

FINANCIAL PHYSICS

“Financial Physics represents the interconnected relationships among key elements in the economy and the financial markets that determine the stock market’s overall direction.”



PREFACE

This presentation introduces Crestmont's core "*Financial Physics*" model. The model represents a framework to understand the relationship between the economy ('the source of wealth') and the equity markets ('the measure of equity wealth').

This presentation, although abbreviated and presented in slides, is intended to be self-explanatory. A more descriptive presentation and discussion of the material is included in chapters 7 and 8 of *Unexpected Returns: Understanding Secular Stock Market Cycles* and chapters 3—7 of *Probable Outcomes: Secular Stock Market Insights*, both books by Ed Easterling. For more information about the implications of *Financial Physics* for the next decade, please contact Info@CrestmontResearch.com.

In summary, the key factors include real GDP, inflation, nominal GDP, earnings per share (EPS), and P/E ratio. Since real GDP has been relatively constant over extended periods and all other factors are driven by inflation, a primary driver of the stock market is the inflation rate—as it trends toward or away from price stability. Given the recent state of volatile inflation and the possibility of it either rising (inflation) or declining (deflation), the market P/E ratio may be vulnerable to decline. As the P/E ratio declines and EPS grows, the result could be another relatively non-directional secular market period.



INTRODUCTION

- ❑ Conventional wisdom and long-term studies often focus on long-term averages and don't consider certain fundamental factors driving intermediate stock market cycles
- ❑ For example, the S&P 500 Index started 1982 at 123; the 20-Year Treasury bond yielded 14.6%
- ❑ By 1999, the S&P 500 Index reached 1,469; the 20-Year Treasury bond yielded 6.7%
- ❑ That two-decade secular bull market was driven by financial fundamentals and, ultimately, accentuated by a stock market bubble



INTRODUCTION (cont.)

- ❑ The preceding 16 years (1966-1981) were also driven by fundamental factors
- ❑ Stocks were virtually flat; bond yields soared and total returns were disappointing
- ❑ Rising inflation in the late 1960s and '70s drove the market P/E ratio lower
- ❑ The result was a secular bear market starting in stocks
- ❑ Starting in 1982, the inflation cycle reversed thereby starting a secular bull market



INTRODUCTION (cont.)

- ❑ **Real GDP rose equally during both secular periods, averaging near 3% annually**
- ❑ **Earnings per share rose by over 300% during the secular bear market (1966-1981), similar to the gains in the secular bull market (1982-1999)**
- ❑ **Regardless, the stock market was virtually flat during the secular bear, yet the market soared dramatically during the secular bull**
- ❑ **Stock market returns were affected by the P/E cycle, which is driven by trends in the inflation rate**



INTRODUCTION (cont.)

- Fine factors—real GDP, nominal GDP, inflation, EPS, and P/E—share an interrelated relationship that Crestmont Research calls “*Financial Physics*”
- This presentation will explore the consistency, predictability, and dependence among the factors
- The *Financial Physics* model provides a framework to understand the likely returns from the stock market over the next 5, 10, or 20 years

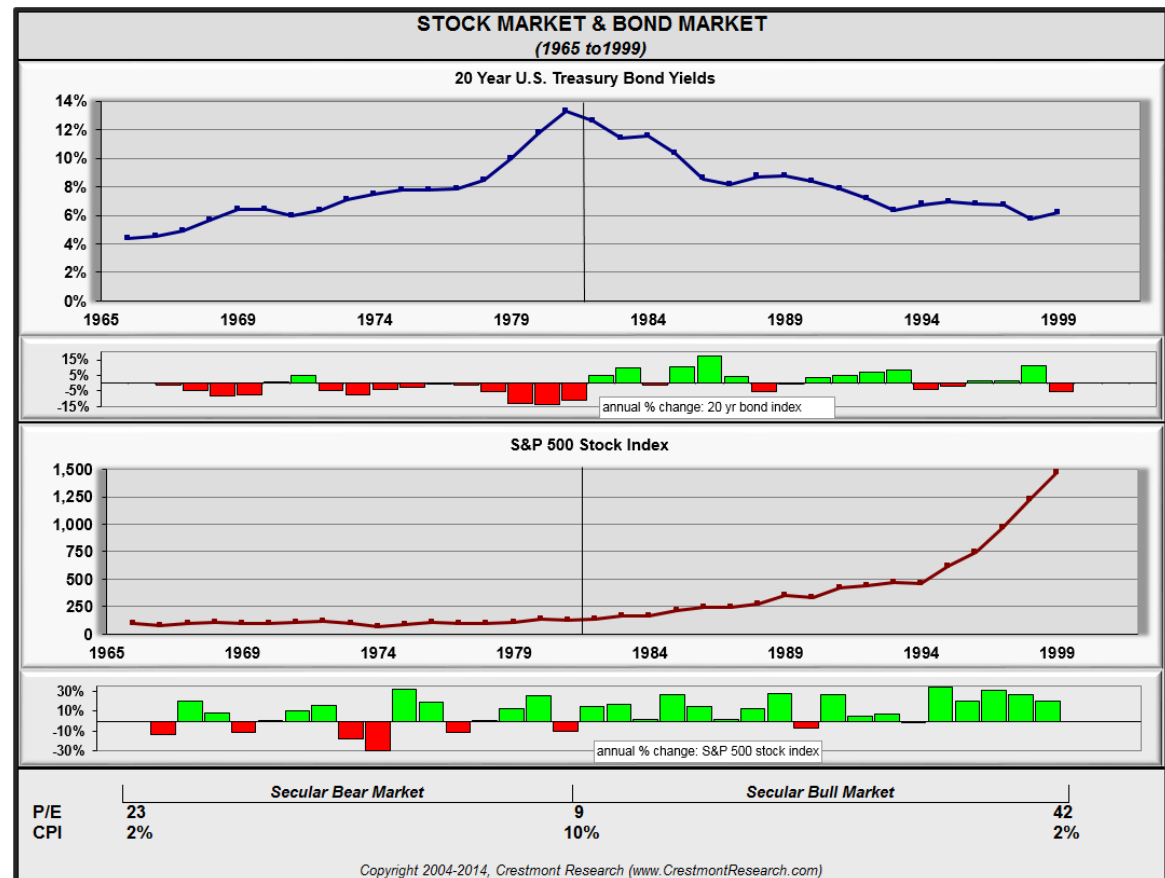


INTRODUCTION (cont.)

- To determine the level of the stock market in the future, estimates for two variables are needed:
 - (1) *price/earnings ratio ("P/E")***, the price of the market index divided by earnings per share, and
 - (2) *earnings per share ("EPS")***
- The future level of the S&P 500 Index can be forecast by multiplying the estimated future P/E ratio for the S&P 500 Index and the estimated future EPS for the S&P 500
- An estimate of the future Index helps to assess the overall investment environment for stocks over 5, 10, or 20 Years



- Stocks and bonds are financial assets that often are not correlated month-to-month, but do perform similarly over longer periods
- During the 1960s & 1970s, both financial asset classes had poor returns; yet during the 1980s & 1990s, both had solid, above-average returns





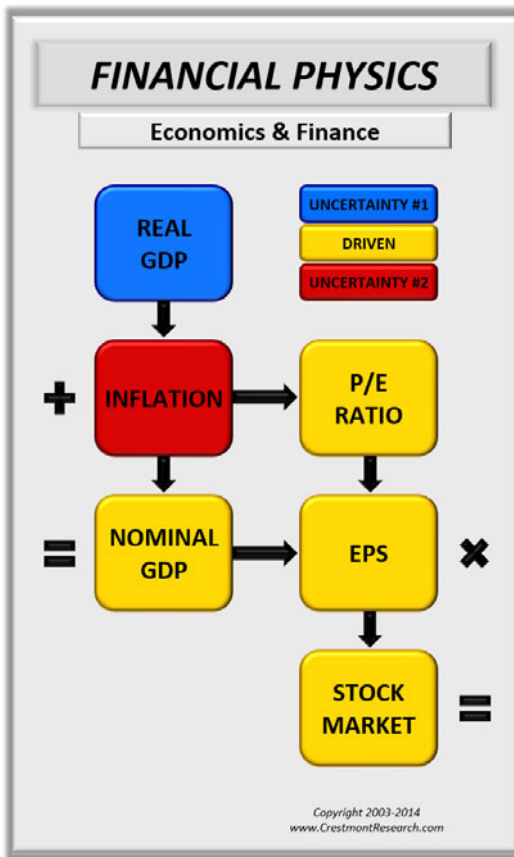
FINANCIAL PHYSICS

Regarding the model diagram on slide 10:

- A factor is considered 'Given' when it tends to be consistent over long periods and is fundamentally based on underlying factors
- Before the 2000s, GDP-R was considered to be Given, but it is now an "Uncertainty" due to significantly lower growth over the past few decades
- A factor is considered "Driven" when it is directly affected by any of the other factors
- A factor is considered an "Uncertainty" when it is generally unpredictable and its future is uncertain



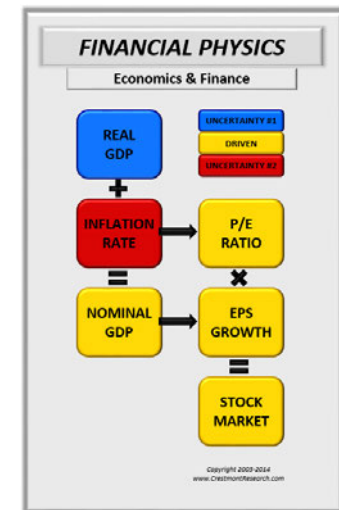
FINANCIAL PHYSICS





real GDP

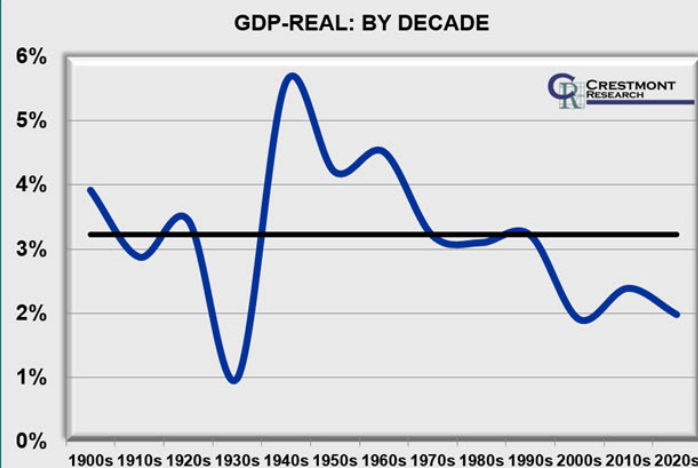
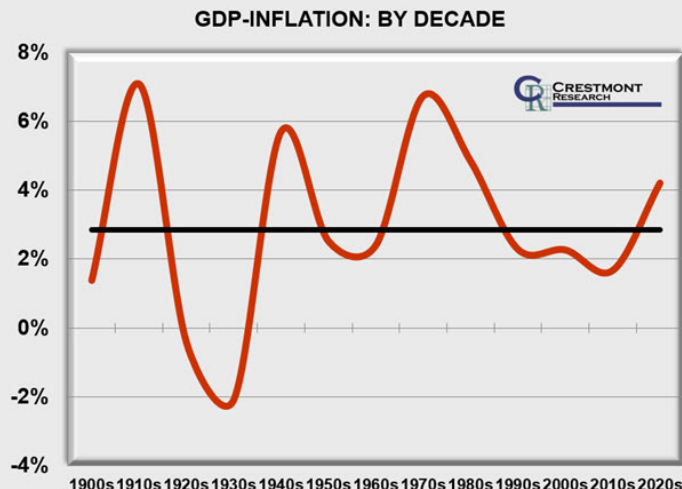
- ❑ Real gross domestic product ("GDP") represents the absolute level of the economy before inflation
- ❑ Real GDP growth has been relatively consistent over the past century
- ❑ Annual real GDP averaged 3.3%
- ❑ Most Decades between 3.0%-4.5%
- ❑ The '70s, '80s, & '90s: 3.2%, 3.1%, 3.2%
- ❑ The '00s, '10s, & '20s reflect a downshift in growth rate (1.9%, 2.4%, 2.0%), which has significant implications





REAL ECONOMIC GROWTH: TREND OR REVERSION?; INFLATION HAS BEEN VARIABLE POPULATION GROWTH DECLINING... STANDARD OF LIVING GAINS (GDP PER CAPITA) REVERTING?

BY DECADE	GDP NOMINAL	GDP REAL	GDP INFLATION	POPUL- ATION	GDP PER CAPITA
1900s	5.3%	3.9%	1.4%	1.9%	1.9%
1910s	10.0%	2.9%	7.1%	1.5%	1.4%
1920s	3.0%	3.4%	-0.4%	1.5%	1.9%
1930s	-1.1%	1.0%	-2.1%	0.7%	0.2%
1940s	11.3%	5.6%	5.7%	1.3%	4.2%
1950s	6.7%	4.2%	2.5%	1.8%	2.4%
1960s	6.9%	4.5%	2.4%	1.3%	3.2%
1970s	9.9%	3.2%	6.7%	1.1%	2.1%
1980s	7.9%	3.1%	4.8%	0.9%	2.1%
1990s	5.5%	3.2%	2.3%	1.2%	2.0%
2000s	4.2%	1.9%	2.3%	1.0%	0.9%
2010s	4.0%	2.4%	1.7%	0.7%	1.7%
2020s	6.2%	2.0%	4.2%	0.5%	1.5%
1900-2023	6.1%	3.2%	2.9%	1.2%	2.0%
1900-1949	5.6%	3.3%	2.2%	1.4%	1.9%
1950-1999	7.4%	3.6%	3.7%	1.3%	2.4%
2000-2023	4.4%	2.1%	2.3%	0.8%	1.3%



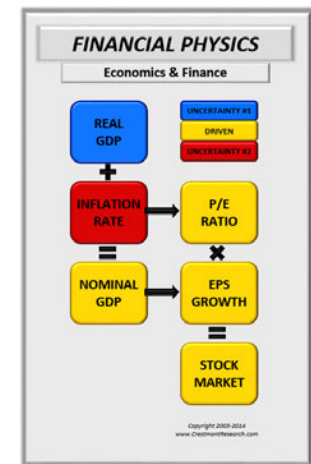
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Note: real GDP for the decade of the 2000s was below 2%; the downshift from the historical average is generally unexplained. The decades of the 2010s and 2020s have not returned the trend to average. The downshift in economic growth may have significant implications for the economy and the stock market in the future.



sales & earNiNGs

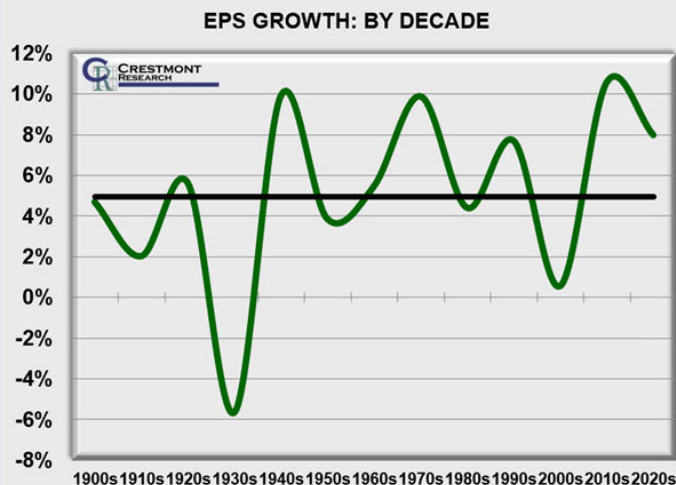
- Nominal GDP is real GDP plus inflation (“real” means “without inflation”; essentially, nominal GDP is similar to the reported revenues of all companies)
- Nominal GDP growth has averaged 6.1%
- Earnings as represented by earnings per share (“EPS”) has grown by 4.9%
- Strong relationship:
Correlation “r” = 0.95
- The relationship is fundamentally based;
earnings emanate from revenues



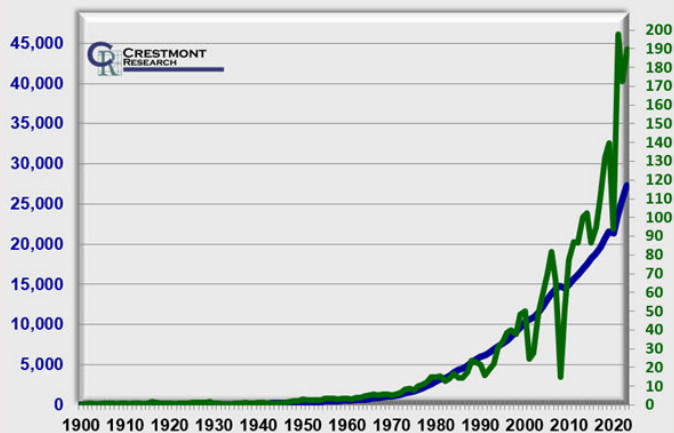


EARNINGS PER SHARE (S&P 500) HAS A STRONG RELATIONSHIP TO ECONOMIC GROWTH

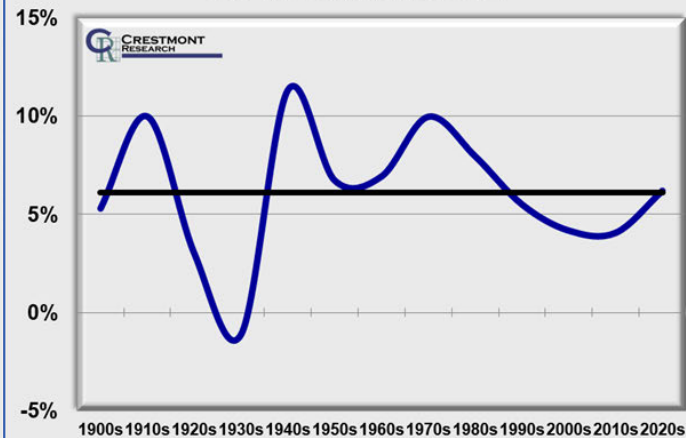
BY DECADE	GDP NOMINAL	EPS GROWTH
1900s	5.3%	4.7%
1910s	10.0%	2.0%
1920s	3.0%	5.6%
1930s	-1.1%	-5.7%
1940s	11.3%	9.9%
1950s	6.7%	3.9%
1960s	6.9%	5.5%
1970s	9.9%	9.9%
1980s	7.9%	4.4%
1990s	5.5%	7.7%
2000s	4.2%	0.6%
2010s	4.0%	10.6%
2020s	6.2%	8.0%
1900-2023	6.1%	4.9%
1900-1949	5.6%	3.2%
1950-1999	7.4%	6.3%
2000-2023	4.4%	5.9%



GDP-N (left--blue) vs. EPS (right--green)



GDP-NOMINAL: BY DECADE



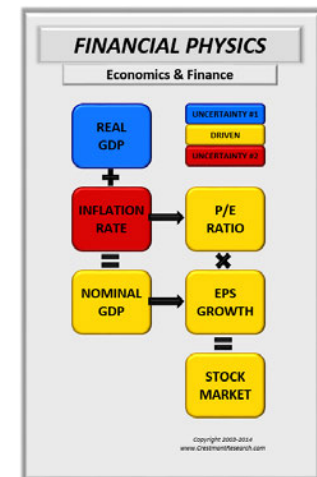
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Note: EPS and profit margins continue at business cycle highs and distorted the EPS growth rate for the decade of the 2010s and 2020s. at this point, the recession of 2020 reverted earnings back to the trendline, but recent years and current forecasts reflect a return to previously elevated levels.



PREDICTING EPS

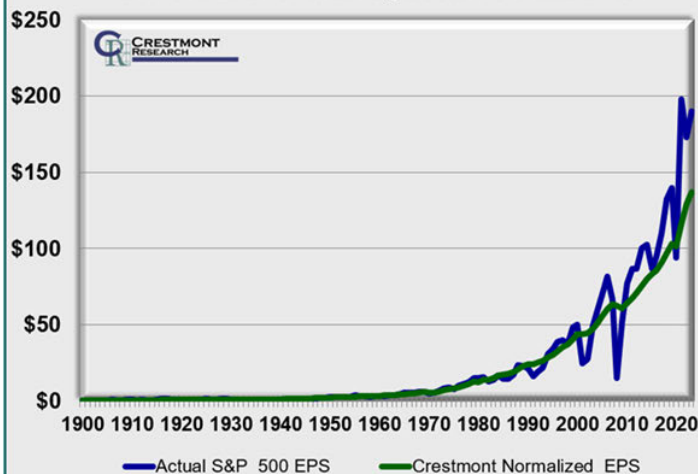
- Since the relationship between GDP and EPS is highly-correlated and fundamentally based, estimates of future GDP can be used to determine expected future EPS
- For now, future growth near the historical average of 3% (a midrange value) is assumed to estimate future EPS (*although recent decades make 3% uncertain for the future*)
- A regression methodology is used to predict EPS based on extrapolated GDP
- Historical real GDP growth scenarios and estimated inflation are used to predict average future nominal GDP
- Estimated future nominal GDP predicts a baseline level around which EPS can be expected to cycle above and below





EARNINGS PER SHARE (S&P 500) IS HIGHLY PREDICTABLE OVER TIME *[however, the recent surge in profit margins may represent a shift-change to perpetually higher EPS]*

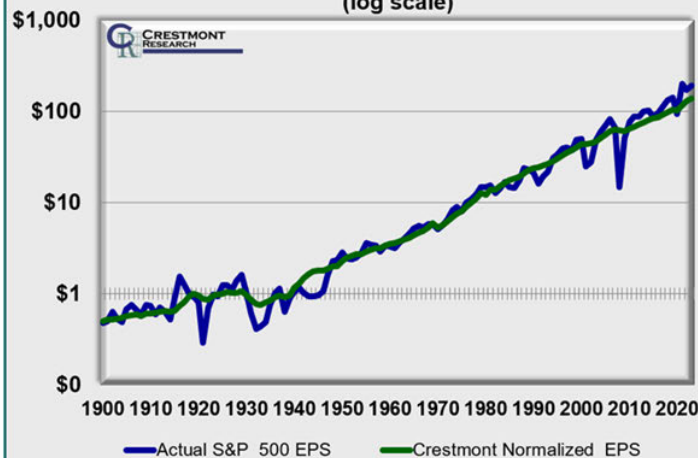
S&P 500 EPS: Growth Regressed To Nominal GDP



S&P 500 EPS: Predicted By Regression



S&P 500 EPS: Growth Regressed To Nominal GDP
(log scale)



	2024	2025	2026	2027	2028
S&P 500 EPS	\$ 144	\$ 152	\$ 160	\$ 168	\$ 177

Note: EPS prediction based upon historical GDP and EPS data

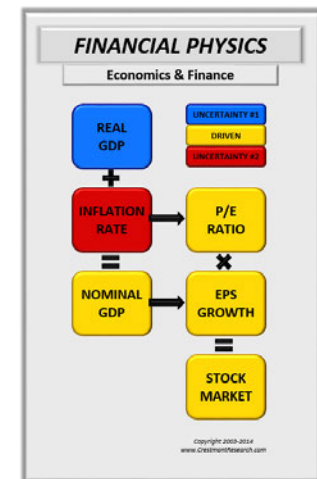
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Note: the EPS prediction is the baseline level using the historical relationship to GDP; actual EPS can be expected to cycle above and below the baseline level depending upon accounting policies, recessions, recoveries, etc.



RECAP

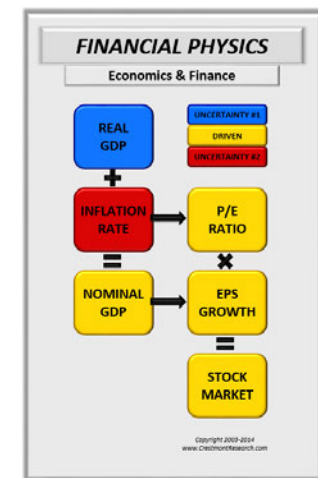
- Economic growth (GDP-real), excluding inflation, has been relatively consistent over long periods of time
- EPS is relatively consistent with economic growth including inflation (GDP-Nominal)
- Predicting economic growth (GDP-Nominal) provides a basis to predict EPS





P/E RATIO

- Contrary to conventional wisdom, the market P/E ratio is not driven by interest rates, it is driven by the inflation rate
- The next slide reflects the inconsistent relationship between interest rates and P/E ratios over the past century
- In addition, the slide reflects the inconsistency between inflation and interest rates over the past century





*P/E RATIO & INTEREST RATES HAVE A MIXED RELATIONSHIP BEFORE THE 1960s
... AS DO INTEREST RATES & INFLATION*

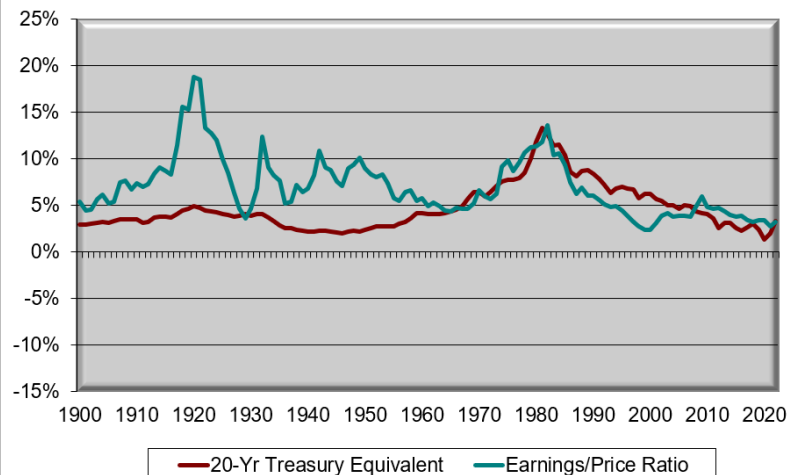
BY DECADE	E/P RATIO	20-YEAR BONDS	SPREAD
1900s	5.8%	3.2%	2.6%
1910s	9.8%	3.8%	6.0%
1920s	10.8%	4.2%	6.6%
1930s	7.3%	3.1%	4.2%
1940s	8.7%	2.2%	6.5%
1950s	7.1%	3.0%	4.1%
1960s	4.9%	4.6%	0.2%
1970s	8.3%	7.5%	0.8%
1980s	9.4%	10.5%	-1.1%
1990s	4.3%	6.9%	-2.6%
2000s	3.9%	5.0%	-1.1%
2010s	4.0%	2.9%	1.1%
2020s	3.1%	2.2%	0.9%
AVERAGE	6.0%	5.8%	0.2%

NOTE: Average represents the simple annual average of the decades from 1950-2019.

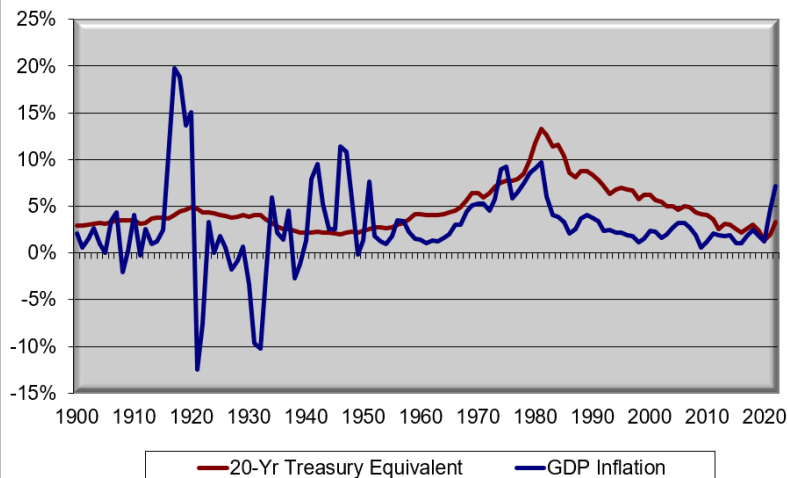
BY DECADE	20-YEAR BONDS	GDP INFLATION	SPREAD
1900s	3.2%	1.4%	1.8%
1910s	3.8%	7.1%	-3.3%
1920s	4.2%	-0.4%	4.6%
1930s	3.1%	-2.1%	5.2%
1940s	2.2%	5.7%	-3.5%
1950s	3.0%	2.5%	0.5%
1960s	4.6%	2.4%	2.2%
1970s	7.5%	6.7%	0.8%
1980s	10.5%	4.8%	5.7%
1990s	6.9%	2.3%	4.6%
2000s	5.0%	2.3%	2.8%
2010s	2.9%	1.7%	1.2%
2020s	2.2%	4.3%	-2.1%
AVERAGE	5.8%	3.3%	2.5%

NOTE: Average represents the simple annual average of the decades from 1950-2019.

P/E RATIO & INTEREST RATES



INTEREST RATES & INFLATION

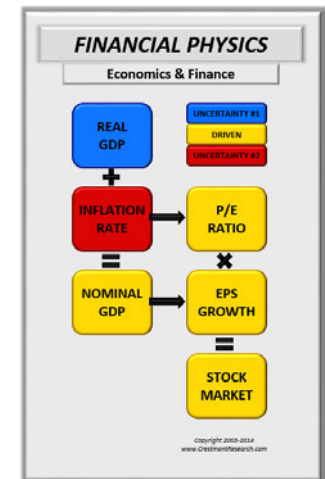


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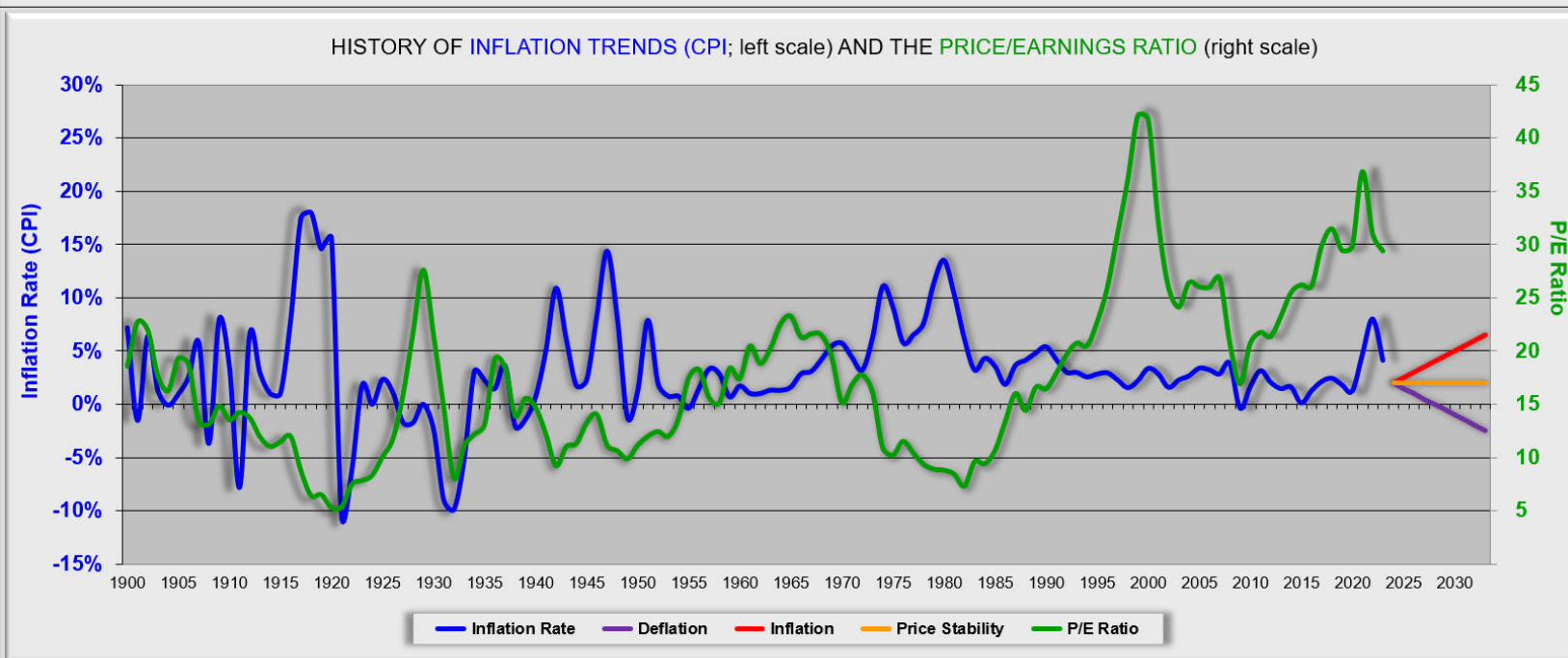
P/E RATIO (cont.)

- A trend toward price stability increases P/E ratios
- Rising inflation decreases P/E's; deflation decreases P/E's
- **Crestmont designates the impact of inflation on P/E's as the "Y Curve Effect"**
- Slide 21 reflects a sideways "Y" created by the impact of rising inflation or deflation on the P/E ratio; a fork occurs as inflation departs from price stability



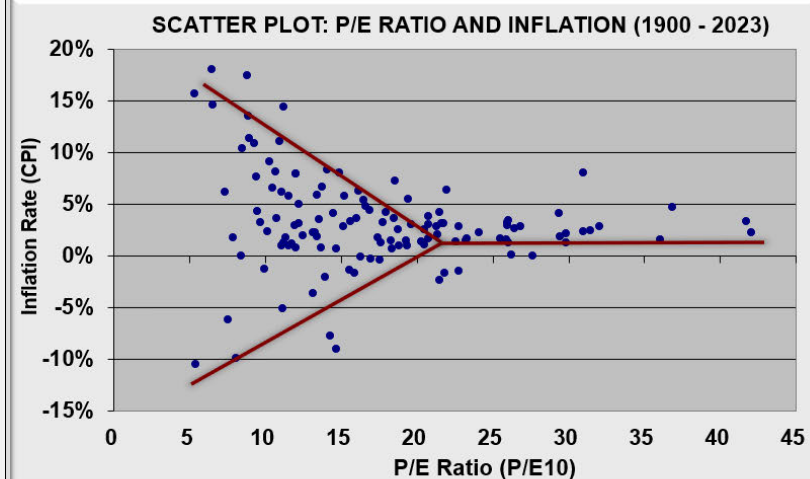


RELATIONSHIP OF INFLATION & PRICE/EARNINGS RATIOS (1900 - 2023)



AVERAGE P/E RATIO BY RANGE OF INFLATION

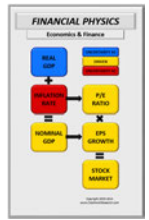
CPI RANGE		ALL PERIODS (1900-2023)		EXCL. LATE 1990s+ (1900-1994)	
		AVG CPI	AVG P/E	AVG CPI	AVG P/E
less than	0.00%	-3.8%	14	-4.0%	14
0.00%	0.99%	0.5%	18	0.6%	16
1.00%	1.99%	1.4%	19	1.4%	16
2.00%	2.99%	2.5%	23	2.6%	16
3.00%	3.99%	3.3%	19	3.3%	16
4.00%	4.99%	4.4%	20	4.3%	16
5.00%	5.99%	5.5%	15	5.5%	15
6.00%	9.99%	7.3%	14	7.3%	13
10.0%	and more	13.7%	8	13.7%	8



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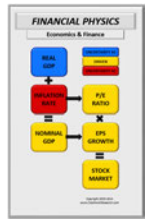
RECAP



- ❑ This methodology of predicting EPS trends is fundamentally based
- ❑ P/E typically trends based on the direction of the inflation rate toward or away from price stability
- ❑ The return environment for the stock market over the next 5, 10, or 20 years can be predicted by the outlook for the inflation rate over the same period
- ❑ Relatively low levels of inflation are expected over the near term (2-4 years from now); however, the market P/E ratio is vulnerable to inflation moving away from price stability in either direction



IMPLICATIONS



- The economy and earnings can be expected to grow over the long-term, yet move in cycles over shorter periods
- Relatively low inflation, if achieved and sustained, should result in the market P/E ratio near the range of 20-25
- The direction and level of inflation is a significant driver of stock market returns over the longer-term
- Eight secular periods driven by the inflation and P/E cycle have occurred over the past century; each secular cycle has one or more shorter-term cyclical cycles
- Investment strategies are significantly different for secular bull and secular bear markets



CONTACT INFORMATION

The information in this presentation is explained in greater detail in both books by Ed Easterling:

*Unexpected Returns:
Understanding Secular Stock Market Cycles
and
Probable Outcomes:
Secular Stock Market Insights*

Group presentations, individual consultations, or coordinated academic research regarding this presentation and other financial market perspectives are available.

Please contact Info@CrestmontResearch.com