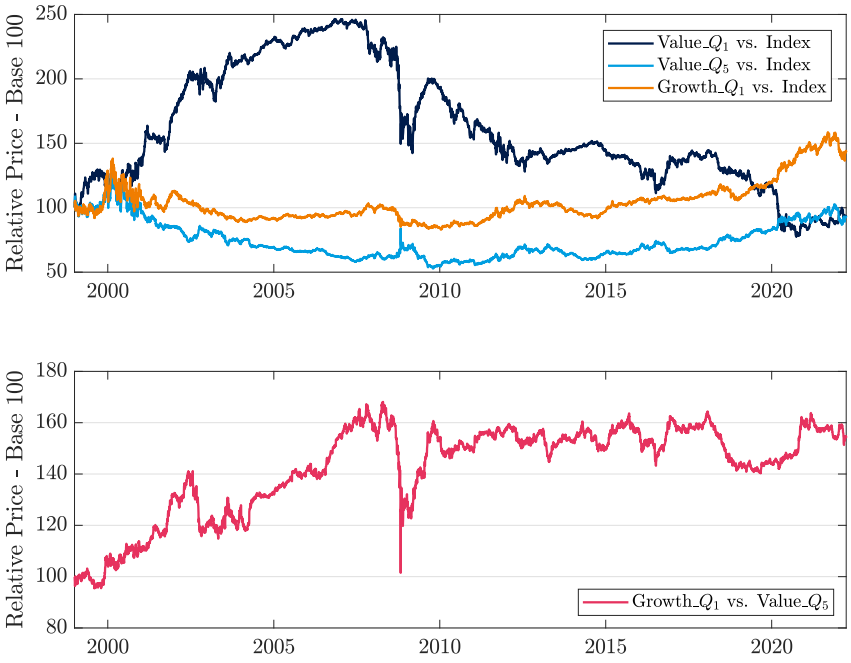
A.2.5 Performance and ex-post risk measures

Table 15: Performance and ex-post risk measures

	MSCI Emu	Value Q1	Value Q5	Growth Q1
Annualized return (%)	4.52	4.20	4.19	6.15
Volatility (%)	20.6	27.5	20.3	21.5
Sharpe ratio	0.15	0.10	0.14	0.22
Information ratio		-0.02	-0.03	0.14
Alpha (%)		0.3	0.9	2.4
Beta		1.17	0.81	0.89
Skewness	-0.70	-0.45	-0.37	-0.63
Kurtosis	6.8	6.5	4.0	3.6
Tracking error (%)		13.6	12.3	11.5
Correlation		0.88	0.82	0.85
Turnover (% - One way)		65.7	56.6	64.3
Max Drawdown (%)	-62.2	-76.5	-73.6	-70.6

Source: MSCI, FactSet, Authors' calculations, Amundi Institute

Figure 31: Relative performance of simulated portfolios – Eurozone



Source: MSCI, FactSet, Authors' calculations, Amundi Institute

A.3 MSCI SDG Alignment database

A.3.1 Reading table

Table 16: Reading table

Deviation from the benchmark (%)	Signage
<-10%	− − −−
[-10%,-5%[	− − −
[-5%,-2.5%[	−−
[-2.5%,-0.5%[	−
[-0.5%,0.5%[	=
[0.5%,2.5%[	+
[2.5%,5%[	++
[5%,10%[	+ + +
>= 10%	+ + ++

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