

OSSIAM RESEARCH TEAM

# Fundamental profile of the Ossiam Minimum Variance indices

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WHITE PAPER



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## Abstract

Whereas much has already been said about the performance of Minimum Variance portfolios and their ability to reduce portfolio volatility and drawdowns, the topic of the fundamental characteristics of Minimum Variance portfolios has hardly been covered. In this study we compare the Minimum Variance portfolios to the market-capitalization weighted benchmarks across five fundamental axes: valuation, growth, size, profitability and debt. The study is performed in four different geographic areas: the US, Europe, Global Developed Markets and Emerging Markets. For each geographic zone the Minimum Variance portfolios are comprised of the most liquid stocks and follow the portfolio construction methodology that is used in the indices underlying Ossiam ETFs. The results suggest that different Minimum Variance portfolios share a common fundamental pattern and are consistently tilted toward high profitability stocks that are less indebted than the market average.



## Introduction

The aim of this article is to study the Ossiam Minimum Variance indices from a fundamental point of view. It is documented in the literature that Minimum Variance strategies benefit from the Low Volatility Anomaly<sup>1</sup> and display strongly decreased volatility and draw-downs in comparison to their market capitalization weighted counterparts while maintaining a level of performance similar to the benchmark. But how does this translate in terms of financial ratios? For example, do Minimum Variance indices have a strong Value/Growth tilt? Below we try to get a better understanding of the fundamental characteristics of Minimum Variance portfolios. Empirically, we are led to think that as they select less volatile stocks, Minimum Variances portfolios should be heavily focused on mature companies, less subject to important price swings thanks to a well-established and stable business. Therefore, we expect these indices to exhibit higher valuation multiples and somewhat lower growth rates. To validate this intuition, we study how Ossiam Minimum Variance portfolios score on multiple fundamental ratios in comparison to their market capitalization weighted benchmarks, both over the long run and in a more recent period.

## 1 Methodology

### 1.1 Indices used

We use the following Minimum Variance indices<sup>2</sup>:

- Europe : iStoxx Europe Minimum Variance (EUMV)
- US : Ossiam US Minimum Variance (USMV)

- Emerging : Ossiam Emerging Markets Minimum Variance (EMMV)
- Global Developed : Ossiam World Minimum Variance (WOMV)

Minimum Variance optimization is based on empirical covariance matrix with the following constraints: full investment, no short sales, maximum exposure per stock and per sector, and a quadratic diversification constraint<sup>3</sup>.

We compare the Minimum Variance indices to the following benchmark indices for the respective geographic areas:

- Europe : Stoxx Europe 600 Index (S600)
- US : S&P 500 Index (SP500)
- Emerging Markets: S&P IFCI Index (IFCI)
- Global Developed : S&P Global 1200 Index (SP1200)

For further comparison, we also build Equal Weight versions of the benchmark indices, with the weights being equalized on a monthly basis: S600EW, SP500EW, IFCIEW, SP1200EW.

### 1.2 Computation of Index Scores

Each month end, the values of the various fundamental ratios are computed for every constituent of the reference indices. The index score, for each index and for each specific ratio, is computed as a weighted average of the scores (when available) of its constituents. The Equal Weight index score for each criterion is therefore a pure mean of the relevant criterion across the investment universe (all stocks belonging to the benchmark index at that specific date). To make sure that the calculated index scores are significant, we only consider the results obtained when data was available for at

least half of the considered universe, which explains the / symbols in tables below and the different time spans covered by the accompanying charts.

### 1.3 Data used

Price and fundamental data from December 2000 to May 2013 is used when available. Stock prices and analyst estimates come from the Thomson Reuters I/B/E/S database. Reported data are extracted from the Thomson Reuters I/B/E/S and Worldscope databases.

### 1.4 Metrics

We study the fundamental positioning of the Minimum Variance indices in light of fundamental ratios belonging to five families (the definition of each metric is given in the Appendix):

- Value
- Growth
- Size
- Profitability
- Debt

The factor scores for each index are computed on three different time horizons: ten years, five years and one year. Our discussion focuses on the five years and ten years results when the data is available as it allows to take into account full business cycles, but we found it interesting to display one year average scores as well to assess the current fundamental situation of the Minimum Variance indices. We have also included historical charts for some metrics which we believe to be representative fundamental indicators within their families. This allows to assess how the fundamental biases of the different indices evolved over time.

## 2 Results

### 2.1 Value metrics

In this first part, we assess the valuation properties of the Minimum Variance indices. Do they display a Value tilt, which means that they would trade at a discount in terms of multiples of Earnings, Sales, Book Value and Cash Flows in comparison to their market capitalization weighted and equally weighted counterparts? Or do they, on the contrary, trade on higher multiples? For each metric we look at both reported and estimated numbers. The multiples computed with reported data are often regarded as purer value indicators, compared to the ones computed with estimated data which already integrate a part of growth in the estimated Earnings, Sales, Book Value or Dividend. On the other hand as the estimated multiples help to avoid distortions caused by strong variations in both the price and the considered financial measure since the last reporting period, we find it interesting to have a look at both.

#### 2.1.1 Global Developed Universe

Table 1: Global Developed Universe: Value metrics

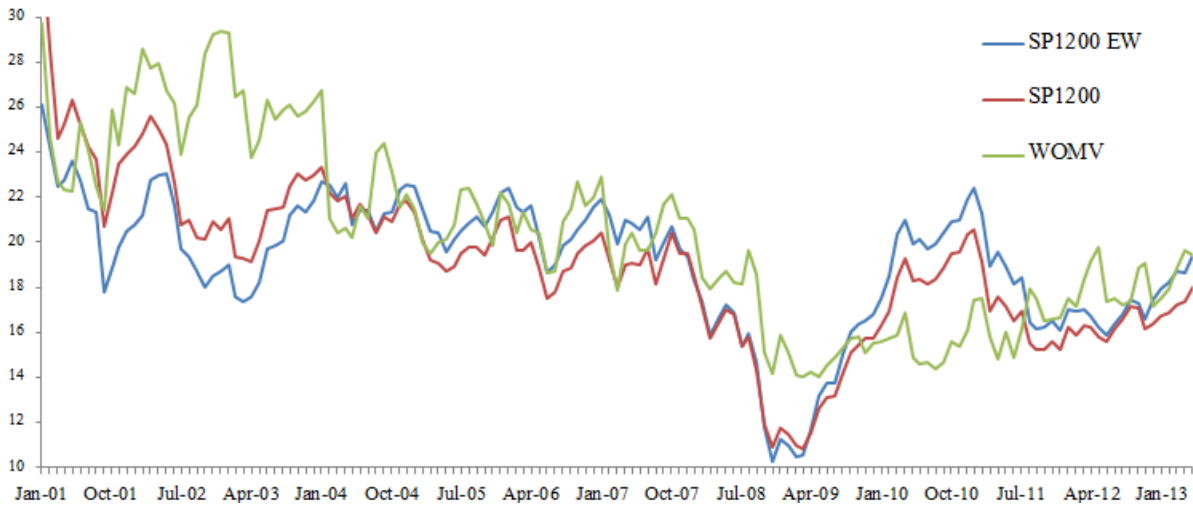
Index/Score		PE	PB	PCF	PS	F12 PE	F12 PB	F12 PCF	F12 PS
10 Y	SP1200	18.0	/	12.9	3.4	15.1	2.8	10.7	3.1
	SP1200EW	18.8	/	12.0	3.5	15.8	2.4	10.1	3.3
	WOMV	19.0	/	11.9	3.8	15.4	3.3	10.2	3.6
5 Y	SP1200	16.0	3.0	12.1	3.4	14.1	2.5	10.1	3.0
	SP1200EW	16.9	2.5	10.9	3.3	14.7	2.2	9.3	3.1
	WOMV	16.5	3.3	10.6	4.0	14.2	2.9	9.0	3.8
1 Y	SP1200	16.8	3.0	11.1	3.2	13.4	2.5	9.4	2.9
	SP1200EW	17.6	2.6	11.7	3.4	14.6	2.3	9.5	3.2
	WOMV	18.2	3.5	10.8	3.9	14.6	3.2	9.2	3.7

Thomson Reuters Datastream. Calculations by Ossiam

As can be seen from Table 1, the World Minimum Variance Index has historically traded on higher or similar average multiples than

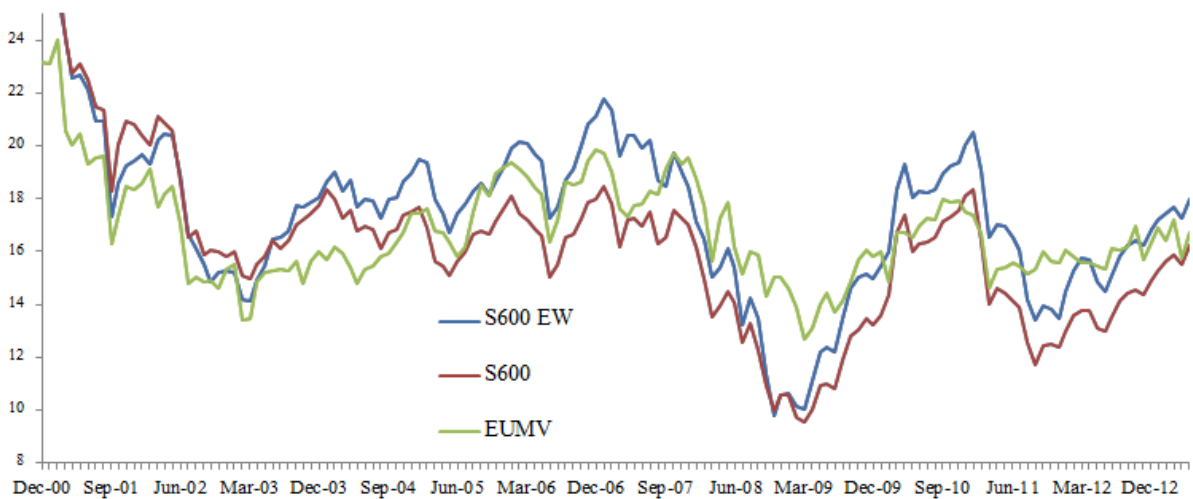


Figure 1: Global Developed Universe : Reported P/E



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 2: European Universe : Reported P/E



Source Thomson Reuters Datastream. Calculations by Ossiam

the market capitalization weighted and equally weighted indices (cash flow multiples are the exception). The historical chart of reported P/E ratio on Figure 1 however shows a significant variability in the relation between valuation scores of Minimum Variance indices and the market. For example in the mid 2009 - mid 2011 period the index experienced lower ratios than the S&P Global 1200 Index and its equal weighted version. This situation has since reversed and the Minimum Variance index is currently the most expensive one, which is not an unusual situation.

### 2.1.2 European Universe

Table 2: European Universe : Value metrics

Index/Score		PE	PB	PCF	PS	F12 PE	F12 PB	F12 PCF	F12 PS
10 Y	S600	15.3	2.8	10.4	/	12.8	2.4	8.8	/
	S600 EW	17.0	2.8	11.7	/	14.1	2.4	9.6	/
	EUMV	16.6	3.5	11.1	/	14.3	3.1	9.6	/
5 Y	S600	13.8	2.6	9.7	1.9	11.9	2.2	8.5	1.7
	S600 EW	15.4	2.5	11.0	2.0	13.2	2.1	9.3	1.8
	EUMV	15.8	3.5	11.1	3.4	13.7	2.9	9.4	2.2
1 Y	S600	14.8	2.9	11.3	2.1	12.7	2.5	9.4	2.0
	S600 EW	16.6	2.6	12.7	2.2	13.8	2.3	10.2	2.0
	EUMV	16.3	3.8	12.1	2.5	14.2	3.3	10.3	2.3

Thomson Reuters Datastream. Calculations by Ossiam

From Table 2 and Figure 2 we see that the Europe Minimum Variance Index also has higher long-term valuation multiples than the market. This was particularly true in the 2008-2009 period when it traded at a significant premium to its market capitalization and equal weighted counterparts. Outside of this period the Minimum Variance index traded at multiples close to that of the market. It currently trades on higher multiples than the Stoxx 600 but the spread is far from its historical highs.

### 2.1.3 US Universe

One can see from Table 3 and Figure 3 that the US Minimum Variance index also historically tends to trade on higher multiples whereas the scores are rather close to the ones of the S&P 500 Index. As is the case for the World Minimum Variance Index and Europe Minimum Variance index, the US Minimum Variance index is currently a bit more expensive than the S&P 500 Index but not in unusual proportions.

Table 3: US Universe : Value metrics

Index/Score		PE	PB	PCF	PS	F12 PE	F12 PB	F12 PCF	F12 PS
10 Y	SP500	19	/	/	2.7	15.7	3.1	11.4	2.3
	SP500EW	19.8	/	/	2.3	16.7	2.8	11.6	2.0
	USMV	18.6	/	/	2.5	15.9	3.5	11.2	2.3
5 Y	SP500	16.7	3.4	11.5	2.4	14.2	2.8	9.9	2.1
	SP500EW	17.5	3.0	11.6	2.1	15.4	2.6	10.3	1.9
	USMV	16.4	3.9	11.2	2.3	14.5	3.3	10.1	2.1
1 Y	SP500	17.3	3.7	12.3	2.6	14.7	2.9	10.4	2.3
	SP500EW	18.1	3.3	12.8	2.3	15.7	2.8	10.6	2.1
	USMV	18.2	3.9	11.7	2.7	16.4	3.4	10.7	2.5

Thomson Reuters Datastream. Calculations by Ossiam

### 2.1.4 Emerging Markets Universe

Table 4: Emerging Universe : Value metrics

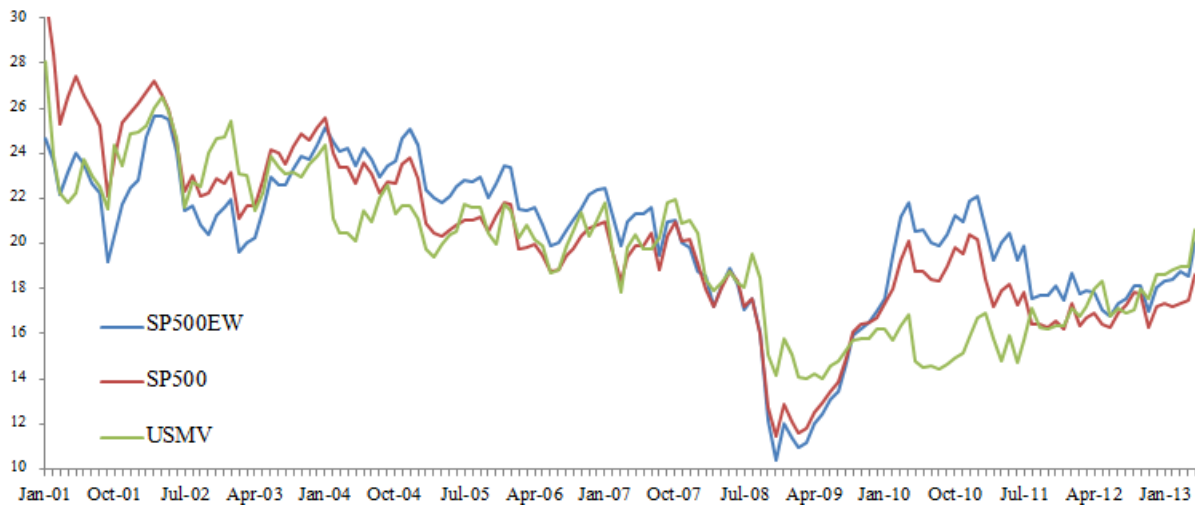
Index/Score		PE	PB	PCF	PS	F12 PE	F12 PB	F12 PCF	F12 PS
10 Y	IFCI	17.7	/	/	/	13	2.4	9.8	/
	IFCI EW	18.2	/	/	/	13.4	2.1	10.1	/
	EMMV	18.7	/	/	/	14.2	2.8	10.3	/
5 Y	IFCI	17	2.8	/	/	13.1	2.3	10.3	/
	IFCI EW	17.8	2.6	/	/	13.3	2.1	10.3	/
	EMMV	18.7	3.4	/	/	14.6	2.9	10.8	/
1 Y	IFCI	16.3	2.7	/	/	12.8	2.3	10	/
	IFCI EW	17.6	2.5	/	/	13.5	2.0	10.5	/
	EMMV	20.6	3.9	/	/	16.3	3.4	12	/

Thomson Reuters Datastream. Calculations by Ossiam

As follows from Table 4 and Figure 4, the Emerging Markets Minimum Variance Index has always been composed of expensive stocks, whatever multiple we chose to assess

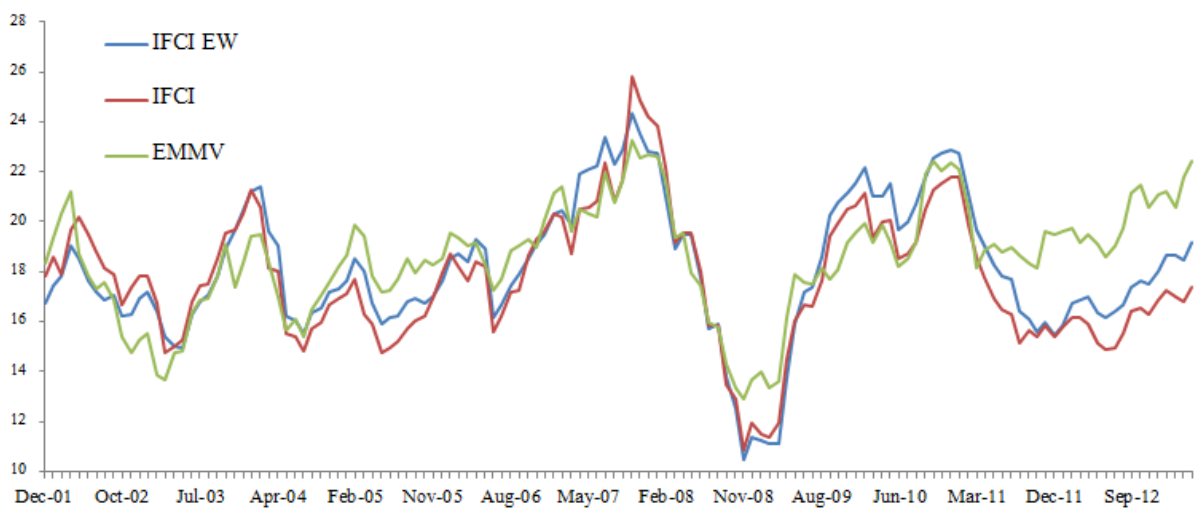


Figure 3: US Universe : Reported P/E



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 4: EM Universe : Reported P/E



Source Thomson Reuters Datastream. Calculations by Ossiam

the stocks valuation. It currently trades at an important premium, similar to what happened in 2008.

To conclude on Value metrics, it appears that the Minimum Variance indices historically traded at a small premium in comparison to their market capitalization weighted and equally weighted counterparts. However this relationship varies through time and depends on the universe and metrics used. If we refer to the one year average scores we see that Minimum Variance indices currently are in one of the periods when they trade at a premium.

## 2.2 Growth metrics

In this second part we have a look at the growth features of Minimum Variance indices. This will help us to assess what kind of stocks is favored by these indices: immature and fast-growing businesses or, on the contrary, more mature, well-established companies.

### 2.2.1 Global Developed Universe

Table 5: Global Developed Universe: Growth metrics

Index/Score		LTG (%)	EPS G(%)	CFPS G(%)	DPS G(%)	BVPS G(%)	EPS P5Y G(%)
10 Y	SP1200	10.1	12.7	/	/	/	10.2
	SP1200EW	10.2	12.7	/	/	/	8.8
	WOMV	10.1	10.8	/	/	/	11.4
5 Y	SP1200	9.9	10.5	10.7	12.0	11.5	7.3
	SP1200EW	10.3	10.8	8.9	8.5	8.8	5.3
	WOMV	9.3	8.6	9.7	9.3	8.0	10.5
1 Y	SP1200	10.2	10.9	11.9	13.3	11.7	6.6
	SP1200EW	10.7	10.1	10.7	13.0	8.8	3.1
	WOMV	8.6	8.2	8.9	11.7	8.3	7.2

Thomson Reuters Datastream. Calculations by Ossiam

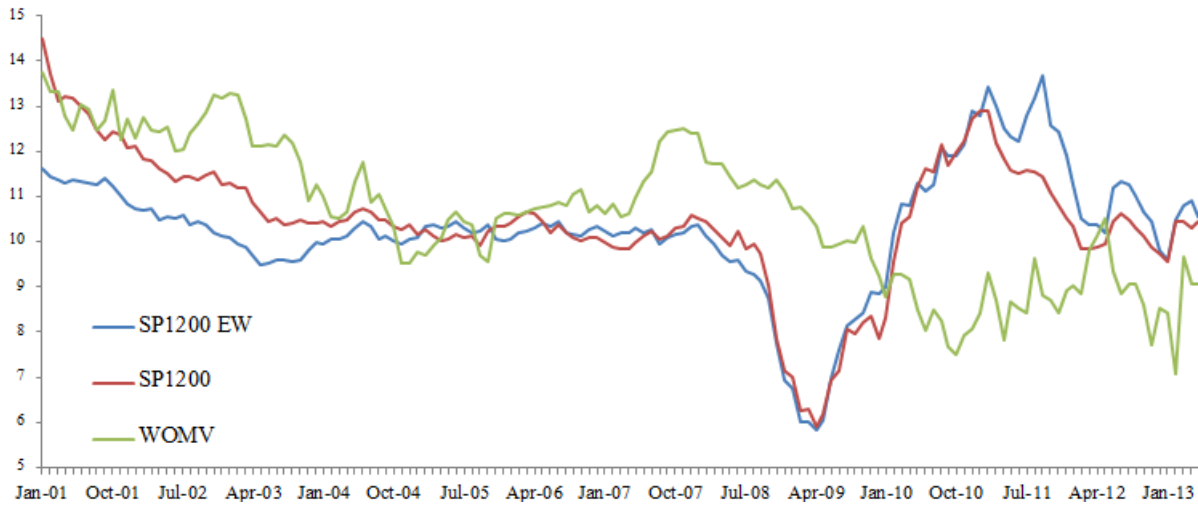
Growth metrics for the Global Developed indices are given in Table 5 and Figures 5 and

6. We see here a very interesting growth pattern for the Minimum Variance index. Over the last five years the EPS Long Term Growth and EPS Past five years Growth rates of the World Minimum Variance Index have been more stable (ranging, respectively, between 7% to 12% and between 5% to 20%) than the same metrics of its market capitalization weighted and equally weighted counterparts that experienced stronger swings during the same period, moving respectively from 6% to 13% and from 22% to almost 0%. One explanation for this would be the stable and mature profile of the stocks selected by the Minimum Variance index.

We see on Figure 6 that at the end of the long bull market (2007) the past growth of the firms is at its top since the business environment has been friendly for a long time. Firms that depend more on economic conditions have enjoyed this to a greater extent than more stable firms and one sees that the EPS Past five years Growth score of the Minimum Variance index is below the ones of the market capitalization weighted and the equally weighted indices while its EPS Long Term Growth rate is approximately at par. At the end of the bull market, perspectives for companies strongly deteriorate which can be seen in the sharp drop of the Long Term Growth rate score of the S&P Global 1200 Index (Figure 5), while the earnings estimates of the more stable companies belonging to the World Minimum Variance Index are only slightly affected. With their earnings depressed by the crisis, the average past growth rates of companies hit a bottom in 2011 while earnings of the members of the Minimum Variance index have still been able to grow at an appreciable rate, around 10%.

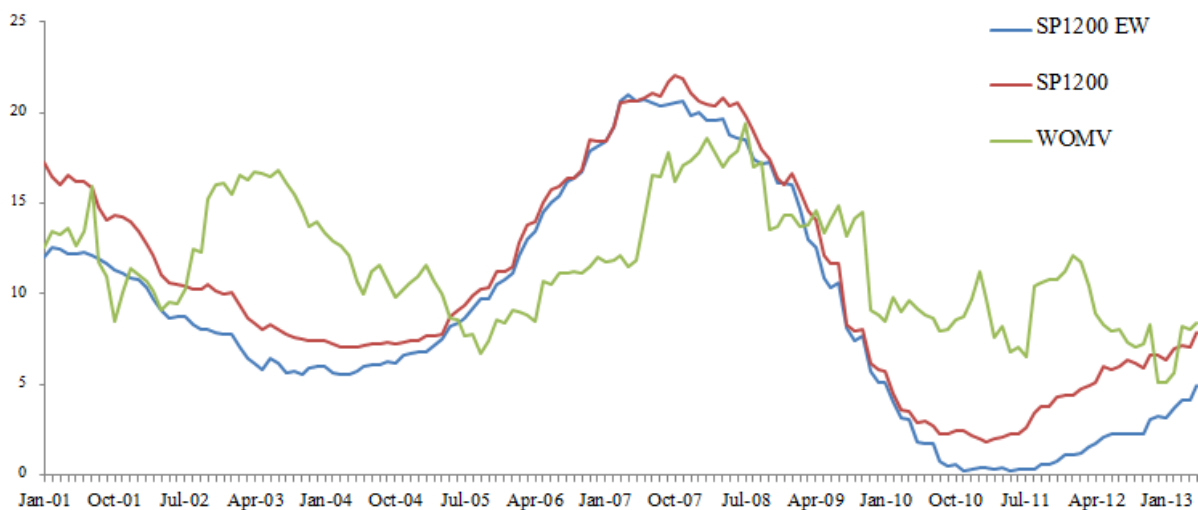
Currently, the Long Term Growth scores of the World Minimum Variance Index are below the scores of the S&P Global 1200 Index and of its equal weighted version. Its expected EPS growth score is also lower while its past EPS

Figure 5: Global Developed Universe : Long Term Growth



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 6: Global Developed Universe : EPS Past 5 yrs Growth



Source Thomson Reuters Datastream. Calculations by Ossiam

growth score is higher (Table 5).

### 2.2.2 European Universe

Table 6: European Universe: Growth metrics

Index/Score		LTG (%)	EPS G(%)	CFPS G(%)	DPS G(%)	BVPS G(%)	EPS P5Y G(%)
10 Y	S600	9.0	12.1	9.8	12.8	8.6	7.5
	S600EW	10.1	13.0	11.6	13.5	9.4	9.8
	EUMV	8.7	9.6	7.7	11.1	9.3	10.3
5 Y	S600	9.2	8.7	8.0	9.8	8.1	4.7
	S600EW	10.6	9.4	10.3	9.9	8.4	5.7
	EUMV	8.7	8.5	9.5	9.2	10.3	9.2
1 Y	S600	9.0	7.3	9.4	10.1	8.5	3.0
	S600EW	10.6	10.8	12.0	10.2	8.5	2.0
	EUMV	7.8	7.9	8.7	8.6	9.2	7.5

Thomson Reuters Datastream. Calculations by Ossiam

The European indices scores (Table 6 and Figures 7-8) show the same pattern as observed before. The Minimum Variance index tends to exhibit lower or market average anticipated growth rates, but Minimum Variance stocks are less affected by market downturns, as their earnings seem to be more stable. As for the realized growth, it also tends to be pretty stable, being inferior to that of the market capitalization weighted indices during strong economic expansion but superior during more difficult times.

### 2.2.3 US Universe

As seen from Table 7 and Figures 9-10 the US Minimum Variance index exhibits the same growth pattern as Global Developed and European Minimum Variance indices on a five years time span. There is one last characteristic of Minimum Variance indices worth mentioning. Whereas the market capitalization weighted and equally weighted indices tend to exhibit higher expected growth rates than reported growth rates, this is the opposite for Minimum Variance indices. The stocks selected by these

Table 7: US Universe: Growth metrics

Index/Score		LTG (%)	EPS G(%)	CFPS G(%)	DPS G(%)	BVPS G(%)	EPS P5Y G(%)
10 Y	SP500	11.4	14.6	/	/	/	12.2
	SP500EW	11.7	14.7	/	/	/	10.5
	USMV	10.3	11.3	/	/	/	11.6
5 Y	SP500	10.8	11.9	9.6	12.3	12.8	9.8
	SP500EW	11.2	10.8	8.9	9.8	11.5	7.8
	USMV	9.4	8.6	8.7	11.4	11	10.8
1 Y	SP500	10.7	12.7	9.9	26.4	13.4	10.1
	SP500EW	11.0	12.0	11.1	19.7	11.3	6.8
	USMV	8.9	7.7	7.2	12.7	10.8	8.5

Thomson Reuters Datastream. Calculations by Ossiam

indices seem to be more mature, which means that their period of fast growth is behind them. An additional explanation might be that as their businesses are more stable it leaves less space for analysts to extrapolate on extravagant expected growth rates.

### 2.2.4 Emerging Markets Universe

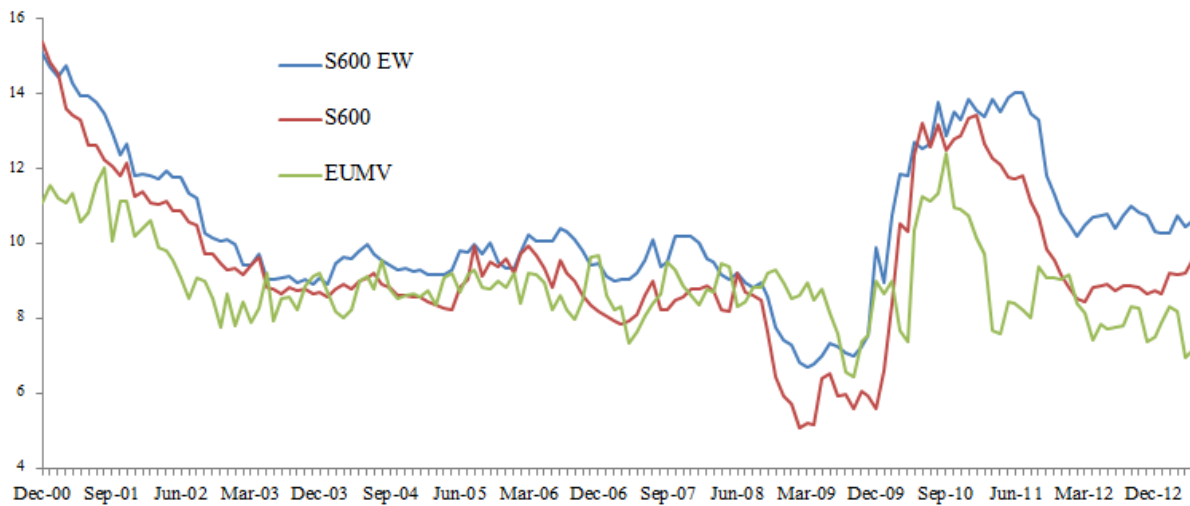
Table 8: Emerging Universe: Growth metrics

Index/Score		LTG (%)	EPS G(%)	CFPS G(%)	DPS G(%)	BVPS G(%)	EPS P5Y G(%)
10 Y	IFCI	/	/	/	/	/	28.9
	IFCI EW	/	/	/	/	/	19.9
	EMMV	/	/	/	/	/	16.7
5 Y	IFCI	/	17.9	/	/	/	18.8
	IFCI EW	/	18.5	/	/	/	17.1
	EMMV	/	15.4	/	/	/	13.3
1 Y	IFCI	13.4	13.0	/	/	13.3	14.1
	IFCI EW	15.0	14.1	/	/	12.2	12.7
	EMMV	12.4	13.8	/	/	12.5	11.6

Thomson Reuters Datastream. Calculations by Ossiam

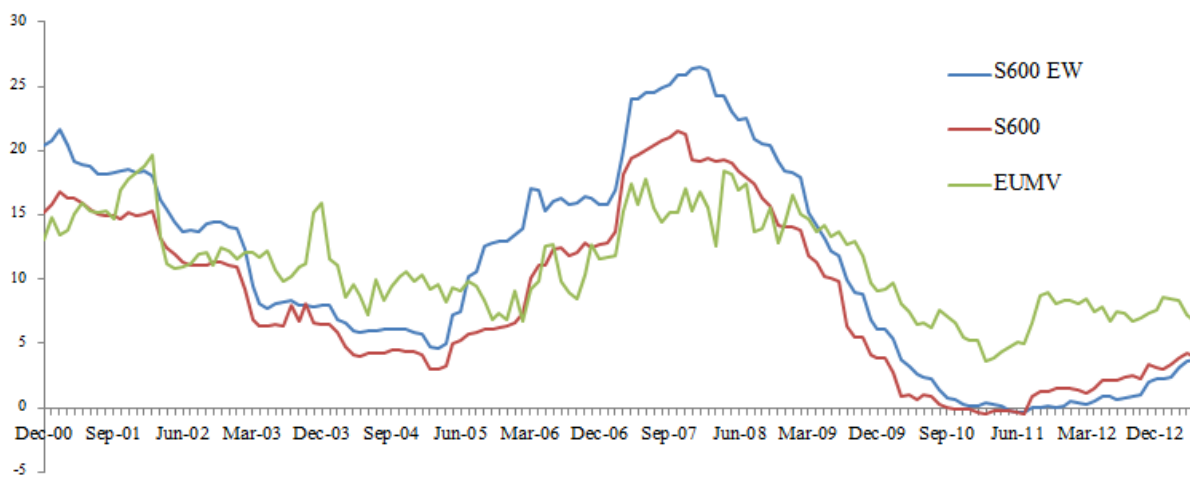
Due to the scarcity of historical data and the non-mature nature of Emerging Markets where high growth rates are still witnessed, it is difficult to draw conclusions on the growth characteristics of the Emerging Markets indices. From Table 8 and Figure 11 one can simply notice that stocks selected by

Figure 7: European Universe : Long Term Growth



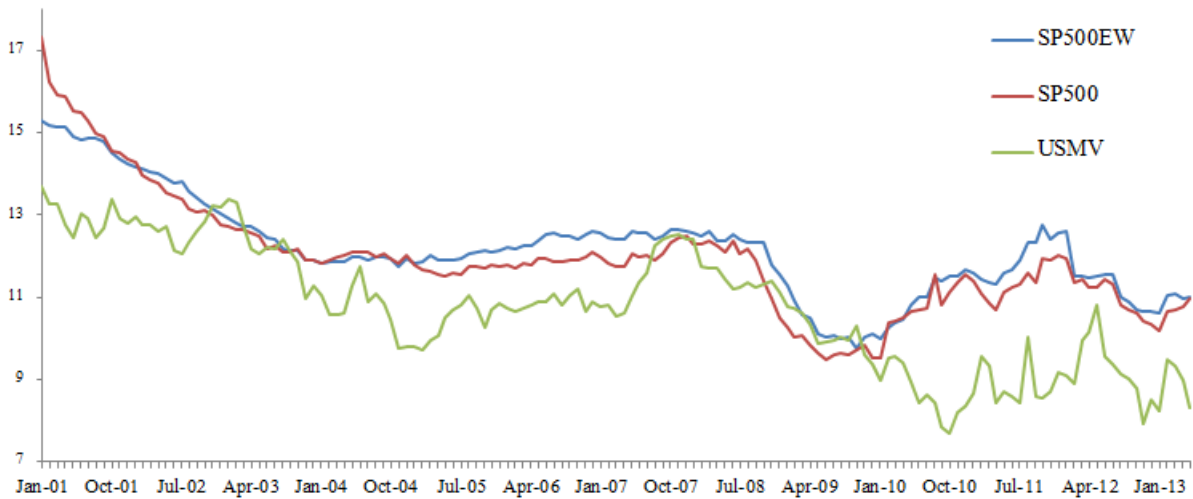
Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 8: European Universe : EPS Past 5 yrs Growth



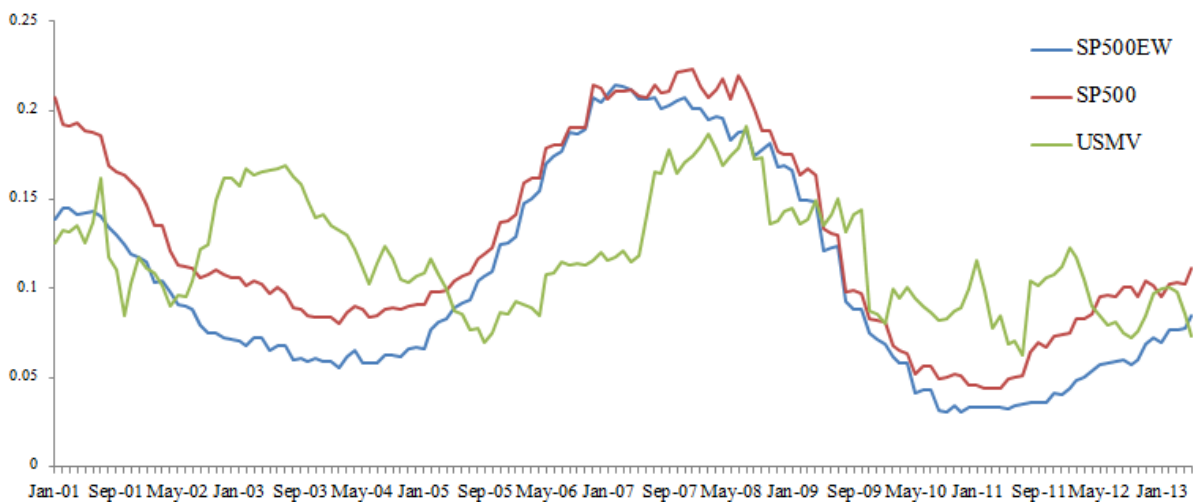
Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 9: US Universe : Long Term Growth



Source Thomson Reuters Datastream. Calculations by Ossiam

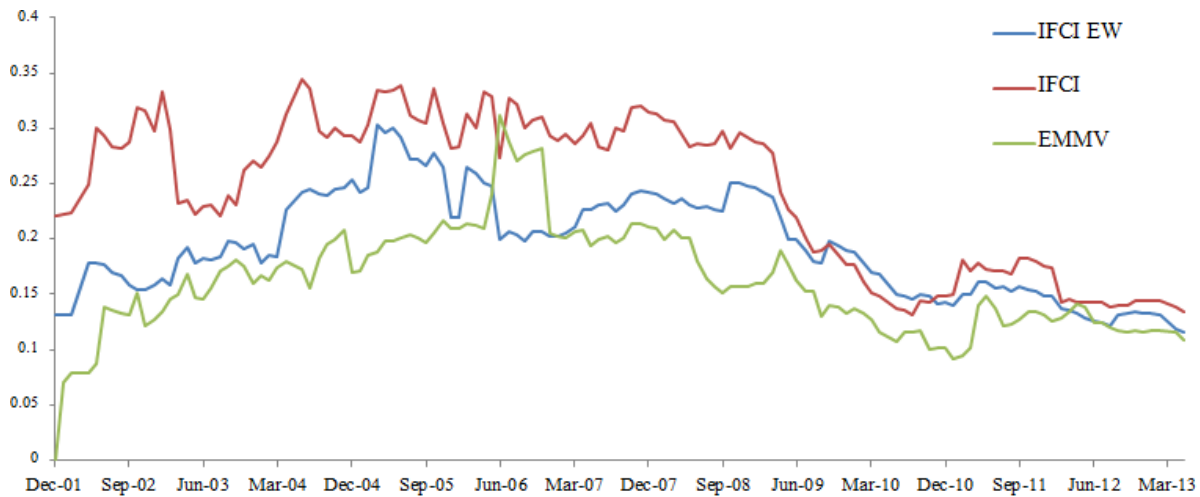
Figure 10: US Universe : EPS Past 5 yrs Growth



Source Thomson Reuters Datastream. Calculations by Ossiam



Figure 11: EM Universe : EPS Past 5 yrs Growth



Source Thomson Reuters Datastream. Calculations by Ossiam

the Minimum Variance index tend to exhibit lower past growth rates than the market capitalization weighted index.

To conclude on the Growth metrics, we can state that Minimum Variance indices in developed markets share similar characteristics. Firstly, the exhibited growth rates tend to be more stable than for market capitalization weighted and equally weighted indices. Secondly, there is a strong divergence depending on the considered time horizon. Indeed, while Minimum Variance indices have lower *expected* growth rates, their *current* growth rates are close to their market capitalization weighted counterparts, whereas their *past* growth rates are the highest. This leads us to conclude that Minimum Variance indices are focused on mature stocks which have already gone through their period of fast, non-mature growth. Their growth rates have slowed down but are now more stable as they are less dependent on market conditions.

Regarding the Emerging Markets indices,

the lack of sufficient data and the immaturity of these markets make it difficult to draw conclusions. However the data on past growth suggest that the Minimum Variance index has past growth rates inferior to the market average.

As Growth stocks are expected to deliver strong future growth, we can state that Minimum Variance indices are not Growth indices.

## 2.3 Size metrics

To correctly assess the eventual size biases of Minimum Variance indices, we had to slightly amend the methodology of the study for this specific metric. Due to various liquidity/market capitalization filters used in the Minimum Variance indices considered here, the Minimum Variance methodology is applied to a universe where the smallest/most illiquid stocks have already been filtered out. Therefore it is difficult to directly compare the filtered Minimum Variance indices to the benchmarks that contain the full investment universe. Thus we have built sub-indices, applying to the benchmark index the same market capitalization/liquidity filters as in the respective Minimum Variance indices. The resulting stock selection is then equally-weighted (and referred hereunder as *IndexName* Filter).

In addition, there is little sense in weighting the Market Capitalization indicator by the index weights, which are for the benchmark indices themselves derived from market capitalizations. Therefore we use another formula for this size metric. Namely we rank the indices components by Market Capitalization and then make a cumulative sum of their weights. We then pick the Market Capitalization of the stock that makes the sum reach fifty percent.

For example for an equal weighted portfolio this size metric is just a median market capitalization in the index. Instead for market cap indices this measure will be much larger, as often roughly 10% of the biggest stocks in an index like the S&P500 represent 50% of the index weight. This is due to the extreme asymmetry in the distribution of market capitalizations, which is skewed in the direction of large capitalization. For the filtered index (constructed using equal weights), the size metric will automatically exceed that of the universe-wide

equal weight index but will still lag behind the size metric of the market cap index.

By definition, the Minimum Variance portfolio will have a positive size bias (a size metric smaller than that of the market cap index) but this does not automatically imply that the Minimum Variance methodology in itself selects small stocks. As the Minimum Variance construction uses a liquidity selection but does not use market weights in defining its allocation, it is interesting to look at its 'size tilt' by comparing the Minimum Variance size metric to that of the filtered index. This will show, among all, the effect of the Minimum Variance methodology on the portfolio size, i.e. when applying the Minimum Variance optimization, is the final portfolio size metric smaller than the median capitalization of the underlying universe?

Hence, in what follows we will see that the Minimum Variance indices always have a size bias and that the Minimum Variance methodology has a negative size tilt over the long run (the size metric of the portfolio exceeds that of the filtered universe index) while it can sometimes turn positive (size metric smaller than that of the filtered universe index).

### 2.3.1 Global Developed Universe

First, we note that the Minimum Variance methodology itself has little effect on the size metric of the portfolio, except in late 2006 early 2007 where this metric strongly diverged between the World Minimum Variance index and the index we named S&P Global 1200 IndexFilter (Table 9 and Figure 12). The size tilt, negative most of the time, is therefore small.

Then one can see that, as expected, the Minimum Variance index has a size bias compared to the market capitalization weighted index (which is by definition highly concentrated on

Figure 12: Global Developed Universe : Market Cap (\$ bn)

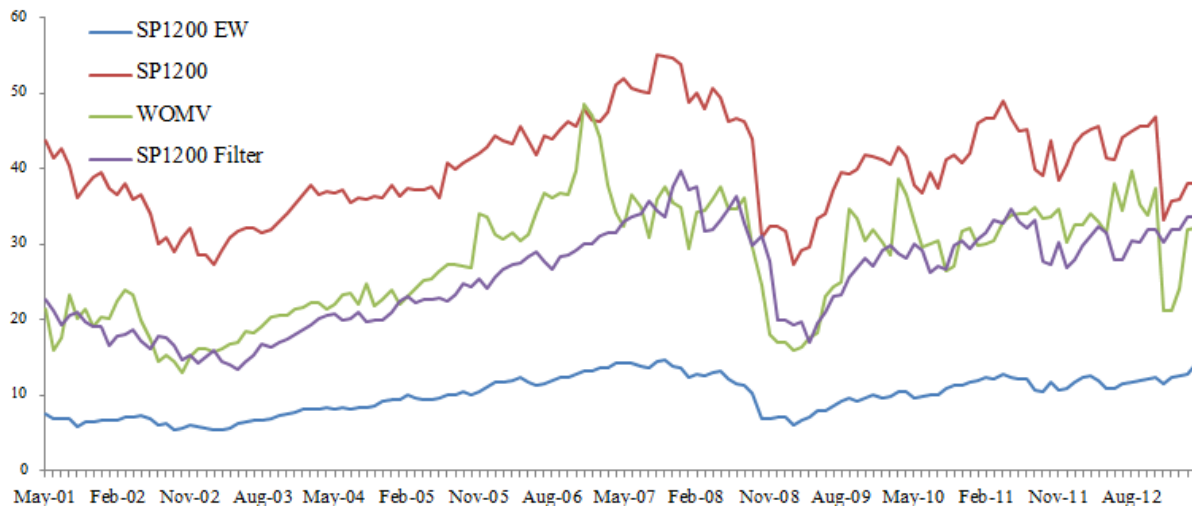


Figure 13: European Universe : Market Cap (Eur bn)

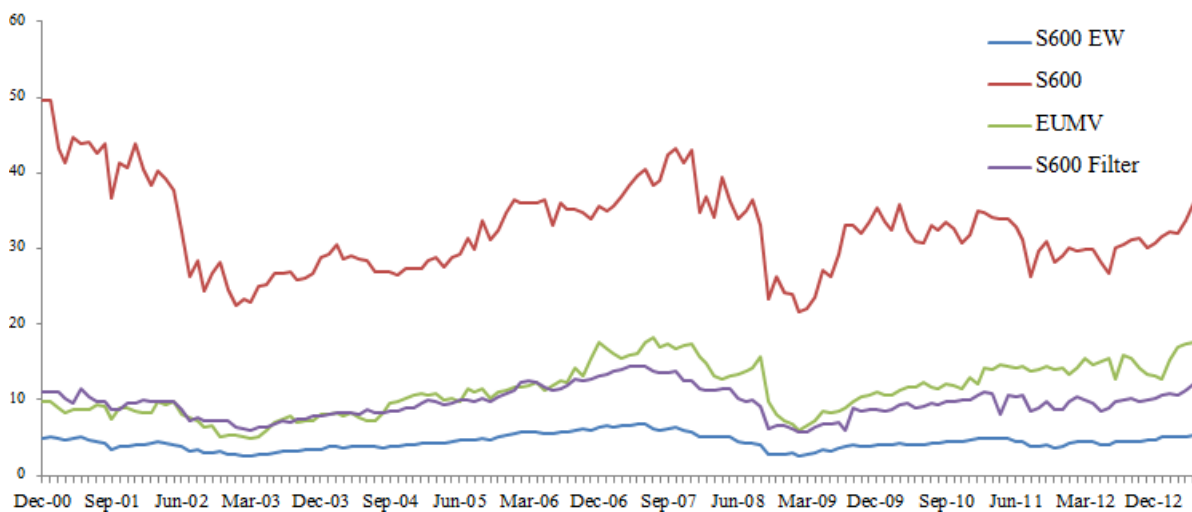


Table 9: Global Developed Universe: Size

	Index/Score	Market Cap (\$ bn)
10 Y	SP 1200	41.4
	SP1200 EW	10.7
	WOMV	29.7
	SP1200 F	27.4
5 Y	SP 1200	42.3
	SP1200 EW	11.2
	WOMV	30.7
	SP1200 F	29.9
1 Y	SP 1200	40.9
	SP1200 EW	12.7
	WOMV	31.8
	SP1200 F	31.1

Thomson Reuters Datastream. Calculations by Ossiam

the largest market capitalizations). But this size bias is rather moderate, due to both the market capitalization and liquidity filters applied to the investment universe, and in no case comparable to the small capitalizations bias of the equally-weighted index.

### 2.3.2 European Universe

Table 10: European Universe: Size

	Index/Score	Market Cap (Eur bn)
10 Y	S600	31.8
	S600 EW	4.6
	EUMV	12.2
	S600 F	9.9
5 Y	S600	30.8
	S600 EW	4.2
	EUMV	12.4
	S600 F	9.2
1 Y	S600	31.3
	S600 EW	4.8
	EUMV	15.0
	S600 F	10.3

Thomson Reuters Datastream. Calculations by Ossiam

With only a liquidity filter applied to the Europe Minimum Variance index, the importance of the size bias in this index is stronger (Table 10 and Figure 13). Over the past ten years this bias has ranged from strong (metric around one fifth of the one of the Stoxx 600 index) to moderate (metric half the one of the

Stoxx 600 Index).

In Europe it looks like the Minimum Variance methodology leads on average to a small negative size tilt as confirms the slightly superior metric in comparison to the Stoxx 600 Index Filter.

### 2.3.3 US Universe

In the US, the size bias has varied a lot during the past ten years, from large at the beginning of the previous decade to small in 2006-2007, being currently moderate (Table 11 and Figure 14).

Table 11: US Universe: Size

	Index/Score	Market Cap (\$ bn)
10 Y	SP 500	50.4
	SP500 EW	10.7
	USMV	20.9
	SP500 F	30.3
5 Y	SP 500	47.7
	SP500 EW	10.3
	USMV	21.4
	SP500 F	40.0
1 Y	SP 500	58.0
	SP500 EW	13.0
	USMV	24.5
	SP500 F	36.9

Thomson Reuters Datastream. Calculations by Ossiam

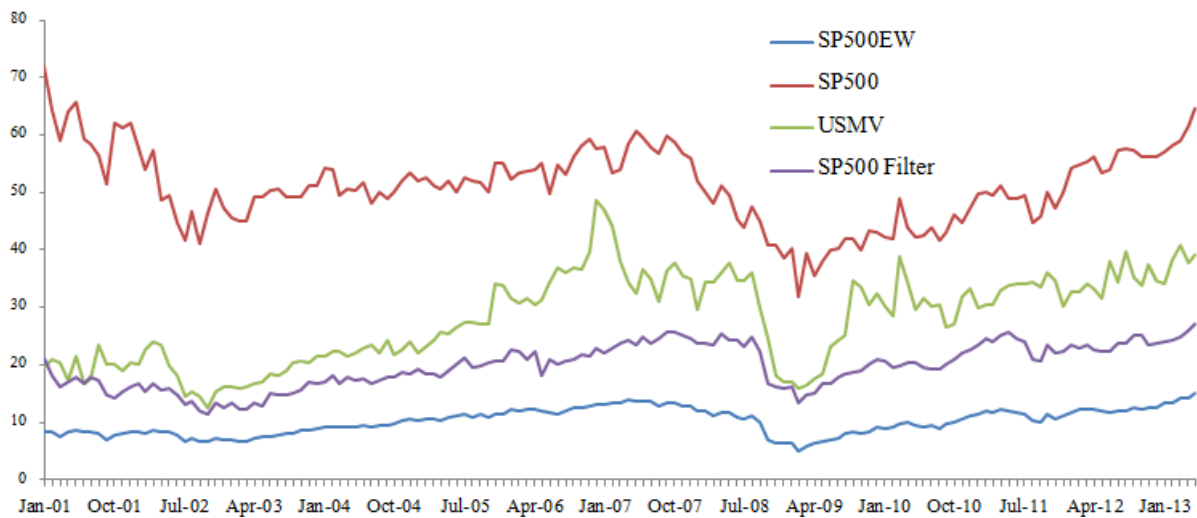
We can see that the filter has a rather constant effect on the size metric of the index (difference in metrics of the equally weighted index and the Filtered index), whereas the effect of the Minimum Variance methodology varies across time. The size tilt is always negative but its magnitude varies a lot.

### 2.3.4 Emerging Markets Universe

Historically the positive size bias of the Emerging Markets Minimum Variance Index varies from moderate to small and is currently small (Table 12 and Figure 15).

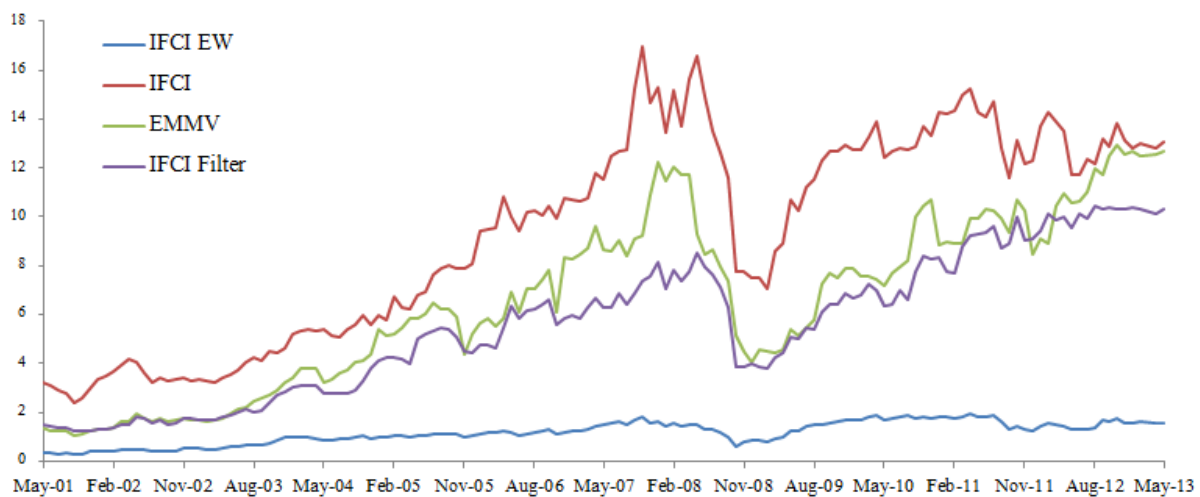
The market capitalizations and liquidity filters play an important role in decreasing

Figure 14: US Universe : Market Cap (\$ bn)



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 15: EM Universe : Market Cap (\$ bn)



Source Thomson Reuters Datastream. Calculations by Ossiam

Table 12: Emerging Universe: Size

Index/Score		Market Cap (\$ bn)
10 Y	IFCI	10.6
	IFCI EW	1.3
	EMMV	7.5
	IFCI F	6.4
5 Y	IFCI	12.4
	IFCI EW	1.5
	EMMV	8.8
	IFCI F	7.8
10 Y	IFCI	12.8
	IFCI EW	1.5
	EMMV	12.2
	IFCI F	10.3

Thomson Reuters Datastream. Calculations by Ossiam

the size bias on this universe. As one sees comparing the IFCI Filtered Index to the equally-weighted index, the gap in market capitalization can be rather big. The Minimum Variance methodology tends to decrease this bias further with a persistent, while variable in magnitude, negative size tilt.

Here we have compared the Minimum Variance indices to two index families which are very different in terms of size characteristics. Market capitalization weighted indices have a very strong tilt toward large caps (and even mega caps). On the opposite side, equally weighted indices have a tilt toward small caps. Therefore it is not surprising that Minimum Variance indices are situated between these two extremes in each universe.

If Minimum Variance indices are bound to have a size bias, we see that the importance of this bias varies a lot according to the considered universe. The addition of Filter indices enabled us to realize that the filters applied to the investment universe play a crucial role in explaining the importance of the biases but that the Minimum Variance methodology also tends to favor larger caps, further decreasing size biases.

## 2.4 Profitability metrics

In this fourth part we have a look at profitability features of the Minimum Variance indices. We investigate whether these indices select highly profitable companies and examine what drives the profitability levels of these companies: high profit margins, use of leverage or efficiency of operations.

### 2.4.1 Global Developed Universe

Table 13: Global Developed Universe: Profitability metrics

Index/Score		ROE (%)	ROA (%)	PM (%)	AT (%)	EM (%)
10 Y	SP1200	12.74	4.81	10.78	48.25	3.08
	SP1200EW	9.72	3.77	8.99	51.88	2.98
	WOMV	15.83	5.56	11.36	51.95	3.04
5 Y	SP1200	12.23	4.61	11.83	46.64	2.96
	SP1200EW	9.24	3.76	9.06	49.22	2.94
	WOMV	15.96	5.31	12.44	51.68	2.87
1 Y	SP1200	13.47	5.47	10.38	51.33	2.91
	SP1200EW	10.21	4.24	10.21	50.73	2.9
	WOMV	14.08	5.28	10.03	54.32	2.96

Thomson Reuters Datastream. Calculations by Ossiam

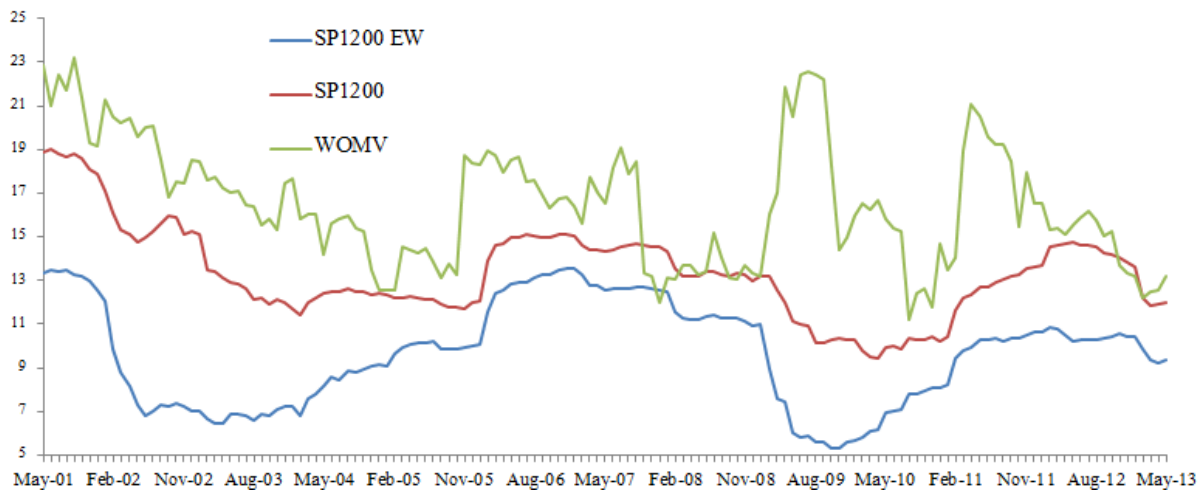
From Table 13 and Figure 18 one can see another distinguishing feature of Minimum Variance indices: they score far better than their market capitalization weighted and equally weighted counterparts on profitability metrics.

Decomposing the ROE measure according to the DuPont analysis<sup>4</sup> we find that the ability of the stocks belonging to the World Minimum Variance Index to deliver higher returns is essentially due to their capacity to both operate their business more efficiently (higher Asset Turnover (AT)) and to achieve higher Profit Margins (PM), whereas they do not resort too much to Financial Leverage (lower Equity Multiplier (EM)).

Currently the level of ROE delivered by stocks in the Minimum Variance index is above that of the market capitalization and equally weighted indices.

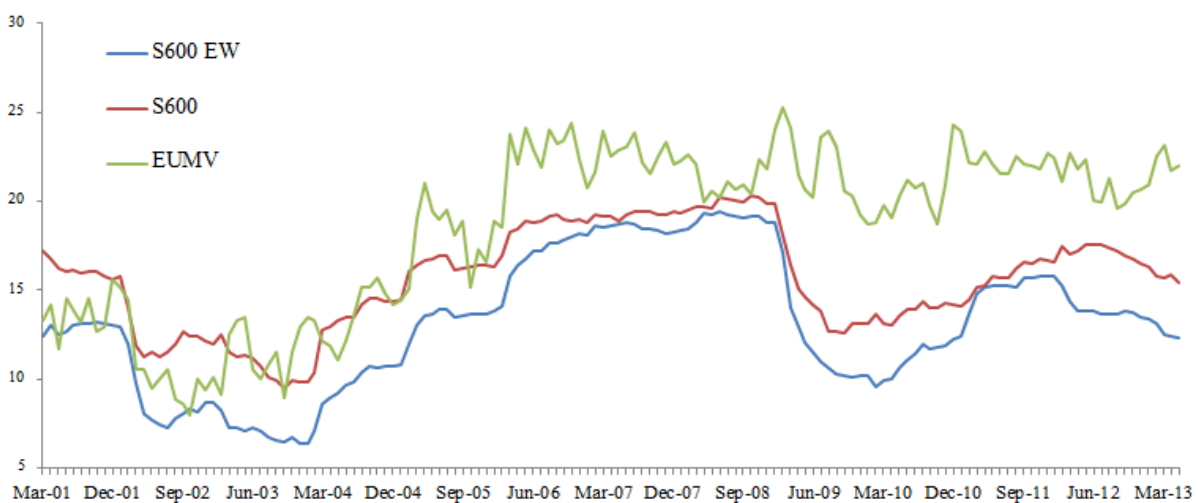


Figure 16: Global Developed Universe : Return on Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 17: European Universe : Return on Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

### 2.4.2 European Universe

Table 14: European Universe: Profitability metrics

Index/Score		ROE (%)	ROA (%)	PM (%)	AT (%)	EM (%)
10 Y	S600	16.07	5.46	9.77	56.05	3.24
	S600EW	13.86	5.09	9.81	60.41	3.15
	EUMV	19.89	7.22	13.49	60.96	3.05
5 Y	S600	15.93	5.87	10.41	56.97	3.15
	S600EW	13.79	5.28	9.56	60.00	3.08
	EUMV	21.46	7.99	14.71	63.14	2.96
1 Y	S600	16.57	6.32	11.23	57.84	3.04
	S600EW	13.29	5.55	9.68	60.81	2.96
	EUMV	21.03	7.78	14.94	54.57	2.98

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Over the long run, the profitability scores of the Europe Minimum Variance index are also above the ones of the Stoxx 600 and the Stoxx 600 EW indices (Table 14 and Figure 17). In addition, we see that stocks which belong to the index benefit from higher Profit Margins and Operating Efficiency while also keeping their Financial Leverage lower.

### 2.4.3 US Universe

Table 15: US Universe: Profitability metrics

Index/Score		ROE (%)	ROA (%)	PM (%)	AT (%)	EM (%)
10 Y	SP500	18.66	7.49	11.95	61.06	2.88
	SP500EW	14.16	5.7	8.64	64.54	2.91
	USMV	20.22	7.94	11.68	64.76	2.89
5 Y	SP500	19.08	7.97	12.11	62.93	2.8
	SP500EW	13.39	5.83	8.53	64.24	2.89
	USMV	20.88	8.61	12.31	65.84	2.82
1 Y	SP500	19.62	8.28	13.23	61.47	2.81
	SP500EW	15.16	6.5	10.58	62.51	2.88
	USMV	17.28	7.48	11.8	60.51	2.99

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From Table 15 and Figure 18 one can see that in the US universe also, higher Profit Margins and Operating Efficiency allow for higher

profitability while the use of Financial Leverage is in line with the market.

### 2.4.4 Emerging Markets Universe

Table 16: Emerging Universe: Profitability metrics

Index/Score		ROE (%)	ROA (%)	PM (%)	AT (%)	EM (%)
10 Y	IFCI	13.49	6.19	14.64	48.52	2.63
	IFCI EW	10.7	5.12	12.17	51.5	2.53
	EMMV	14.53	6.78	15.72	49.38	2.5
5 Y	IFCI	12.64	5.74	15.17	45.21	2.64
	IFCI EW	10.27	4.9	12.88	48.59	2.52
	EMMV	14.21	6.87	15.42	50.98	2.4
1 Y	IFCI	13.11	5.95	15.32	47.78	2.64
	IFCI EW	10.2	4.95	12.57	50.64	2.52
	EMMV	16	7.4	15.58	54.09	2.43

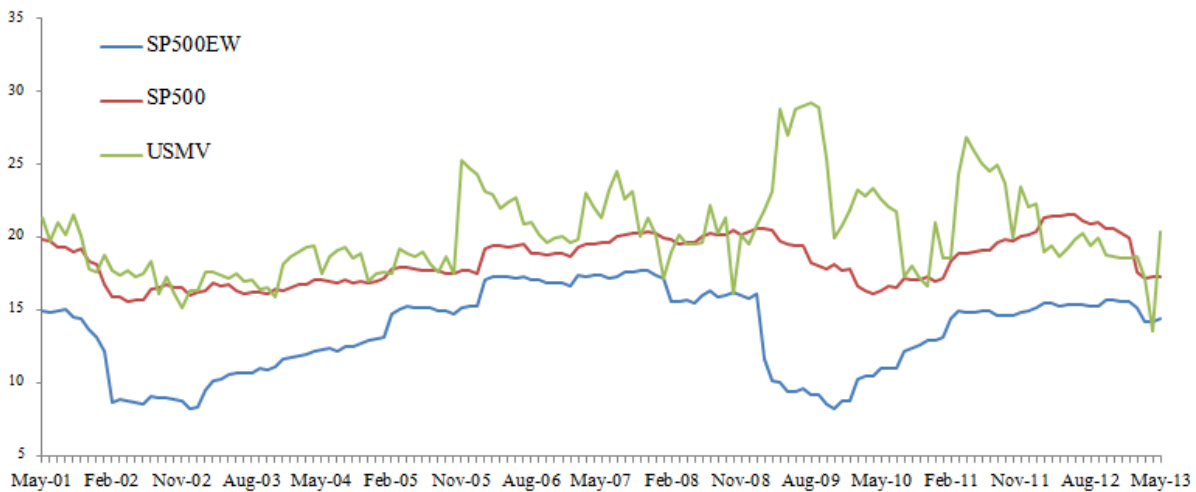
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The profitability scores tend to confirm for emerging markets what we have seen in other geographical areas, superior returns achieved through higher margins and efficiency despite a lower use of leverage (Table 16 and Figure 19).

To conclude, Minimum Variance indices historically score high on profitability measures. They share the ability to attain high levels of Operating Efficiency and Profit Margin which enable them to reach superior levels of Return on Equities and Return on Assets. During some periods the lesser use of Financial Leverage lowers the profitability levels which then score in-line with the market average or even slightly lower but it also shows that this profitability is more sustainable and bears less risks.

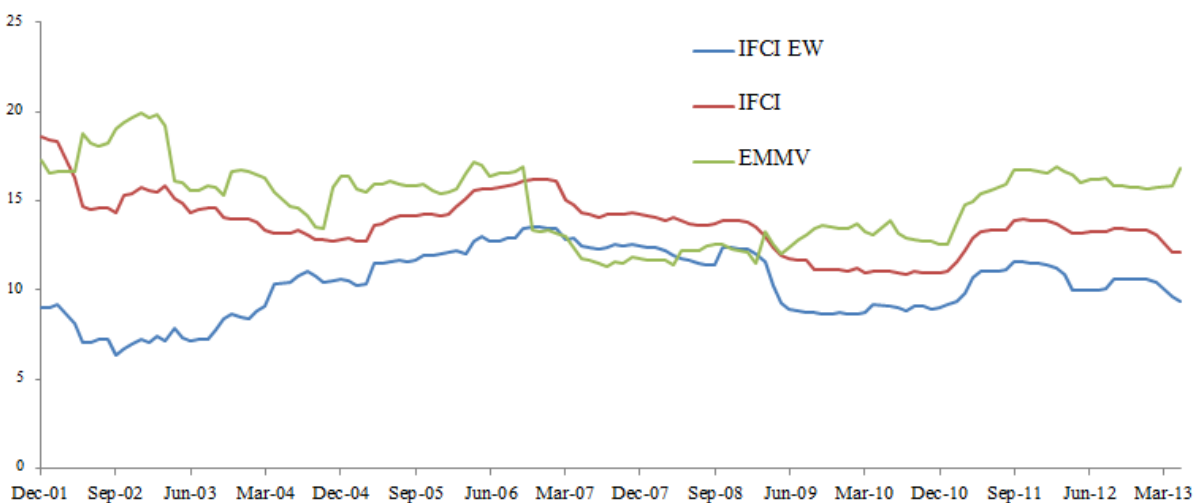
These superior scores in Profit Margin and Operating Efficiency, as well as lower Financial Leverage scores are pretty consistent across time and therefore they really seem to be dominant fundamental characteristics of the Min-

Figure 18: US Universe : Return on Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 19: EM Universe : Return on Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

imum Variance indices which appear to be strongly profitability tilted.

## 2.5 Debt metrics

In this fifth part we study the debt profile of Minimum Variance indices. If a certain level of debt is necessary in order to lower the Weighted Average Cost of Capital of a firm, exaggerated levels of indebtedness can be problematic, especially in times of restrained access to liquidity. Therefore we examine how the firms belonging to Minimum Variance indices fund their activity.

### 2.5.1 Global Developed Universe

From Table 17 and Figure 20, we first notice that the Debt to Equity ratio of the World Minimum Variance Index is constantly lower than the one of the S&P 500 Index since 2003. Further one can see that the proportion of debt in the balance sheet of the stocks belonging to the Minimum Variance index varies strongly over time and goes down as low as 150% in contrast to the global market where it hardly varies and never goes down below 200%. It actually looks like the Minimum Variance strategies picked cash-rich stocks in times of markets stress. It is also possible that firms belonging to the Minimum Variance index had the ability to use strong cash-flow generation capabilities to decrease their debt level as debt turned more and more expensive, reaching a historically low debt level during the crisis. The cost of debt having diminished since then, they have resumed gearing up. The superior level of Interest Coverage also hints at a well-controlled level of debt.

Currently the level of leverage of the constituents of the Minimum Variance index is close to the one of the components of the market capitalization weighted index.

Table 17: Global Developed Universe: Debt metrics

Index/Score		Debt to Assets (%)	Debt to Equity (%)	Interest Coverage (%)
10 Y	SP1200	61.6	221.5	/
	SP1200EW	61.5	217.9	/
	WOMV	62.6	219.9	/
5 Y	SP1200	60.1	203.8	16.6
	SP1200EW	61.0	212.7	13.1
	WOMV	60.2	195.8	17.2
1 Y	SP1200	61.1	210.8	16.7
	SP1200EW	60.4	208.1	13.9
	WOMV	63.4	204.3	17.5

Thomson Reuters Datastream. Calculations by Ossiam

### 2.5.2 European Universe

In Europe, we make similar findings from Table 18 and Figure 21. First, the Minimum Variance displays a Debt to Equity ratio inferior to the one of the market capitalization index and varying greatly between markets growth phases and downturns. Second it also exhibits a higher Interest Coverage score.

Table 18: European Universe: Debt metrics

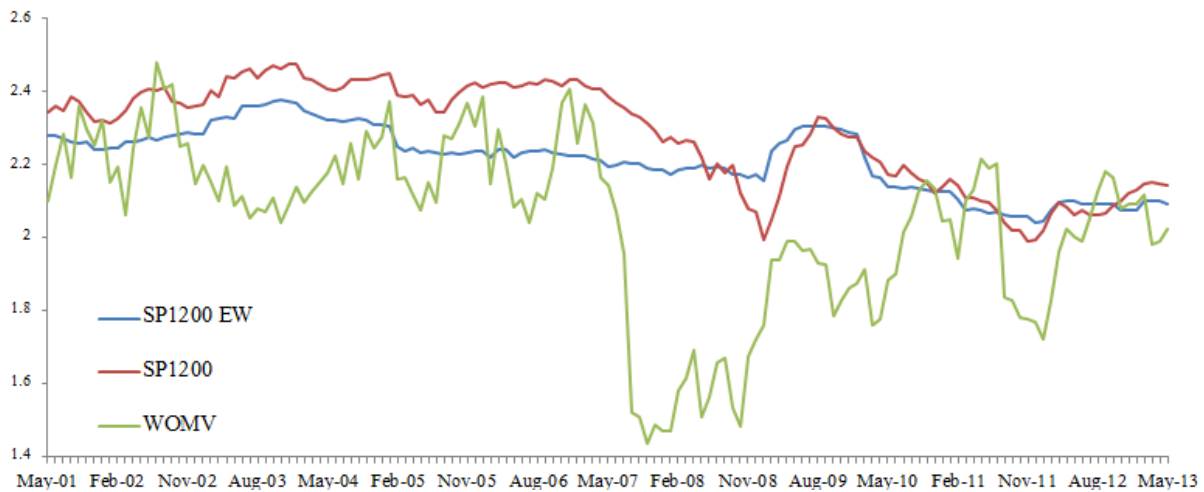
Index/Score		Debt to Assets (%)	Debt to Equity (%)	Interest Coverage (%)
10 Y	SP600	66.83	252.99	12.64
	SP600EW	64.97	237.53	12.02
	EUMV	62.68	222.63	13.57
5 Y	SP600	65.18	238.21	13.08
	SP600EW	63.72	228.44	12.68
	EUMV	60.34	208.22	14.4
1 Y	SP600	63.74	225.1	14.73
	SP600EW	62.1	215.17	13.76
	EUMV	60.75	210.98	14.52

Thomson Reuters Datastream. Calculations by Ossiam

### 2.5.3 US Universe

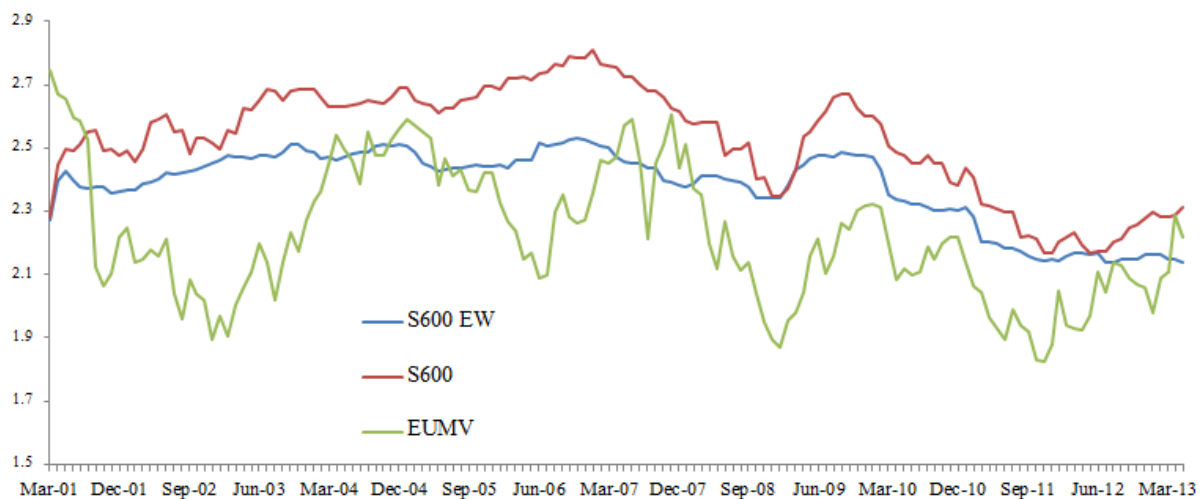
From Table 19 and Chart 22 one can see that the overall level of debt of stocks belonging to the Minimum Variance Index is in line with stocks from the S&P 500 Index but the Debt

Figure 20: Global Developed Universe : Debt to Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 21: European Universe : Debt to Equity



Source Thomson Reuters Datastream. Calculations by Ossiam

Figure 22: US Universe : Debt to Equity

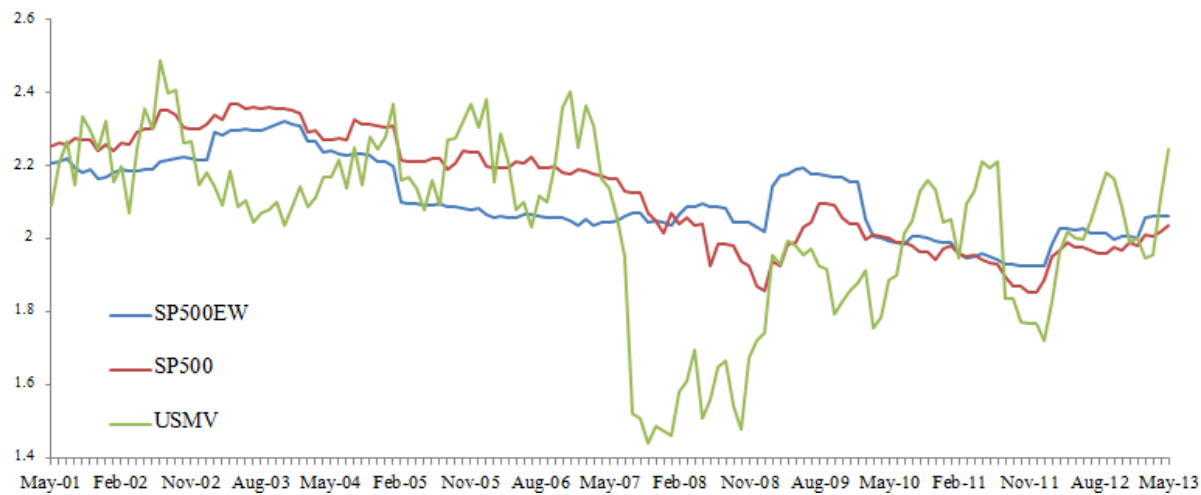
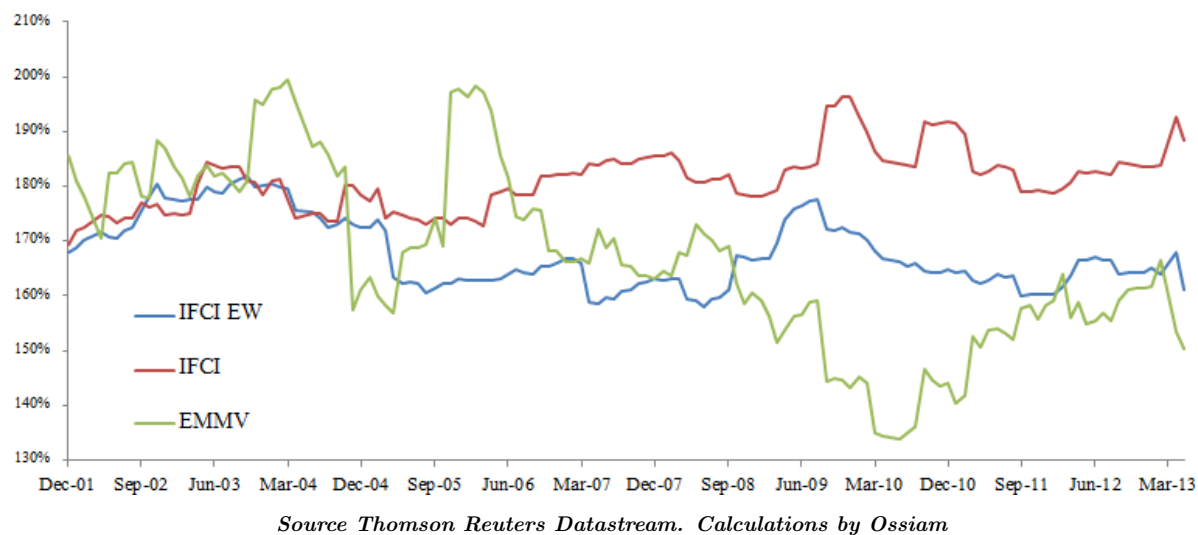


Figure 23: EM Universe : Debt to Equity





to Equity ratio also decreases sharply in times of market downturns.

Table 19: US Universe: Debt metrics

Index/Score		Debt to Assets (%)	Debt to Equity (%)	Interest Coverage (%)
10 Y	SP500	59.94	209.38	16.37
	SP500EW	60.48	208.45	13.08
	USMV	61.53	200.38	13.06
5 Y	SP500	58.95	197.11	16.27
	SP500EW	60.44	203.66	12.71
	USMV	61.8	193.38	12.76
1 Y	SP500	59.15	198.81	17.46
	SP500EW	60.5	202.81	13.21
	USMV	64.29	207.13	10.97

Thomson Reuters Datastream. Calculations by Ossiam

## 2.5.4 Emerging Markets Universe

Table 20: Emerging Universe: Debt metrics

Index/Score		Debt to Assets (%)	Debt to Equity (%)	Interest Coverage (%)
10 Y	IFCI	54.9	181.86	/
	IFCIEW	52.93	167.08	/
	EMMV	52.4	165.36	/
5 Y	IFCI	54.65	184.32	17.17
	IFCIEW	52.64	165.7	12.5
	EMMV	50.55	153.9	19.32
1 Y	IFCI	54.61	184.48	17.99
	IFCIEW	52.71	165.11	13.58
	EMMV	51.98	158.13	15.04

Thomson Reuters Datastream. Calculations by Ossiam

The story is similar in Emerging Markets (Table 20 and Figure 23) with a Debt to Equity ratio lower than the one of the IFCI index and a high Interest Coverage ratio proving that the level of indebtedness is well-controlled.

In summary, the stocks belonging to the Minimum Variance indices tend to be less indebted than their market capitalization

weighted counterparts. The strong Interest Coverage scores tend to demonstrate that the Minimum Variance portfolios select cash rich companies, generating strong recurring Cash Flows. The significant changes in their average Debt to Equity ratio following changes in market conditions, compared to the slow evolution of the global market (represented by the market capitalization weighted indices and equally weighted indices) comfort us in this analysis. It finally appears that stocks belonging to Minimum Variance indices have a more conservative capitalistic structure, relying less heavily on debt to finance their activity which makes them less sensitive to variations in the global economic conditions.

## 3 Conclusion

We have seen that the main fundamental feature of the Ossiam Minimum Variance indices is their significant and persistent profitability tilt. The other tilts we have highlighted in our study are in essence consequences of this focus on mature and profitable stocks rather than independent biases of the Minimum Variance indices compared to the market capitalization weighted and equally weighted indices.

On the growth side, we have seen that due to the focus on these successful companies, the Minimum Variance indices components displayed higher past growth, a somewhat similar current growth and a lower forecasted growth. Also, due to firmly established operations, these stocks are able to maintain satisfactory level of growth even when market conditions worsen.

On the valuation side, the Minimum Variance indices often trade at a slight premium as investors usually value the stocks which have the ability to deliver strong and recurring cash flows. After a phase of strong growth in earnings they have usually gone through a phase of

multiple expansions, rewarding their accession to the status of successful company. However the magnitude of this quality premium of Minimum Variance indices varies in time with the appetite of investors for high quality stocks and it decreases for example when investors instead strive for growth.

On the size side we have seen that the size bias is present in Minimum Variance portfolios but to much lesser extent than for equal weighted portfolios. The main part of the size bias reduction is linked to the use of market capitalization/liquidity filters prior to the application of the Minimum Variance optimization, the latter also tends to put a focus on larger stocks. We can reasonably consider that this tilt toward larger stocks stems from the focus on well-established companies which have already experienced a strong price appreciation which therefore increased their market value.

On the debt side eventually, firms in the Minimum Variance indices tend to have a higher proportion of equities in their balance sheets and thanks to their highly profitable business, they have a superior Interest Coverage ratios as well as a stronger ability to adjust their Debt/Equity mix.

Therefore, if we look at Minimum Variance portfolios from a fundamental perspective, the main driver of stock selection is the profitability of the companies. This primary bias then leads to secondary biases such as lower anticipated growth, premium valuations, slight tilt toward large stocks and a healthier capitalistic structure. The extend of these secondary biases varies in time depending on market conditions and the appetite of investors for stocks displaying superior profitability.

and Baker, M. and Bradley, B. and Wurgler, J. "Benchmarks as limits to arbitrage: Understanding the low volatility anomaly", 2011, Financial Analysts Journal, v.67, no 1, pp. 40-54.

<sup>2</sup>These indices are underlyings of Ossiam ETF.

<sup>3</sup>More information on the methodology of Ossiam Minimum Variance indices is available on [www.ossiam.com](http://www.ossiam.com) and on the index providers websites.

<sup>4</sup>

$$\begin{aligned}
 ROE &= \frac{Net\ Income}{Shareholders'\ Equity} \\
 &= \frac{Net\ Income}{Sales} * \frac{Sales}{Assets} * \frac{Assets}{Shareholders'\ Equity} \\
 &= Profit\ Margin * Asset\ Turnover * Equity\ Multiplier
 \end{aligned}$$

## Notes

<sup>1</sup>See for example Baker, N. Haugen, R. "Low Risk Stocks Outperform within All Observable Markets of the World", 2012, Working Paper, SSRN-2055431

## Appendix : Metrics definitions

PE	Current share Price / last reported Earnings per Share
PB	Current share Price / last reported Book Value per Share
PS	Current share Price / last reported Sales per Share
PCF	Current share Price / last reported Cash Flow per Share
F12 PE	Current share Price / median estimated 12 months forward Earnings per Share
F12 PB	Current share Price / median estimated 12 months forward Book Value per Share
F12 PS	Current share Price / median estimated 12 months forward Sales per Share
F12 PCF	Current share Price / median estimated 12 months forward Cash Flow per Share
LTG	Long Term Growth : median expected earnings increase over next business cycle (3-5 years)
EPS Growth	Sqrt of median 12 months forward Earnings per Share / trailing 12 months Earnings per Share - 1
CFPS Growth	Sqrt of median 12 months forward Cash Flow per Share / trailing 12 months Cash Flow per Share - 1
DPS Growth	Sqrt of median 12 months forward Dividend per Share / trailing 12 months Dividend per Share - 1
BVPS Growth	Sqrt of median 12 months forward Book Value per Share / trailing 12 months Book Value per Share - 1
ROE	Return on Equity : after tax net Income / Shareholder Equity
ROA	Return on Assets : after tax net Income / Total Assets
Operating Profit Margin	After tax Net Income / Total Sales
Asset Turnover	Total Sales / Total Assets
Equity Multiplier	Total Debt / Total Assets
Debt to Assets	After tax Net Income / Total Sales
Debt to Equity	Total Debt / Total Equity
Interest Coverage	EBIT / Interest Expenses

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