Equity Markets Valuation Using CAPE

Rémy ESTRAN, *CAIA*
MPG Partners

Olivier JÉSÉQUEL, *CAIA*
bfinance

Introducing the CAPE ratio

When it comes to global equity portfolio allocations, relative stock market valuations are one of the most critical factors that influence investors' decision-making. "Are stocks undervalued or overvalued?" is an old and ongoing debate among financial market participants. This question is of the utmost importance given its considerable investment implications.

One way to address the issue of determining whether the stock market is relatively cheap or expensive, is to use the Cyclically Adjusted Price-Earnings ratio (CAPE), a measure developed in 1998 by the Nobel Prize-winning economist Robert Shiller of Yale University and his former colleague Prof. John Campbell (now at Harvard) .

This measure is the real (i.e. inflation adjusted) index price level divided by a 10-year average of real earnings. By using a 10-year average, the CAPE reduces the cyclical element of earnings' fluctuations, and thus is particularly appropriate for comparing valuations over long horizons - whereas the traditional price earnings ratio is more business-cycle sensitive and volatile. The CAPE ratio is often presented as one of the best forecasting models for long-term equity returns, and multiple papers have been published on this subject .

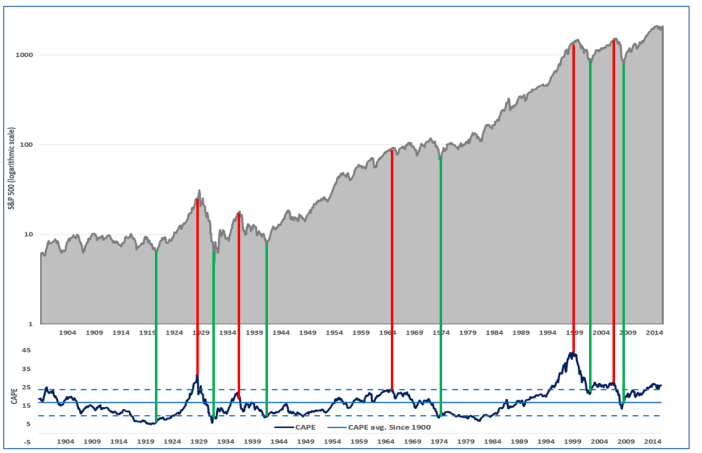
In this paper, we first discuss the pros and cons of using this indicator as a market timing tool, we analyze what current valuations say about expected stock returns, and then we provide CAPE measures for the US and European equity markets, two markets of interest to institutional investors.

CAPE as a market timing tool?

The advantages

Historically, low CAPE values, i.e. below 10, have been followed by higher stock market returns, and conversely, high valuations, i.e. CAPE values above 25, have generally led

Exhibit 1: S&P 500 and CAPE values since 1900



Source: Shiller's website, Author's calculations

to lower expected returns, and increase risks of major stock market sell-offs. For example, the CAPE correctly warned in the years before 1929, 2000, and 2007 that the US stock market was relatively expensive – with CAPE values higher than 25, far above its 20th-century average of 15.2 – and the market subsequently crashed. Hence, as a mean reverting indicator of market valuation, the CAPE can be useful in a world where investors sometimes forget that trees do not grow to the sky.

The two following graphs in Exhibit 1 represent the S&P 500 index and the CAPE values since 1900. The green and red lines linking these two graphs correspond to 11 major market inflection points. As a rule of thumb, they are associated with either low CAPE values followed by bull markets (green lines), or high CAPE values followed by upcoming bear markets (red lines).

However, one can note that the CAPE ratio has remained relatively high over the last two decades. It is equal to 26.2 as of July 2016 and so far, its 21st century average stands at 25.3, a 66% greater level than its 20th century average of 15.2. In this context, after the bursting of the internet bubble in 2000 (following an all-time high CAPE value of 44.2 in Dec. 1999), the market bounced back in Feb. 2003 despite a still relatively elevated CAPE of 21.2.

The S&P 500 levels and CAPE values associated with the 11 market inflection points depicted above are presented in Exhibit 2 below.

As we can see in Exhibit 2, there is a strong correlation between the CAPE ratio and market inflection points. Most bullish markets were preceded by low CAPE values, while bearish markets followed high CAPE measures.

Along the same lines, Exhibit 3 shows the cumulative price return over the following 10 years as a function of the current CAPE ratio. Here again, the negative slope coefficient confirms that high

Exhibit 2: S&P 500 and CAPE values at inflection points

	Aug 1921	Sep 1929	Jun 1932	Feb 1937	Apr 1942	Jan 1966	Dec 1974	Aug 2000	Feb 2003	Oct 2007	Mar 2009
CAPE	5.2	32.6	5.6	22.2	8.5	24	8.3	42.9	21.2	27.3	13.3
S&P 500	6.45	31.30	4.77	18.11	7.84	93.32	67.07	1485.46	837.03	1539.66	757.13
Upcoming Market	Bullish	Bearish	Bullish	Bearish	Bullish	Bearish	Bullish	Bearish	Bullish	Bearish	Bullish

CAPE values should sound as an alarm bell for investors, whereas low CAPE values might look like compelling entry points and longer-term opportunities.

Furthermore, the coefficient of determination (R^2) indicates that market valuation alone explains 15% of the cumulative price returns over the next 10 years.

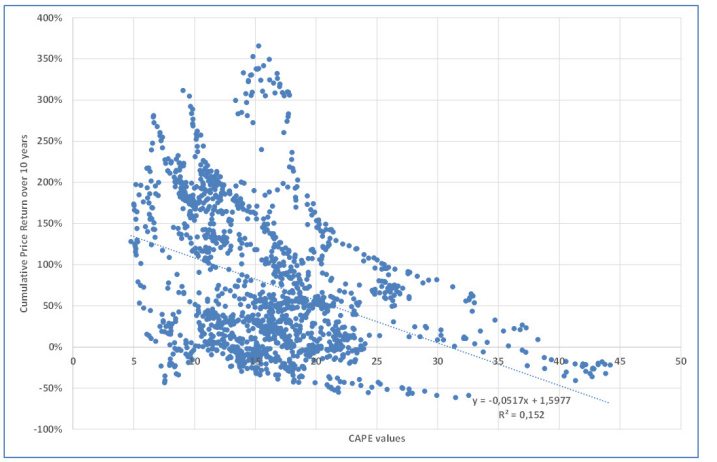
For all the above reasons, the CAPE seems to be an effective market valuation metric. Nonetheless, it is one thing to value the market, but another to correctly time it.

The drawbacks

Indeed, when it comes to market timing, the CAPE effectiveness is largely questionable. With a 10-year average S&P 500 earnings per share of $80.6 as of July 2016, and historical minimum and maximum CAPE values respectively equal to 4.8 (in Dec.1920) and 44.2 (in Dec.1999), simulating the potential corresponding S&P index values at constant earnings would lead to an index level as low as 385.7 or as high as 3563.2. Such a large range makes it difficult, if not impossible, to time the market using the CAPE alone.

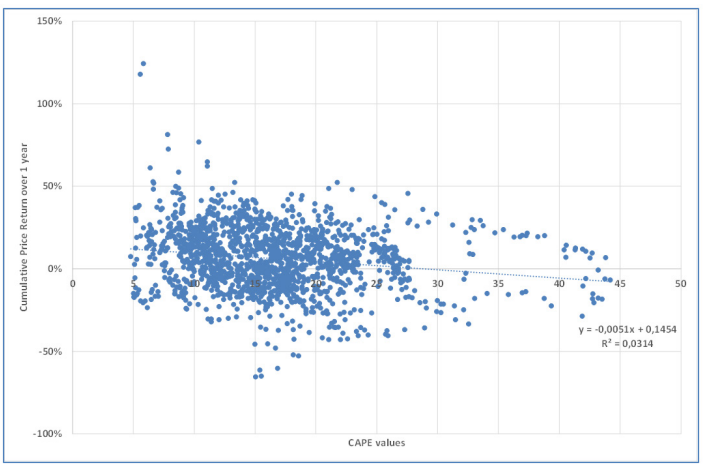
Besides, in the short-term, there is no clear relationship between current CAPE and cumulative price returns over 1 year (see Exhibit 4 below). As Shiller acknowledged himself, the "CAPE was never intended to indicate exactly when to buy and to sell".

Exhibit 3: Cumulative price returns over 10 years as a function of the CAPE



Source: Shiller's website, Author's calculations

Exhibit 4: Cumulative price returns over 1 year as a function of the CAPE



Source: Shiller's website, Author's calculations

Sometimes, it can take a while before the market reverts to the CAPE's historical mean, e.g. since the beginning of the 21st century, the CAPE has spent only nine months (out of 199) below its all-time historical average of 16.7. In such cases, the CAPE has been a poor timing indicator, and blindly translating the ratio into buy or sell orders would have been disastrous for investors.

Moreover, as Siegel (2016) pointed out, another flaw in the CAPE is related to the changes in earnings computation since the early 1990s. The introduction of the mark-to-market accounting by the Financial Accounting Standards Board impacted the way US GAAP (Generally Accepted Accounting Principles) earnings are calculated. These new standards have led to a downward bias in earnings during market downturns, when asset prices are depressed, and heavy losses are potentially concentrated in few financial stocks. This results mechanically in an increased CAPE, and subsequently in lower forecasted equity returns.

Last but not least, it may be at the same time both a strength and a weakness, but the CAPE does not take into account the current market environment. While ultra-dovish central banks policies and low to negative interest rates are clearly underpinning current equity valuations, the CAPE remains insensible to the prevailing "lower for longer" market paradigm, and TINA "There Is No Alternative" effect pushing US stock market to all-time highs.

Having gone through the main advantages and disadvantages of the CAPE, we are now going to take a closer look at current equity market valuations in US and in Europe.

Equity markets valuation using CAPE

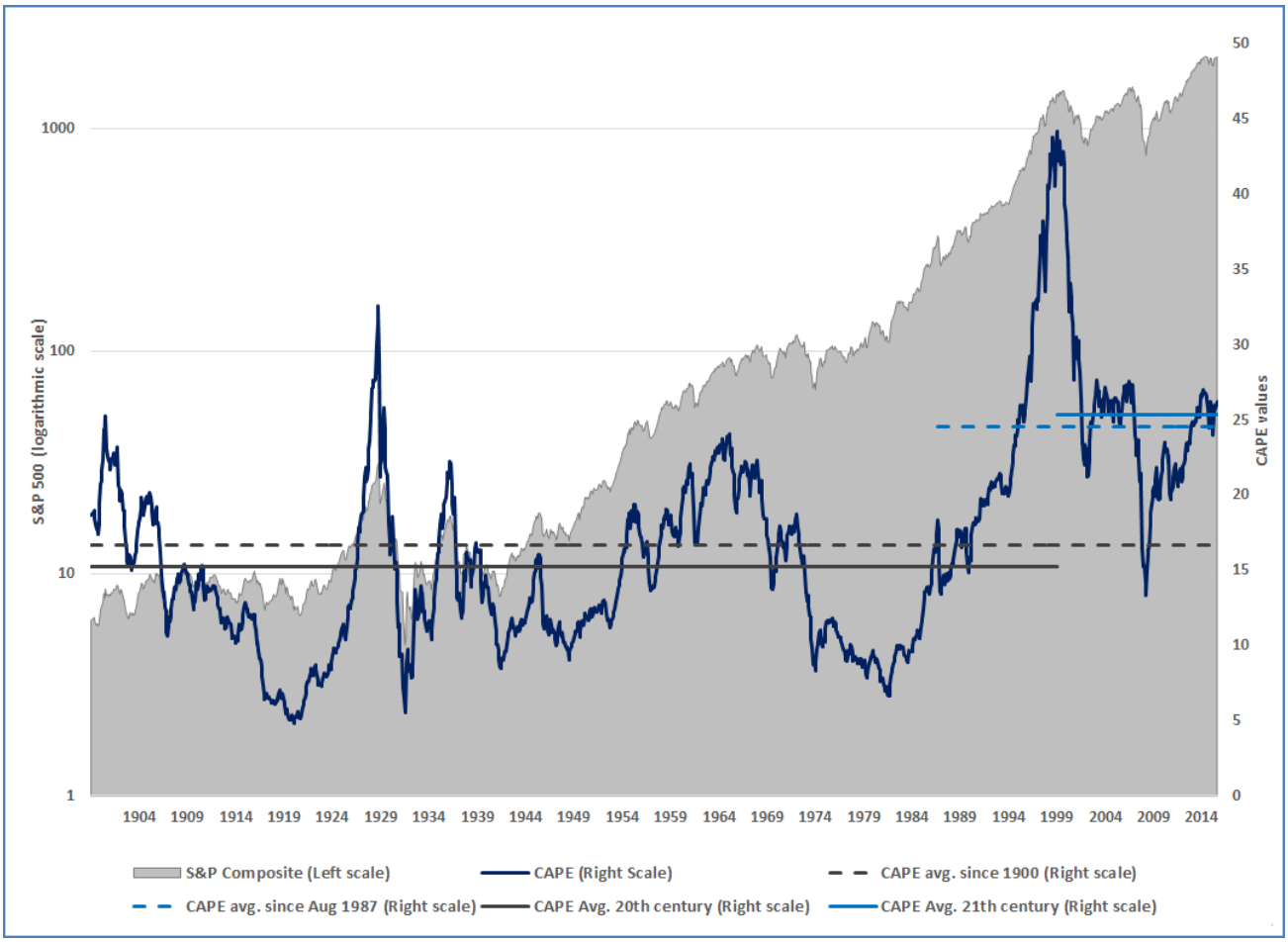
The case for the US equity market

The following chart in Exhibit 5 presents the S&P 500 index (left scale), and the CAPE ratio along with some of its historical averages (right scale).

Moreover, to further put market valuation into perspective, Exhibit 6 provides a comparison of the current CAPE value of 26.2 (as of July 2016) with those multiple historical averages and its all-time average.

Depending on the selected period for the long-term average, investors might consider that the US equity market is either largely overvalued (by 57% or 72%), or just a bit higher than its historical standards (by 7% or 3%). Then, choosing which horizon is the most relevant is a very important but subjective question. As Siegel mentions: "When we say overvalued vs. history, we have to ask, is this period like history?" In our view, using a long-run average including the Great Depression, both 1st and 2nd world wars and the subsequent Cold War is inappropriate because market conditions are totally different now. Thus, we

Exhibit 5: S&P 500 and CAPE values since 1900



Source: Shiller's website, Author's calculations

Exhibit 6: CAPE historical averages vs current market valuation

	Avg. 20th century	Avg. Since 1900	Avg. All-time	Avg. Since Aug 1987	Avg. 21st century
Values	15.2	16.7	16.7	24.5	25.3
Current relative valuation	$\frac{(26.2-15.2)}{15.2} = +72\%$	+57%	+57%	+7%	+3%

propose August 1987 as a starting date for historical comparison since it corresponds to the nomination of Alan Greenspan as the president of the FED. In our view, this arguably marks the beginning of a new era for investors with the so-called "Greenspan put" resulting in higher equity valuations. On this basis, the US equity market appears to be slightly overvalued (by 7%) relative to its average since that date, but hardly in bubble territory.

The case for the European equity markets

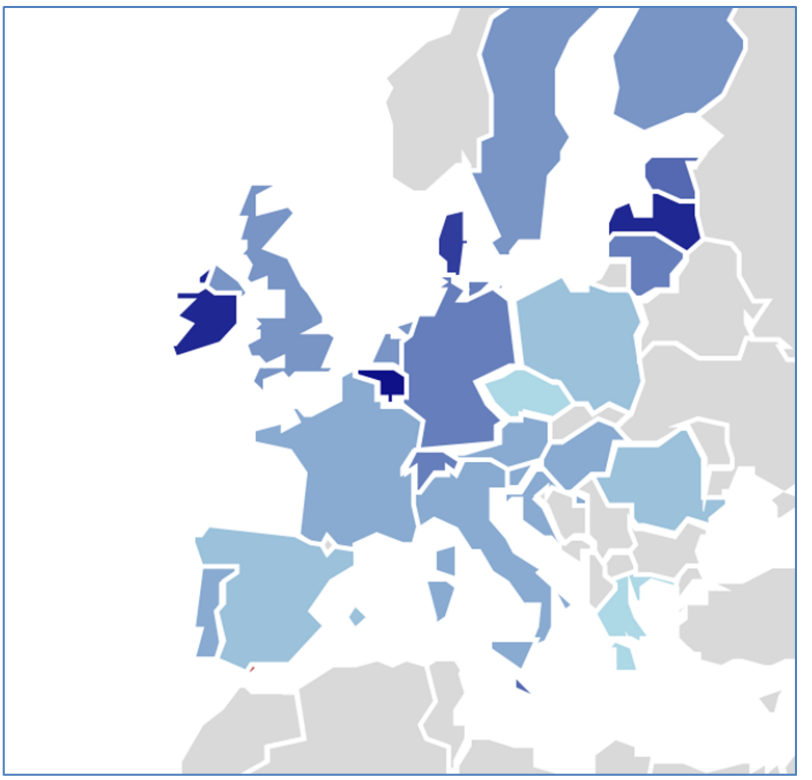
Using Shiller's methodology, we have also worked out the CAPE ratio for 26 European stock markets and presented the results in Exhibit 7 below.

There are very large discrepancies in CAPE values across Europe. At first sight, with a ratio of two, Greece looks extremely cheap while the Irish, Latvian and Belgian markets are deemed expensive with CAPE values respectively equal to 38.5, 38.5 and 45.8. This does not automatically imply these markets are heading for a fall, but it does suggest there is better value and upside potential in other European equity markets.

However, before reaching any definitive conclusions on the attractiveness of one country relative to another, when comparing stock markets with different index compositions, one might keep in mind that the CAPE can be sector-dependent. For example, Price/Earnings valuations tend to be relatively low for the banking sector, while they are generally higher for the technology sector. So, part of the differences in the CAPE of European markets can be attributed to the relative sector weightings of the different stock market indices. However, while this can explain our results, it does not affect them : Valuations in the Old Continent are largely

Exhibit 7: European equity markets valuation

Country	Bloomberg Index	CAPE as of July 2016
Belgium	BEL20 Index	45.8
Latvia	RIGSE Index	38.5
Ireland	ISEQ Index	38.5
Denmark	KFX Index	35.9
Malta	MALTEX Index	27.3
Estonia	TALSE Index	26.3
Switzerland	SMI Index	23.9
Lithuania	VILSE Index	22.5
Germany	DAX Index	20.4
Finland	HEX Index	19.1
Netherlands	AEX Index	17.2
United Kingdom	UKX Index	16.4
Sweden	OMX Index	16.3
France	CAC Index	15.6
Luxembourg	LUXXX Index	15.5
Hungary	BUX Index	15.4
Croatia	CRO Index	14.5
Portugal	PSI20 Index	13.7
Austria	ATX Index	13.3
Italy	FTSEMIB Index	13.3
Slovenia	SBITOP Index	13.1
Romania	BET Index	10.6
Spain	IBEX Index	9.4
Poland	WIG20 Index	7.9
Czech Republic	PX Index	3.5
Greece	ASE Index	2.0



Source: Shiller's website, Author's calculations

Legend: The light blue colour is associated with relatively "cheap" markets on a CAPE basis while dark blue is associated with relatively 'expensive" markets.

dispersed but with CAPE values equal to 13,3 for Italy, 15,6 for France, 16,4 for UK and 20,4 for Germany, the main European markets are largely below the US CAPE level of 26,2.

Conclusion

Although the CAPE was never intended to be an indicator of impending market crashes, high CAPE values have been associated with such events and conversely, low CAPE values have gone hand in hand with high cumulative long-term price returns. Hence the importance of following this indicator regularly.

Obviously, stock markets are a complicated system, with many moving parts, and neither the CAPE, nor any other single "magical" indicator can come up with what "should be" their valuations, particularly in today's unique market paradigm.

However, given the strong correlation with the CAPE and long-term equity returns, this measure can be a valuable input for any institutional investor willing to identify which equity markets are likely to offer the best potential. From the initial portfolio construction to the periodical allocation review, this CAPE assessment can be made regularly over the life of the equity investment program.

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Authors' Bio

Rémy Estran, *FRM, CAIA*
Manager
MPG Partners

Before joining MPG Partners in 2017, Rémy was successively a Risk Research Analyst and a Project Manager at Crédit Foncier, BPCE Group, Head of Analytics at Spread Research Credit Rating Agency, and an Investment Consultant at bfinance. In addition to his professional activities, Rémy is a CAIA Chapter Executive in Paris, and a Lecturer in Finance at Paris Dauphine University, and at ESCP Europe, the world's oldest business school. He holds a master's degree in Financial Research jointly delivered by ESCP Europe, Paris X Nanterre University, and MINES ParisTech.

Olivier Jéséquel, *CAIA*
Director
bfinance

Olivier is in charge of business development with European and North-African French-speaking Institutional Investors. Prior to joining bfinance in 2006, Olivier was Institutional Key Accounts Manager with the French asset manager OFI Asset Management, where he started in 1999. Before, he held Product Specialist and Marketing roles within the asset management division of Banque Worms. He graduated with a Master in Management from Toulouse Business School in 1992 and holds the Chartered Alternative Investment Analyst (CAIA) designation.