Norbert Keimling, Head of Capital Market Research, on the significance of cyclically adjusted price earnings ratios

CAPE: Predicting Stock Market Returns

In the past 100 years, equity investors have managed to generate real capital growth of an annual average some 7 percent. No other form of investment – whether bonds, cash, gold or real estate - offers comparable return potential. But does it still pay to invest in equities at this point in time, and what returns can investors expect in the long term?

The German equity index has more than doubled in price in the last five years since its low in March 2009. In 2013 alone, the DAX achieved more than 25 percent capital appreciation. Sad to say, hardly any investor participated in this. The latest BVI statistics document that German investors remained net sellers of equity funds in 2013 - withdrawing capital worth more than EUR 6 billion.

The fact that investors frequently choose the wrong time to gain exposure or to exit is nothing unusual. But is it possible at all to identify lucrative buy opportunities or risks on equity markets in advance? The forecast quality of capital market experts gives reason for doubt. There is virtually no correlation between the market forecasts for the next year regularly published at year-end and the actual performance in that year. Even the question of whether shares prices are more likely to rise or fall in the following year appears virtually unanswerable. For example, in the crisis years 2001, 2002 and 2008 the most reputable credit institutions forecast price gains for the DAX in average terms of +20%, +12% and +5% respectively. However, the German equity index actually incurred extreme losses in these years of -20%, -44% and -40% respectively.

Not only proponents of the theory of efficient capital markets doubt the significance of short-term equity market forecasts. Traditional economic models for evaluating future equity market potentials are frequently based on questionable assumptions. The common procedure of drawing conclusions on the earnings development of companies from the economic development of a country and estimating the equity market potential from the equity market valuation derived from this is doomed to fail: At best a rough forecast can be made of the economic development, with the earnings development of global players increasingly decoupling from the internal economic trend of their country and profit growth correlating only very weakly with the equity market development in the short to medium term.

Furthermore, equity prices are determined in the short to medium term by unpredictable events. Terror attacks, the outbreak of war, oil price shocks, statements by central banks, currency crises as well as behavioral finance and herd effects influence short-term market happenings more strongly than calculable fundamentals. Three hundred years earlier, Newton already made the painful assertion that he „was able to calculate the movements of stars down to the very second but not the madness of men".

What Significance does the classic Price-Earnings Ratio (P/E) have?

Hence, a meaningful connection between valuation ratios such as the familiar price-earnings ratio (P/E), which deno-

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tes the ratio of a market's corporate profits to the current market price and future equity market returns, couldn't even be established if it were possible to make a precise forecast of the next year's corporate profits. A further reason is that in recession years such as 2009 classic P/Es appear unattractive because the high or negative price earnings ratio resulting from the corporate losses does not factor in the companies' potential for earnings increases after the crisis.

Cyclically Adjusted Price-Earnings Ratio (CAPE)

However, many of the weaknesses of classic P/Es can be eliminated. Robert J. Shiller, winner of the Nobel Prize for Economics, was able to prove that inflation-adjusted corporate profits have achieved relatively stable growth on the American equity market since 1871 of 1.6% p.a.[1]. As above-average corporate profits in economically strong years are as short-lived over a long term horizon as high corporate losses in recession phases, he developed a cyclically adjusted price-earnings ratio (CAPE) which denotes the ratio of the current market price to the average inflation-adjusted profits of the ten preceding years. This CAPE measures whether the valuation of an equity market is high or low compared with its profit level - to which it will return in all likelihood.

Barring a few exceptions, the CAPE quoted in a spread of between 10 and 24 on the American equity market from 1881-2013, regularly returning to its historical average of 16.5 (fig. 1). On only four occasions did it visibly breach upwards out of this spread: in 1901, 1928, 1966 and 1996. For each of these years plausible explanations were given as to why old valuation parameters should no longer be used, e.g. the introduction of mass production, the telephone, the departure from the gold standard, the computer age or globalization[2]. But investors were continually wrong: In each of these years the S&P 500 marked record highs. Investors who invested in these overvaluations regularly incurred real price losses over a period of 15-20 years.

While high CAPEs signaled risks, attractive CAPEs and pessimistic market sentiment were followed by above-average capital growth over a long term horizon. In the S&P 500, the CAPE only fell below the value of 8 on three occasions: in 1917, 1932 and 1980. In each of these years, the S&P 500 marked historic lows - high returns of an average 10.5 percent p.a. were to follow in each of the following 15 year periods.

Overvaluation Periods in the Past

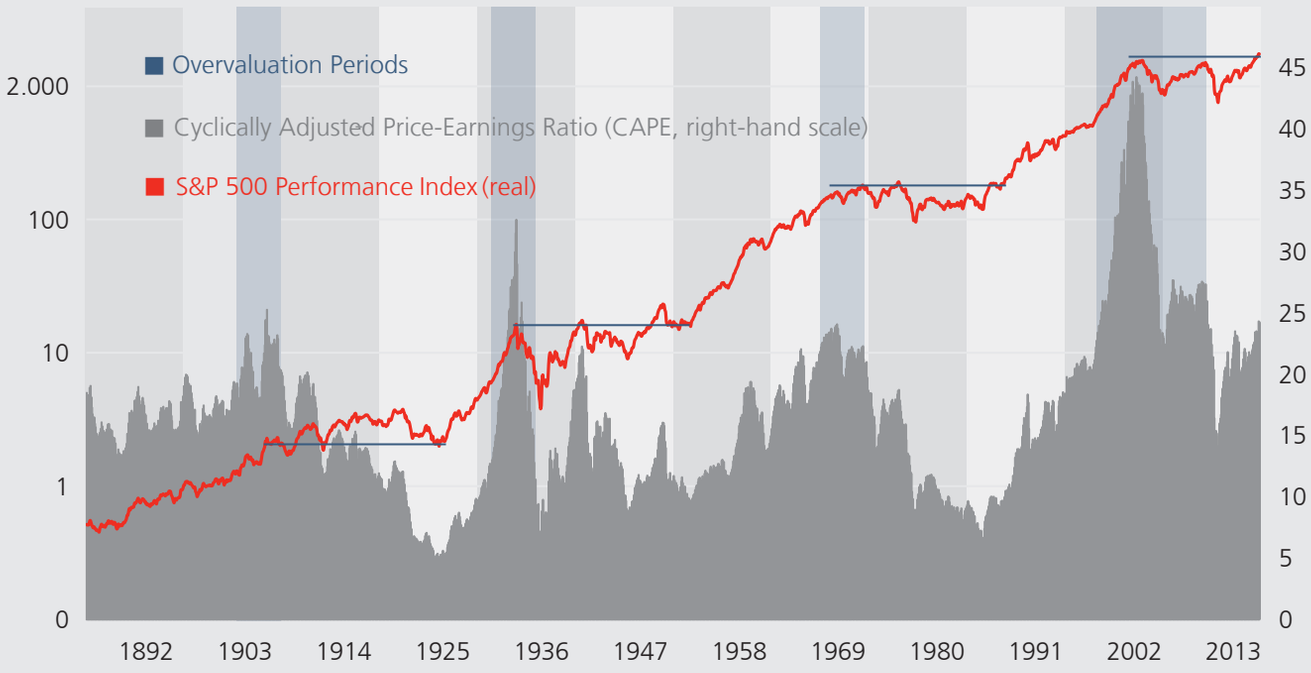

Figure 1: Connection between CAPE and the inflation-adjusted S&P 500 Performance Index in USD in the period 1881-2013. The blue columns mark all the overvaluation phases in which the CAPE exceeded 24. Sources: Robert J. Shiller, StarCapital.

International Evidence

Even if no meaningful equity market forecasts are possible with CAPE in the short to medium term, realistic return expectations can still be derived for the following 10-15 years, and not only in the USA: We were able to confirm this connection in 14 other equity markets in the period 1979-2013.

A connection between the CAPE and subsequent long-term equity market returns could be established in all reviewed countries (tab. 1). Attractive CAPE levels of below 8 were followed by high real capital growth of an annual average 13.1% over the next 15 years. In the most unfavorable case of all 4,083 observation periods, sequential annual returns of a real 5.7% were still established over the following 15 years, with the majority of sequential returns panning out at between 10.9% and 14.9%.

By the same token, CAPE levels above 32 resulted in slight capital growth of an average 0.0%. The sequential returns mostly panned out at between -2.8% and 2.0%.

While the US market was valued with an average CAPE of 16.5 based on data of Robert J. Shiller from 1881-2013, the average global CAPE of all 4,083 observation months is 17.5. All examination values without the US market, which accounts for 34.6% of all observation values, result in an average CAPE of 18.7. For the non-US data it is not possible to establish beyond doubt whether the different average valuation levels and the partially deviating interval sequential returns suggest country-specific fair valuation levels due to the short examination periods of 34 years, i.e. only two independent 15 year periods.

However, given that a comparable connection can be seen across all markets, i.e. the average valuations - despite deviating examination periods, different markets and different accounting standards - deviate from each other by only 13%, the average CAPE is also higher in the US market from 1979-2013 than over the entire period (CAPE 21.2), and given that the CAPE only allows approximate forecasts to be made in any case, an internationally comparable connection must be assumed in the analysis below. Other arguments in support of this are the fact that even low correlated markets, such as Japan with CAPE

Connection CAPE vs. Real Returns of the 15 Following Years (p.a.)

	CAPE	0 - 8			8 - 12			12 - 16			16 - 20			20 - 24			24 - 28			28 - 32			>32	
	∅	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%	min 25%	Med	max 75%
Australia	16,5	11% 12%	11,9%	12% 12%	8% 10%	10,1%	12% 11%	6% 7%	8,2%	12% 9%	4% 5%	5,7%	8% 6%	4% 5%	5,4%	6% 5%	3% 3%	3,2%	3% 3%						
Belgium	14,7	15% 16%	16,9%	18% 17%	13% 14%	17,1%	18% 18%	0% 3%	9,4%	17% 11%	0% 2%	7,9%	13% 10%	0% 1%	5,5%	9% 6%	0% 0%	0,0%	0% 0%	-1% -1%	-1,0%	-1% -1%			
Canada	19,6	9% 9%	9,4%	11% 10%	5% 7%	8,0%	11% 9%	2% 6%	7,0%	11% 9%	4% 7%	8,9%	11% 11%	6% 8%	8,1%	9% 8%	6% 6%	6,4%	8% 7%	4% 5%	5,1%	6% 5%	4% 4%	4,3%	4% 4%
France	19,9	13% 13%	14,0%	16% 15%	13% 14%	14,1%	16% 15%	6% 14%	15,2%	16% 16%	3% 6%	7,3%	15% 9%	2% 5%	6,3%	13% 7%	2% 3%	6,6%	11% 9%	2% 3%	6,1%	9% 8%	1% 1%	1,6%	2% 2%
Germany	18,2	13% 13%	13,1%	14% 14%	6% 9%	11,2%	13% 12%	4% 6%	8,6%	14% 12%	2% 5%	5,9%	11% 7%	3% 4%	5,6%	10% 6%	3% 4%	3,7%	7% 4%	2% 3%	3,1%	3% 3%	1% 2%	2,2%	3% 3%
Hong Kong	18,6				9% 9%	9,9%	11% 10%	7% 8%	9,1%	10% 10%	4% 6%	7,0%	10% 9%	3% 5%	5,9%	10% 7%	1% 2%	2,0%	4% 4%	1% 1%	0,7%	1% 1%	0% 0%	0,4%	0% 0%
Italy	23,0										1% 3%	3,1%	4% 4%	0% 0%	1,0%	3% 2%	-1% -1%	-0,5%	0% 0%	-1% -1%	-1,1%	-1% -1%	-4% -3%	-2,9%	-1% -2%
Japan	39,2							7% 7%	6,8%	7% 7%	6% 7%	7,2%	8% 8%	5% 5%	5,7%	7% 6%	3% 3%	3,6%	5% 4%	-2% 2%	2,9%	4% 4%	-6% -4%	-2,2%	4% 0%
Netherlands	12,4	14% 15%	16,4%	21% 18%	7% 8%	10,0%	16% 15%	2% 5%	5,6%	10% 7%	2% 3%	4,2%	5% 5%	2% 2%	1,7%	2% 2%	0% 1%	0,8%	1% 1%	0% 0%	0,4%	1% 1%	-1% 0%	-0,3%	0% 0%
Norway	14,4	12% 13%	13,4%	14% 14%	3% 6%	9,4%	14% 11%	3% 6%	6,8%	12% 8%	1% 4%	5,4%	8% 7%	5% 6%	6,3%	7% 7%	4% 5%	5,0%	6% 5%	4% 4%	4,4%	4% 4%			
Singapore	22,4				7% 8%	7,7%	9% 8%	6% 7%	7,4%	8% 8%	3% 5%	5,2%	8% 7%	2% 3%	4,1%	8% 7%	2% 3%	4,5%	8% 6%	-1% 2%	2,7%	4% 3%	-1% 0%	1,9%	3% 3%
Spain	16,9				10% 12%	12,5%	15% 14%	6% 8%	9,9%	13% 11%	4% 5%	7,6%	9% 9%	1% 2%	2,6%	3% 3%	2% 2%	2,1%	3% 2%	1% 1%	1,5%	2% 2%	0% 0%	0,1%	0% 0%
Switzerland	18,8	8% 11%	12,2%	16% 14%	8% 10%	14,3%	16% 15%	9% 10%	11,9%	14% 13%	7% 9%	9,6%	13% 11%	4% 6%	6,7%	8% 7%	4% 5%	5,1%	6% 6%	4% 4%	4,0%	4% 4%	2% 2%	2,5%	4% 3%
UK	15,3	11% 12%	12,3%	14% 13%	11% 12%	12,6%	14% 13%	4% 6%	7,2%	11% 8%	2% 3%	4,2%	7% 5%	2% 2%	2,3%	3% 2%	2% 2%	1,8%	2% 2%						
S&P 500*	16,5	6% 8%	10,1%	15% 13%	1% 8%	10,2%	16% 13%	1% 4%	6,8%	13% 9%	-2% 3%	5,4%	11% 7%	-2% 0%	2,0%	8% 4%	0% 1%	3,0%	4% 4%	0% 0%	2,3%	3% 3%	-1% 2%	2,0%	3% 2%
All Countries	17,5	6% 11%	13,1%	21% 15%	1% 8%	10,6%	18% 13%	0% 6%	7,5%	17% 10%	-2% 4%	5,9%	15% 8%	-2% 2%	4,2%	13% 6%	-1% 3%	4,2%	11% 6%	-2% 1%	2,8%	9% 4%	-6% -3%	0,0%	4% 2%

Table 1: All returns inflation-adjusted, in local currency, incl. dividend income and annualized. The starting date is 1979 for non-US countries and 1881 for the US. The last 15-year period taken into account encompasses the years 1998-2013, a total of 4,083 months were evaluated in 15 countries (#). The average CAPE corresponds to the arithmetical mean over the review period, e.g. from 1881-2013 in the US market. The min and max columns represent the minimum and maximum values observed in the relevant country, i.e. the 25%/75% quantiles of the real 15 year returns (med = median). Source: S&P 500: Robert J. Shiller, other countries: Woldscope, Thomson Reuters and own calculations.

levels of above 50, tally with this assumed connection and even complement the connection established in the US market (fig. 2).

With a correlation of -0.7, a stronger statistical connection exists between the CAPE and the long-term sequential returns on the equity market than between the annual returns of the DAX and the S&P 500 in the period 1973-2013 (correlation 0.6). A further comparison: The company profits and the returns of the respective succeeding 15 years displayed a correlation in the US market from 1881-2013 that was only half as high (correlation 0.4). The CAPE thus allows more reliable long-term forecasts to be made than correctly estimated long-term profit growth rates.

What equity market returns can investors currently expect?

The German equity market is currently valued at a CAPE of 17.3. In the last 140 years, periods with comparable valuations were followed by capital growth of an annual average 6.4% (real) over the next 15 years, with the majority of the 15-year periods achieving capital appreciation of 4.3% to 7.6% (tab. 2). Assuming a (conservative) inflation rate of one percent[3], a DAX level of 27,000 points would thus be realistic in the year 2029 within a probable spread of 20,100-32,000 points.

Other European equity markets offer even more potential, Italy for example. Historically, the current CAPE of 8.8 was regularly followed by real capital growth of 9.3% to 13.9% p.a., with such attractive valuations never having been followed by long-term capital losses. Markets such as Spain and Belgium offer similarly attractive return prospects.

By contrast, the return potential of the US market is disappointing. At a CAPE of 24.6 the equity market is pricing some 50% higher than its historical average valuation. In the long term, these valuations were generally followed by gains of only 2.2% to 5.8% p.a., followed almost without exception by below average price gains. Investors with high return expectations investing in the US market over a long term horizon hopefully have some good reasons to justify this since a development of this kind would contradict 130 years of stock market experience[4].

The examination above presupposes that overvaluations

Connection CAPE vs. Real Returns of the 15 Following Years (p.a.)

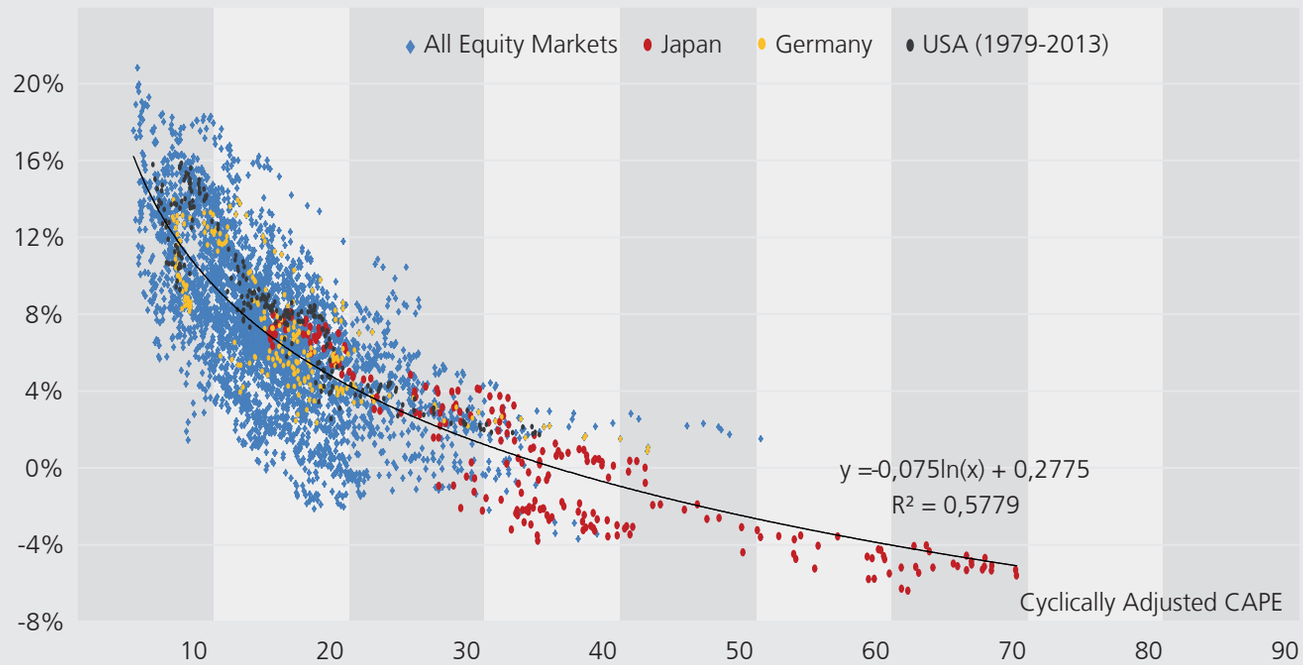

Figure 2: Connection between the CAPE and the returns of the 15 following years in the period 1881-2013 (US) and 1979-2013 (other markets). The USA, Japan and Germany are highlighted as examples in a single period 1979-2013. All returns inflation-adjusted, in local currency, incl. dividend income and annualized. Source: S&P 500: Robert J. Shiller, other countries: Worldscope, Thomson Reuters and own calculations.

always follow a similar reversion pattern over a 15 year period. In practice, however, the mean reversion progresses differently. For example, the US overvaluation of 1929 (CAPE 32.6) was followed by an equity market slump of more than 75% in only three years. The extraordinary price reaction in 1932 resulted not only in an attractive CAPE of 5.6 but also led to one of the strongest uptrends on the US market. In contrast with this, the overvaluation of 1966 (CAPE 24.1) culminated in nearly 20 years of sideways movement amid high volatility.

Scenario Analysis for the German Equity Market Using the DAX

Depending on market conditions, similar valuations are followed by greatly differing equity market trends. These different forms of mean reversion can be described using scenario analyses. In Figure 3 the German market is used as an example for illustrating the trend of equity markets in the last 140 years for comparable valuations over the following 1 to 15 years.

The current German CAPE of 17.3 lies in the CAPE examination interval of 16-20. Since 1881, a CAPE of 16-20 has been measured worldwide in 964 months. As already explained above, real capital growth of an annual average 6.4% was achieved over the following 15 years which, at a conservatively assumed inflation rate of 1%, would correspond to a DAX level of 27,000 points in 2028.

However, the scenario corridor modeled here also offers insight into medium-term opportunities and risks. Disregarding outliers (20% of the observation periods), the DAX can drop back to 7,900 points at any time in a three year horizon (-15% from the current price level) but can also rise to 17,600 points (+89%). Historically, a DAX trend in the area marked gray in figure 3 corresponds to the most probable development. Lower returns were only observed in 10% of all examination periods[5].

Scenario Analysis for the US Equity Market

In the past 132 years, 287 observation periods with a CAPE of 22-26 were measured worldwide. This interval roughly corresponds to the current US valuation of 24.6. In average terms, comparable valuations were followed by real capital growth of 3.7% p.a. over the next 15 years at a probable spread of 2.2% to 5.8%. Assuming 1% inflation

What Equity Returns can Investors Expect in the Long Term (p.a., real)

Land	CAPE	Max	0,75%	Forecast	US-Data	0,25%	Min
Australia	16,2	16,2%	8,3%	6,9%	5,6%	5,2%	-0,5%
Belgium	12,2	18,3%	11,9%	9,0%	7,7%	7,1%	1,2%
Canada	18,6	15,2%	7,6%	5,8%	4,5%	4,3%	-2,1%
France	13,8	16,8%	9,7%	8,1%	6,8%	5,9%	-0,1%
Germany	17,3	15,2%	7,6%	6,4%	5,1%	4,3%	-2,1%
Hong Kong	18,2	15,2%	7,6%	6,0%	4,7%	4,3%	-2,1%
Italy	8,8	18,4%	13,9%	11,4%	10,3%	9,3%	1,4%
Japan	23,9	10,9%	5,8%	3,9%	2,5%	2,2%	-2,0%
Netherlands	14,5	16,8%	9,7%	7,7%	6,4%	5,9%	-0,1%
Norway	12,3	18,3%	11,9%	8,9%	7,7%	7,1%	1,2%
Singapore	12,9	18,3%	11,9%	8,6%	7,3%	7,1%	1,2%
Spain	10,3	18,3%	13,3%	10,3%	9,1%	8,4%	1,4%
Switzerland	21,6	13,4%	6,2%	4,7%	3,3%	2,1%	-2,0%
United Kingdom	12,6	18,3%	11,9%	8,8%	7,5%	7,1%	1,2%
United States	24,6	10,9%	5,8%	3,7%	2,3%	2,2%	-2,0%
World AC	18,2	15,2%	7,6%	6,0%	4,6%	4,3%	-2,1%
Developed Markets	18,5	15,2%	7,6%	5,9%	4,5%	4,3%	-2,1%
Emerging Markets	14,6	16,8%	9,7%	7,6%	6,3%	5,9%	-0,1%
Europe	13,6	16,8%	9,7%	8,1%	6,9%	5,9%	-0,1%

Table 2: The return estimates are based on the connection between CAPE and future sequential returns from 1881-2013 (US) and 1979-2013 (international), with the return forecast established on the basis of a regression function and the intervals corresponding to 25% and 75% quantiles of comparable valuation phases. The forecast in the „US data" column is based exclusively on the data derived from the US market. All data in real terms, in local currency and incl. dividend income as per 31.01.2014. For more information see www.starcapital.de. Data sources: Thomson Reuters, StarCapital.

and reinvested dividends, the S&P 500 can be expected to quote with high probability between 2,800 and 4,800 points in 2028[6].

Not only was the higher fundamental valuation followed by significantly lower capital growth over a long-term horizon compared with the German equity market; generally speaking, volatility was also significantly higher on the equity market. Over a three year horizon and after a 20% adjustment for outliers, a realistic possibility exists that the S&P 500 will mark a level of between 1,400 points (-21%) and 3.800 (+113%)[7].

However, the probability of a volatile sideways movement is far higher than on the attractively valued German equity market. There is even a strong probability of price levels around 1,400 points until 2019 (Fig. 4).

Summary

In the long term, equity investments are not only the most lucrative but also by far the safest form of investment over longer periods and allowing for inflation and liquidity. But equity investments are still subject to high volatility in the short to medium term and a crucial factor for the strategic return potential is the timing of new investments. The objective of this examination has been to answer the extent to which the timing of new exposures can be successfully chosen using the cyclical adjusted CAPE, and whether the indicator allows statements to be made on long-term equity market returns.

The examination reaches the conclusion that it is possible to forecast relatively reliably the long-term equity market returns of 15 equity markets using a cyclical adjusted CAPE. The concept has demonstrated impressive results in the US market over the past 130 years and in 14 other equity markets in the period 1979-2013. It is fair to assume that this connection can also be found in other markets even if we are unable to empirically verify this theory for lack of available data. Based on the insight thus gained, long-term equity market forecasts can be made for various markets for the next 15 years.

The overall conclusion that we reach is that investors who, unlike the majority of investors, do not position themselves close to the benchmark with a high US weighting can expect annual capital growth of some 6% above and bey-

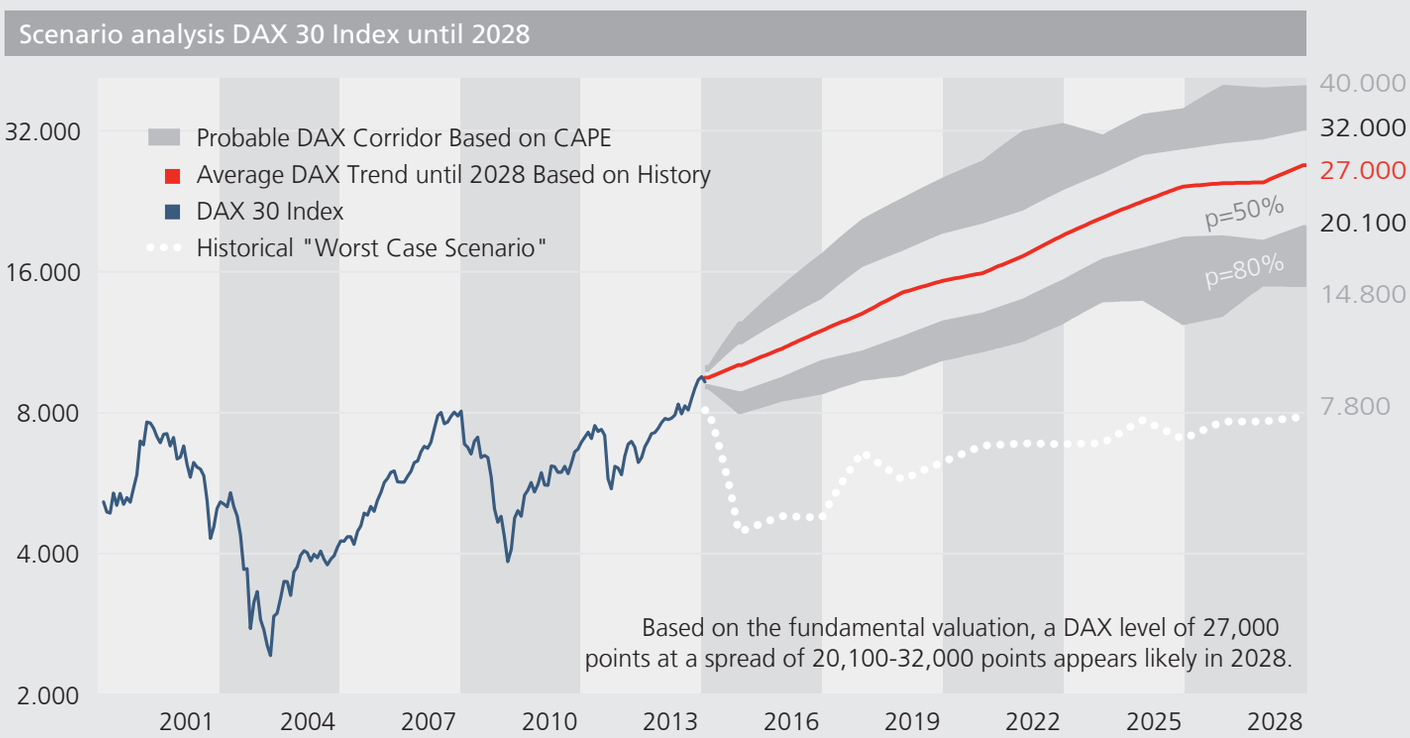

Figure 3: The German equity market is valued at a CAPE of 17.3 as per 31.01.2014. The average sequential returns have been modeled over 1 to 15 years which followed comparable CAPE valuations (CAPE interval 16-20) worldwide. Inflation of 1% and dividend reinvestment were assumed. The „worst case scenario" corresponds to the lowest sequential return following the respective comparable valuation.

ond the inflation rate over a long term horizon. A number of European equity markets in particular, but also selected emerging markets, currently display significant undervaluations and offer strategic investors interesting opportunities for exposure. Right now no other asset class offers such potential.

Footnotes and source references

1 Shiller, Robert J., Irrational Exuberance, Princeton 2000 and stock market data used in „Irrational Exuberance", http://www.econ.yale.edu/~shiller/data/ie_data.xls.

2 Malkiel, Burton G., Börsenerfolg ist (k)ein Zufall, Finanzbuch Verlag 2000.

3 The examination works on the assumption that equity markets offer inflation protection in the long term due to their real asset character. The inflation rate of 1% p.a. was consciously estimated conservatively so that the examination results only display a slight dependence on this assumption.

4 A number of authors claim that the 10 year trailing earnings underestimate the actual profitability due to two financial crises in which extreme profit reductions were recorded. Even if this possibility does exist, it should still be noted that even the current P/E of above 19 clearly exceeds the historical averages (85% quantile) and that the average 10 year profits - in spite of recessions - are still quoting above the long-term profit growth (see also Asness, Clifford, An Old Friend: The Stock Markets Shiller P/E, AQR, 2012). Although authors such as Siegel (Siegel, Jeremy J., The Shiller CAPE Ratio: A New Look, 2013) do not call the CAPE concept into question, they still query whether the current CAPE underestimates the market potential due to changes in accounting standards (esp. the method of reporting goodwill in the balance sheet) and consistently higher margins as a consequence of higher international earnings. Siegel recommends using, for example, NIPA earnings adjusted for goodwill instead of „Standard and Poor's" earnings which lead to more attractive CAPE valuations. Even if the US CAPE has significantly exceeded historical empirical values in past decades, so that a system interruption cannot be ruled out, it should be noted that by using NIPA earnings the entire US economy is modeled and not the differently composed S&P 500, and also that the NIPA time series do not have a comparable long history in order to empirically verify the theory, and that the CAPE concept of cyclical profit adjustment only derives its added value as a result of balancing exceptional earnings years. Added to this, the forecasts for the last 15 year period (1998-2013) do not display any significant deviations relative to the historical empirical values - on the contrary, the low 15 year returns following the bursting of the new economy bubble were more accurately forecast than countless preceding crises.

5 The modeled „worst case scenario" corresponds in each case to the lowest return following a comparable valuation. Although this scenario, which is based on negative outliers, is unlikely to occur, this consideration offers a good indication of the impact that extreme events such as world wars, depressions or financial crises have had in the past. In a worst case scenario of this kind, a DAX level of 4,500 points over a three year horizon would also be feasible on the basis of the history. However, a DAX level of 28,400 points would be equally likely (not modeled in the chart due to its outlier character). However, it should be noted here that the current CAPE of 17.3 is quoting at the lower edge of the CAPE interval of 16-20 and that the scenario analysis is therefore generally conservative.

6 The S&P 500 Index, conceived as a price index, does not consider any dividend payments. Since, however, dividend payments are an elementary component of the return expectation, and in order to establish comparability between the DAX and the S&P500 analysis, all data refer to the S&P 500 Performance Index (source: Thomson Reuters), indexed to the S&P 500 Price Index as per 31.01.2013.

7 In the worst case, the prices of the S&P 500 fell to 603 at similar valuations, which would correspond to a price loss of -66% (see also footnote 5).

Scenario Analysis S&P 500 Index until 2028

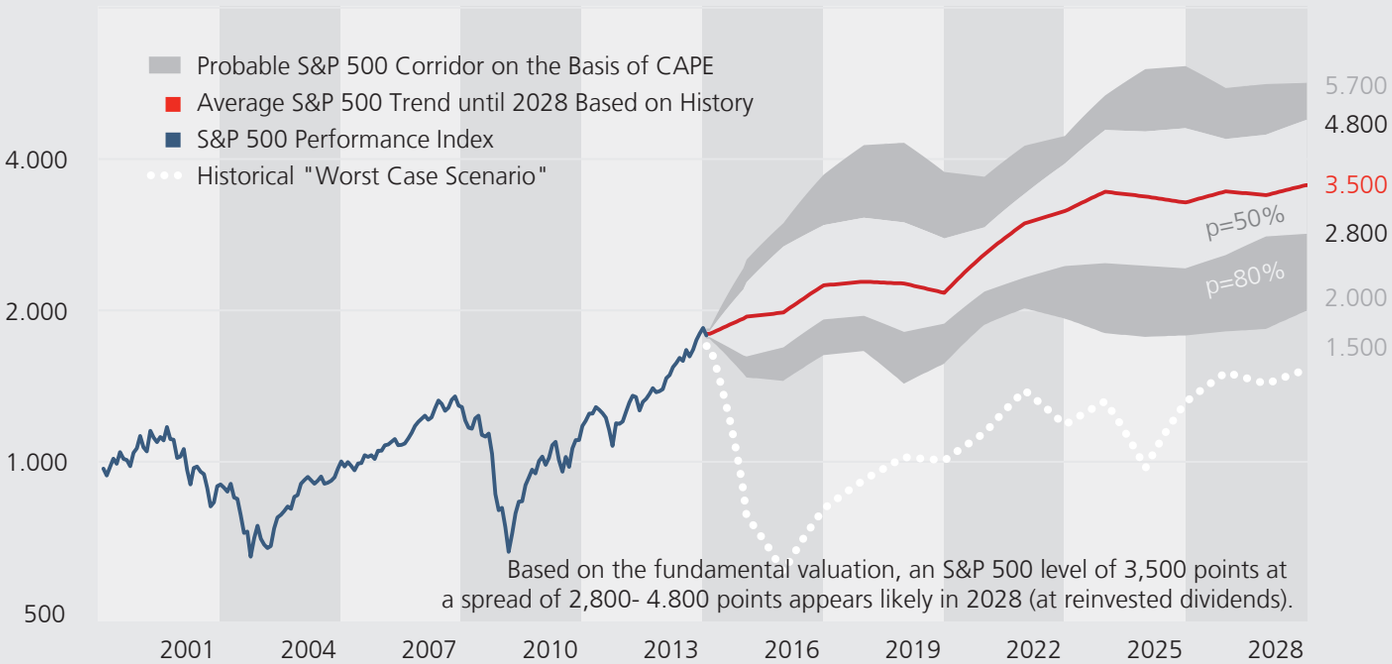

Figure 4: The American equity market is currently valued at a CAPE of 24.6. The average sequential returns have been modeled over 1 to 15 years which followed comparable CAPE valuations worldwide (interval 22 to 26). Inflation of 1% and dividend reinvestment were assumed. The „worst case scenario" corresponds in each case to the lowest sequential return following in each case a comparable valuation.

Das Ganze sehen, die Chancen nutzen.

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