

# *FINANCIAL PHYSICS*

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*"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

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This presentation introduces Crestmont's core "*Financial Physics*" model. The model represents a framework to understand the relationship of 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 implications of *Financial Physics* for the next decade, please contact [Info@CrestmontResearch.com](mailto: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 of time 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 current state of low inflation and the likelihood of it either rising (inflation) or declining (deflation), P/E ratios are expected to decline for a number of years. As P/E ratios decline and EPS grows, the result will be another relatively non-directional secular bear market.

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# INTRODUCTION

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- Conventional Wisdom And Long-Term Studies Often Ignore The Fundamental Factors That Drive Intermediate Stock Market Cycles
  - The S&P 500 Stock Index Started 1982 At 123; The 20-Year Treasury Bond Yielded 14.6%
  - By 1999, The S&P 500 Stock Index Reached 1,469; The 20-Year Treasury Bond Yielded 6.7%
  - The Secular Bull Market Was Driven By Fundamentals And Ultimately Accentuated By A Stock Market Bubble
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## INTRODUCTION (cont.)

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- The Preceding 16 Years (1966-1981) Were Also Driven By Fundamental Factors
  - Stocks Were Virtually Flat; Bond Yields Soared And Total Returns Were Disappointing
  - P/E Ratios Declined During The Secular Bear Market Starting In 1966 As Inflation Rose
  - Starting In 1982, The Inflation Cycle Reversed Thereby Starting A Secular Bull Market
  - During The Late 1990's, An Infection Of Emotions And Other Factors Created A Stock Market Bubble
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## INTRODUCTION (cont.)

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- ❑ **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 Inflation Rate Trends
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# INTRODUCTION (cont.)

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- The Factors—Real GDP, Nominal GDP, Inflation, EPS, and P/E Ratios—Share An Interrelated Relationship That Crestmont Research Calls “*Financial Physics*”
  - This Presentation Will Explore The Consistency, Predictability, And Dependence For Each Of These Factors And Among The Factors
  - For Those Seeking To Understand The Potential Returns Available In The Stock Market In 5, 10, or 20 Years, The *Financial Physics* Model Provides The Framework To Determine Your Own Perspective
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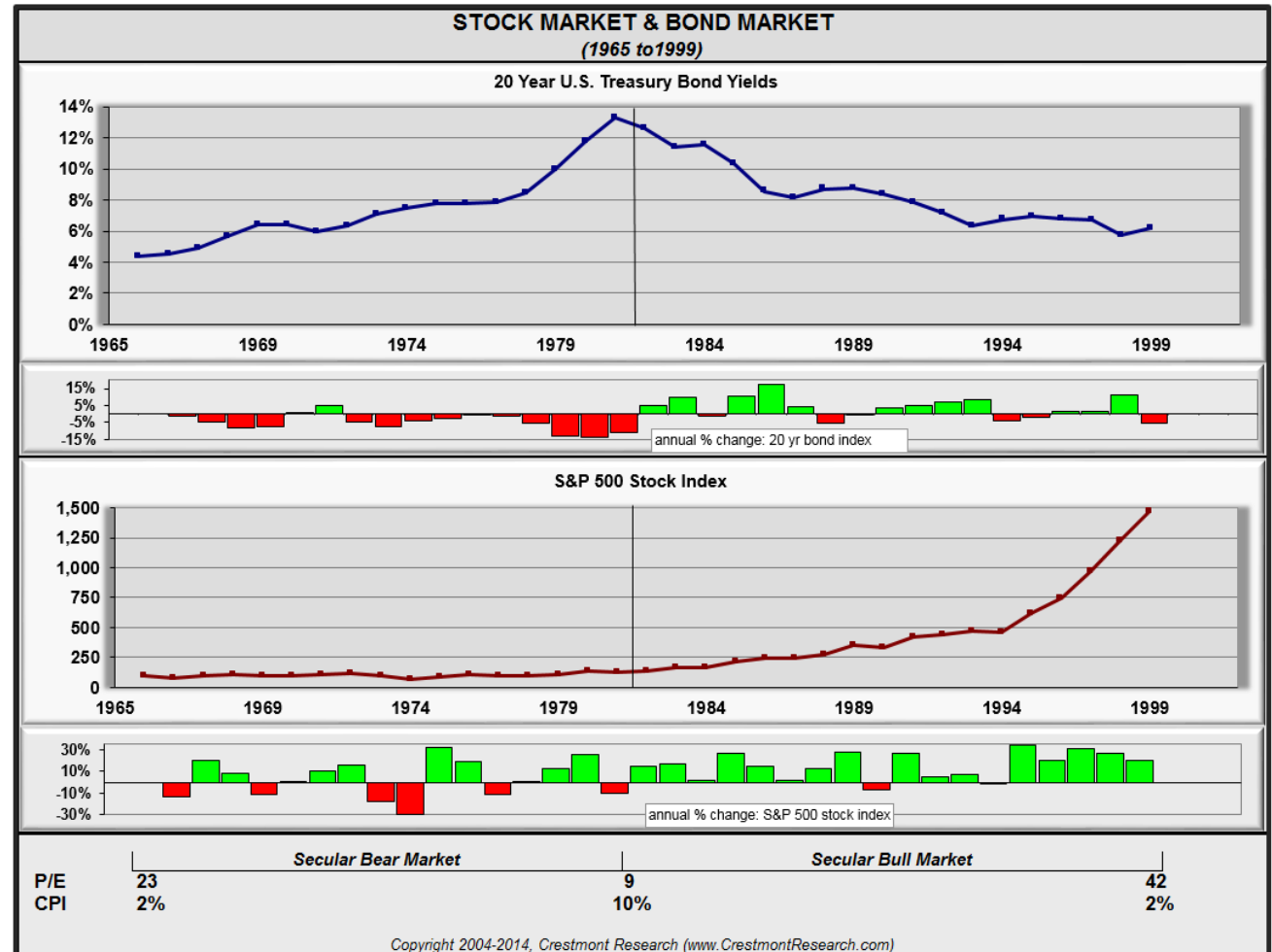
## INTRODUCTION (cont.)

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- 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 Stock Index Can Be Forecast By Multiplying The Estimated Future P/E Ratio For The S&P 500 Stock Index And The Estimated Future EPS For The S&P 500
  
  - When We Estimate The Future Stock Market Level, We Can Assess The Overall Investment Environment For Stocks Over 5, 10, or 20 Years
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- 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 Had Poor Returns; Yet During The 1980s & 1990s, Both Had Solid, Above-Average Returns







# FINANCIAL PHYSICS

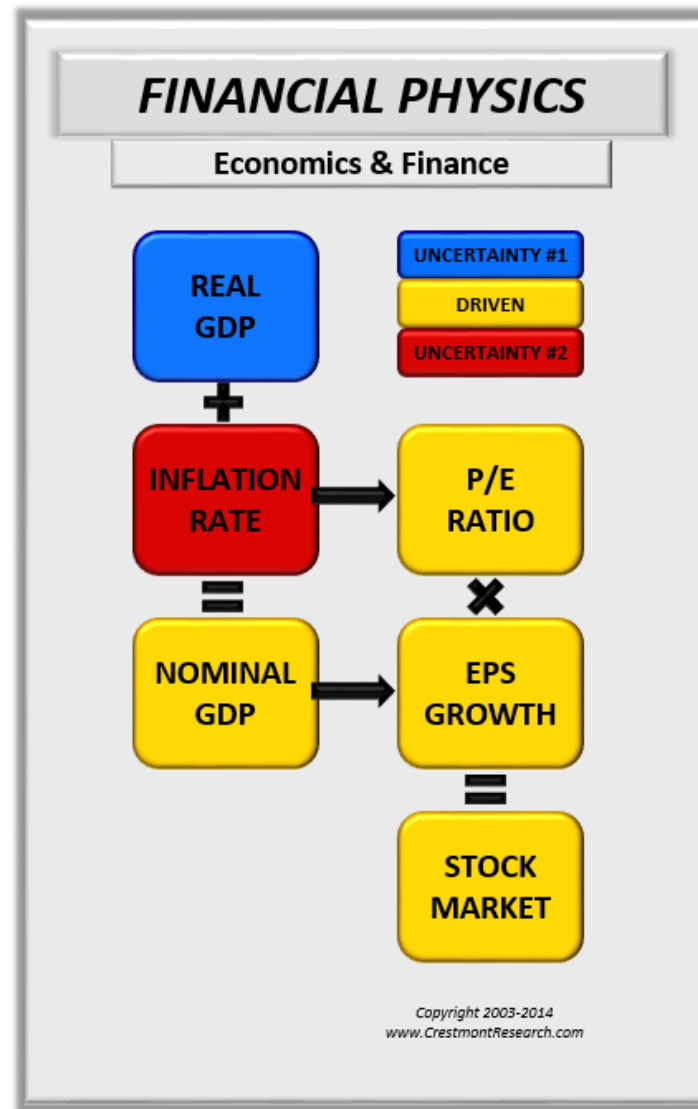
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## Regarding The Model Diagram On Slide 10:

- A Factor Is Considered 'Given' When It Tends To Be Consistent Over Long Periods Of Time And Is Fundamentally Based Upon Underlying Factors; Prior To The 2000s, GDP-R Was Considered To Be Given, But It Is Now An "Uncertainty" Due To Significantly Lower Growth In The Past Decade
  - A Factor Is Considered "Driven" When It Is Directly Affected By Other Given Or Assumed Factors
  - A Factor Is Considered An "Uncertainty" When It Is Generally Unpredictable And Its Future Is Uncertain
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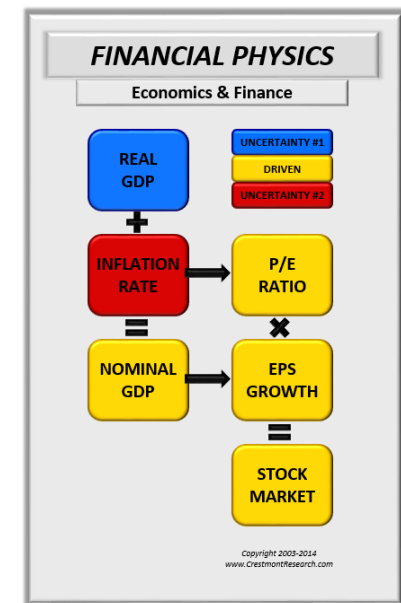
# FINANCIAL PHYSICS





# REAL GDP

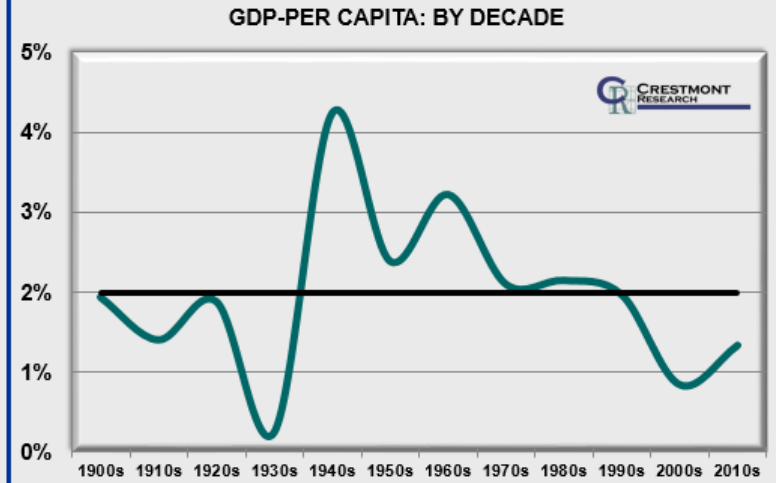
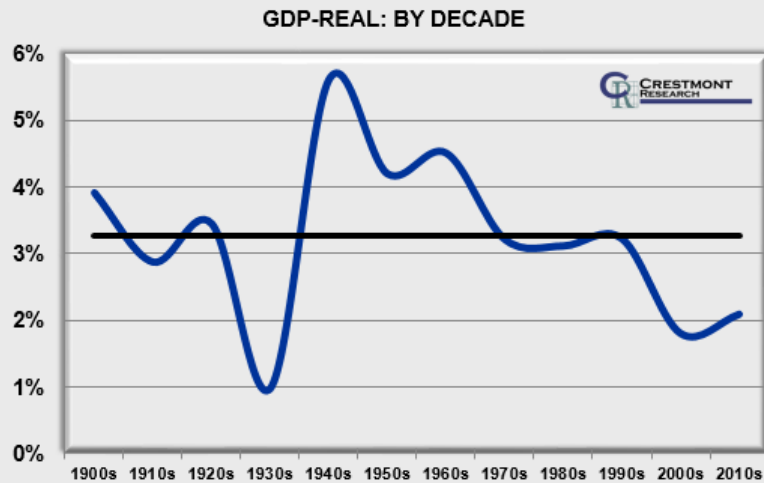
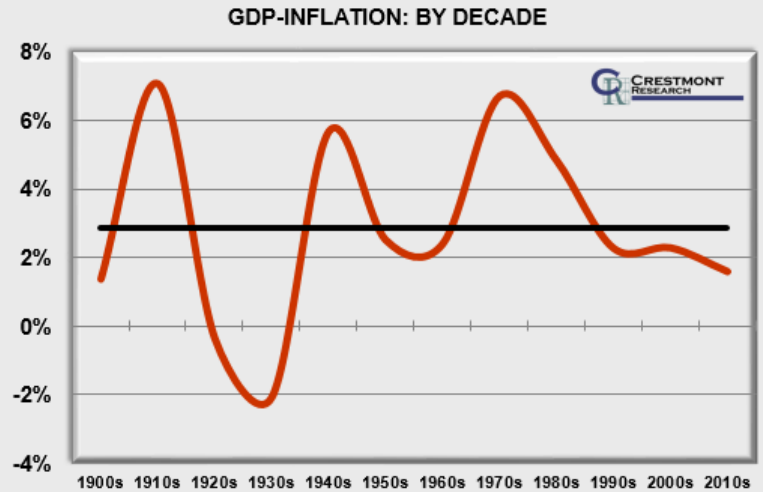
- Real Gross Domestic Product (“GDP”) Represents The Absolute Level Of The Economy Before Inflation; Essentially The Revenues Of All Companies
- Real GDP Growth Has Been Relatively Consistent Over The Past Century
- Annual Real GDP Averaged 3.3%
- Most Decades Between 3.0%-4.5%
- The '70s, '80s, & '90s: 3.2%, 3.0%, 3.2%





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	POPULATION	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	3.1%	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	8.0%	3.1%	4.8%	0.9%	2.1%
1990s	5.5%	3.2%	2.3%	1.2%	2.0%
2000s	4.1%	1.8%	2.3%	1.0%	0.8%
2010s	3.7%	2.1%	1.6%	0.7%	1.3%
1900-2016	6.1%	3.3%	2.8%	1.3%	2.0%
1900-1949	5.6%	3.4%	2.3%	1.4%	1.9%
1950-1999	7.4%	3.7%	3.7%	1.3%	2.4%
2000-2016	3.9%	1.9%	2.0%	0.9%	1.0%



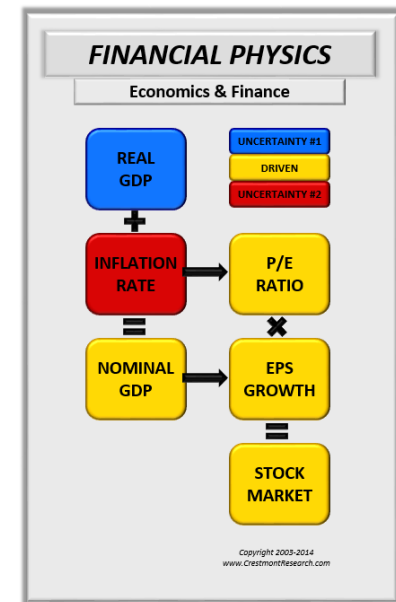
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Note: Real GDP for the decade of the 2000s was below 2%. Last decade's GDP shift is generally unexplained. It is unclear if this decade (the 2010s) will restore the trend average, or whether there will be a new trend line growth rate.



# SALES & EARNINGS

- Nominal GDP Is Real GDP Plus Inflation (“Real” Means “Without Inflation”); Essentially, Nominal GDP Is The Reported Revenues Of All Companies
- Nominal GDP Growth Has Averaged 6.1%
- Earnings As Represented By Earnings Per Share (“EPS”) Has Grown By 4.7% Over The Past Century
- Strong Relationship:  
Correlation “r” = 0.95
- Relationship Is Fundamentally Based;  
Earnings Emanate From Revenues

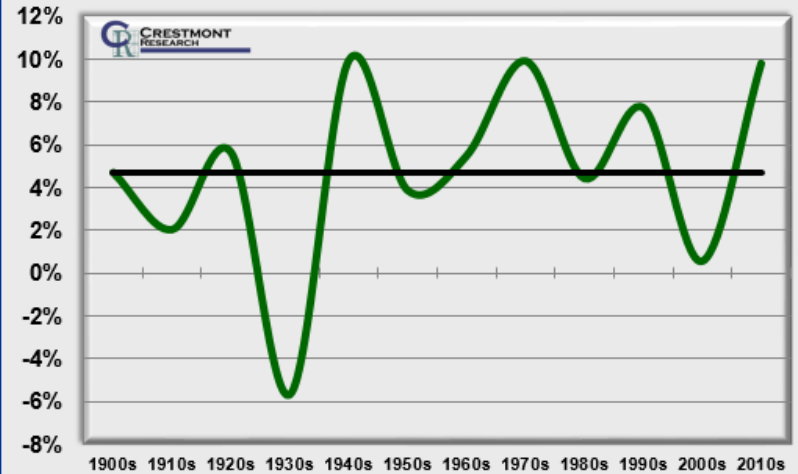




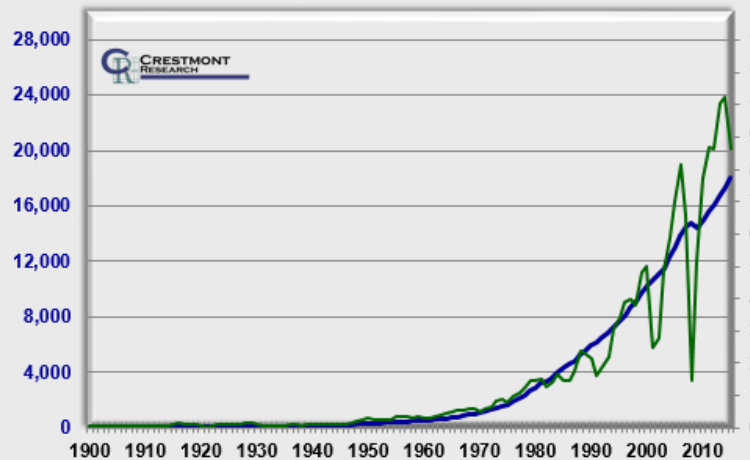
## EARNINGS PER SHARE (S&P 500) HAS A STRONG RELATIONSHIP TO ECONOMIC GROWTH

BY DECADE	GDP NOMINAL	EPS GROWTH
1900s	5.3%	4.7%
1910s	10.0%	2.0%
1920s	3.1%	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	8.0%	4.4%
1990s	5.5%	7.7%
2000s	4.1%	0.6%
2010s	3.7%	9.8%
1900-2016	6.1%	4.7%
1900-1949	5.6%	3.2%
1950-1999	7.4%	6.3%
2000-2016	3.9%	4.3%

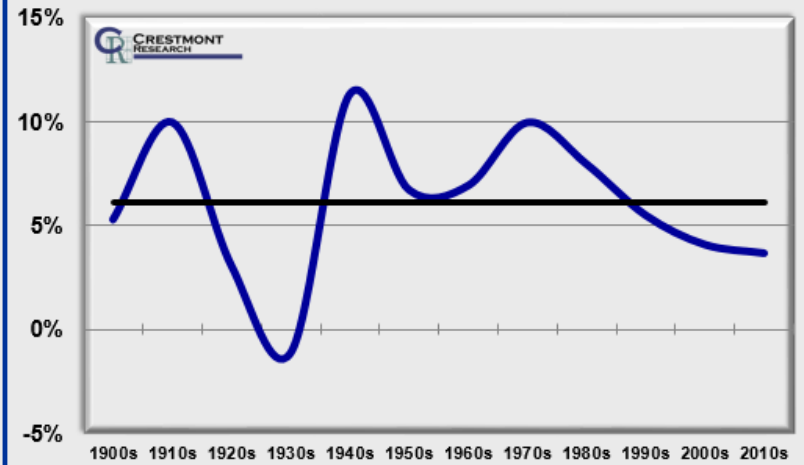
EPS GROWTH: BY DECADE



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



GDP-NOMINAL: BY DECADE



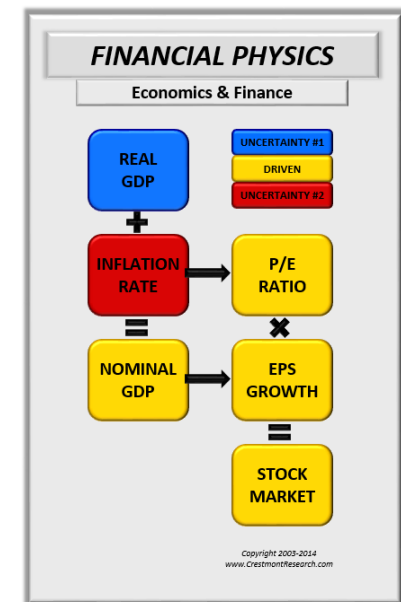
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Note: EPS and profit margins are at business cycle highs and are distorting the EPS growth rate for the decade of the 2010s; the backside of the business cycle (upcoming) should return the average toward historical levels



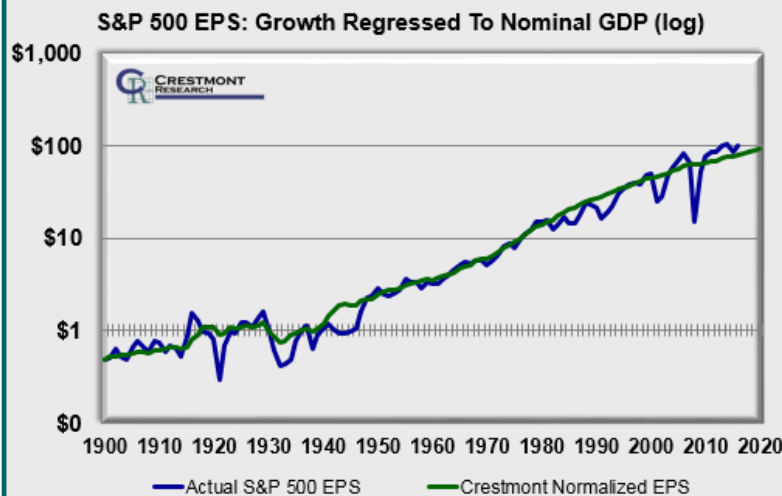
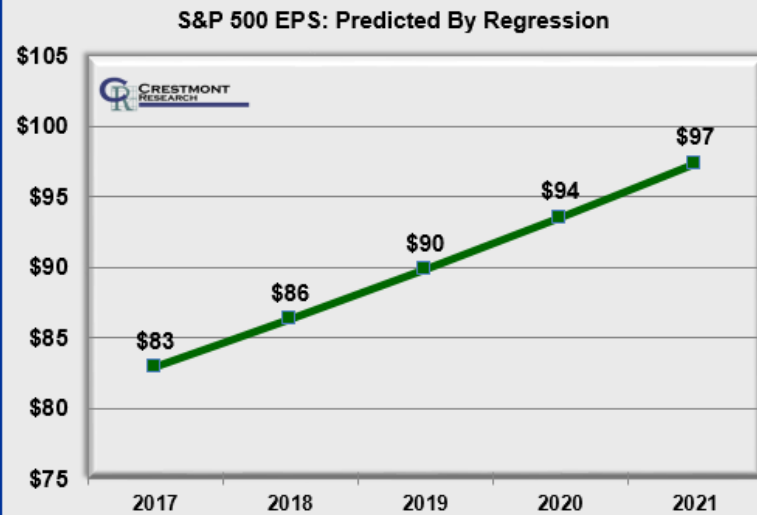
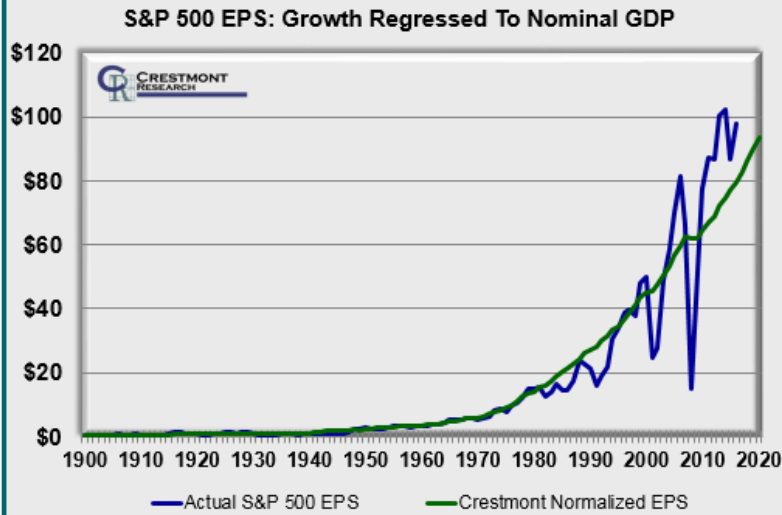
# PREDICTING EPS

- Since The Relationship Between GDP And EPS Is Strong And Fundamentally-Based, Estimates Of Future GDP Can Be Used To Determine Expected EPS
- Despite The Uncertainty About Future GDP Growth, Future Growth Of Near 3% (A Midrange Value) Can Be Assumed To Estimate Future EPS Based Upon The Historical Average
- A Regression Formula Can Be Developed To Use The Value Of GDP To Predict EPS
- Historical Real GDP Growth Scenarios And Estimated Inflation Can Be Used To Predict Average Future Nominal GDP
- The Estimated Future Nominal GDP Predicts A Gravity Line Around Which EPS Will Cycle Above And Below





## EARNINGS PER SHARE (S&P 500) IS HIGHLY PREDICTABLE OVER TIME



	2017	2018	2019	2020	2021
S&P 500 EPS	\$ 83	\$ 86	\$ 90	\$ 94	\$ 97

*Note: EPS prediction based upon historical GDP and EPS data*

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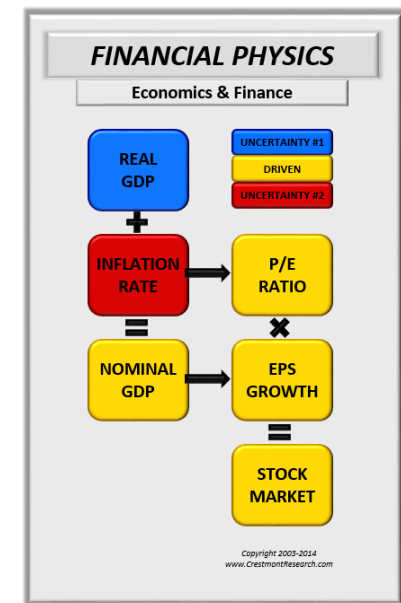
Note: The EPS Prediction is the gravity line for historically consistent EPS; Actual EPS will cycle above and below the gravity line depending upon aggressive accounting, recessions, recoveries, etc.





# RECAP

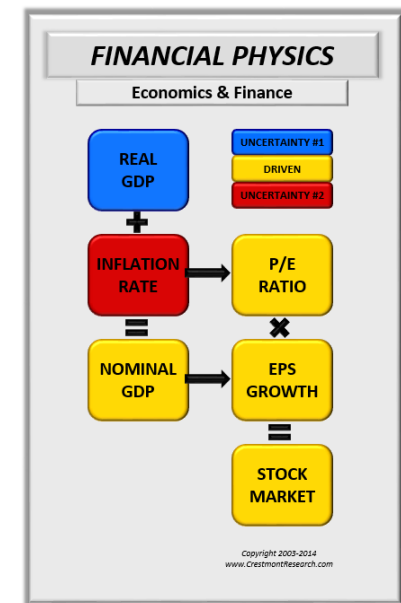
- Economic Growth (GDP-Real), Excluding Inflation, Has Been Relatively Consistent Over Long Periods Of Time
- EPS Is Relatively Consistent With Economic Growth Including Inflation (GDP-Nominal)
- Extending Economic Growth (GDP-Nominal) Provides A Basis To Predict EPS





# P/E RATIO

- Contrary To Conventional Wisdom, P/E Ratios Are Not Driven By Interest Rates: P/E Ratios Are Driven By The Inflation Rate
- Conventional Wisdom Implicitly Assumes Positive Inflation; Deflation Produces Low Interest Rates AND Low P/E Ratios Due To Expected Declines In Future Nominal Earnings (EPS)
- 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





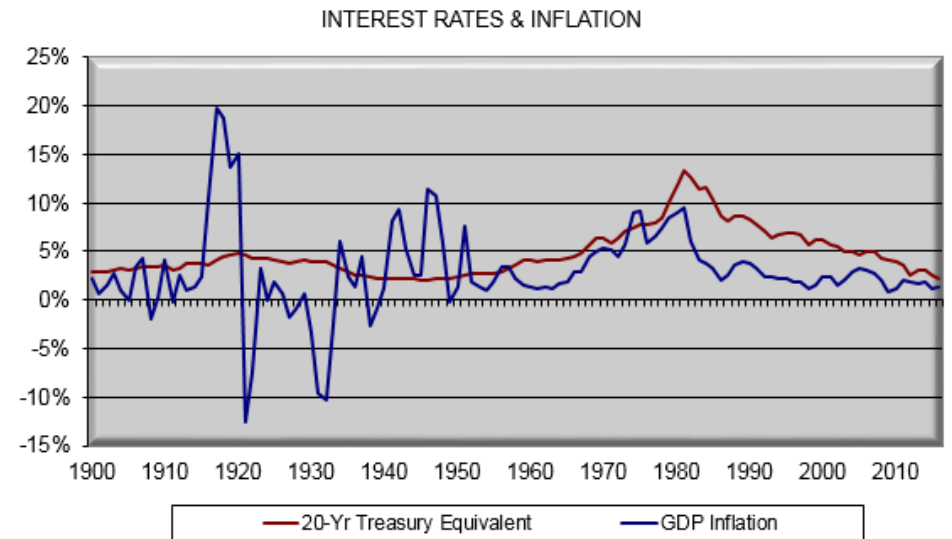
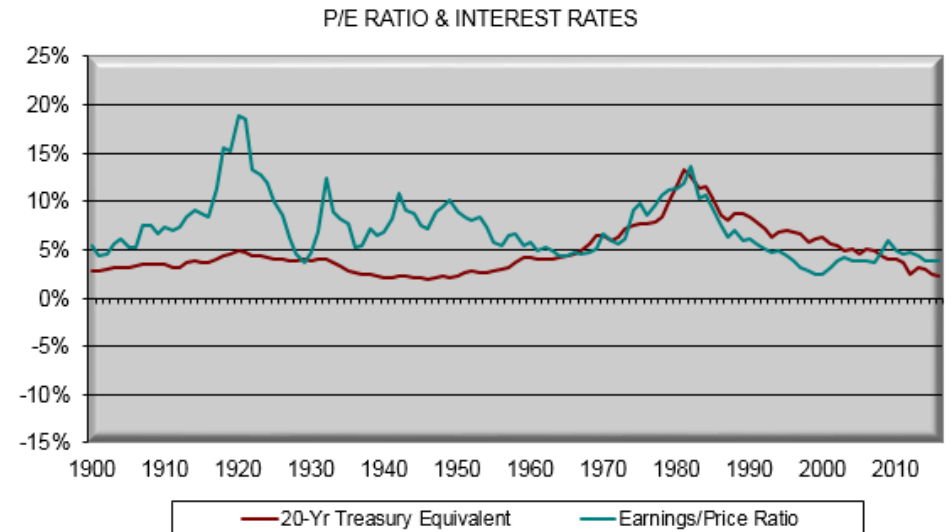
## P/E RATIO & INTEREST RATES HAVE A MIXED RELATIONSHIP BEFORE THE 1960s ... AS DO INTEREST RATES & INFLATION

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	4.3%	3.0%	1.3%
<b>AVERAGE</b>	<b>6.3%</b>	<b>6.3%</b>	<b>0.1%</b>

NOTE: Average represents the simple annual average of the decades from 1950-2009.

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%	2.7%
2010s	3.0%	1.6%	1.4%
<b>AVERAGE</b>	<b>6.3%</b>	<b>3.5%</b>	<b>2.8%</b>

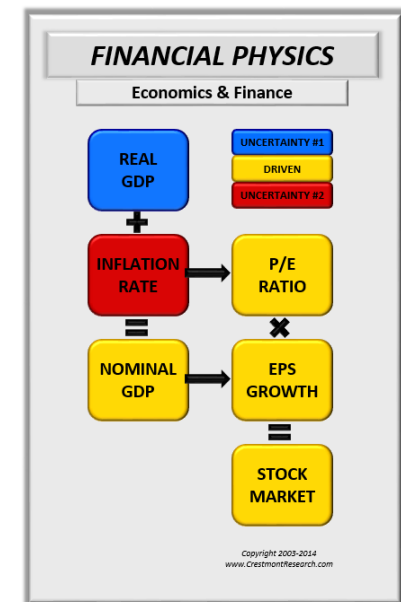
NOTE: Average represents the simple annual average of the decades from 1950-2009.





# P/E RATIO (cont.)

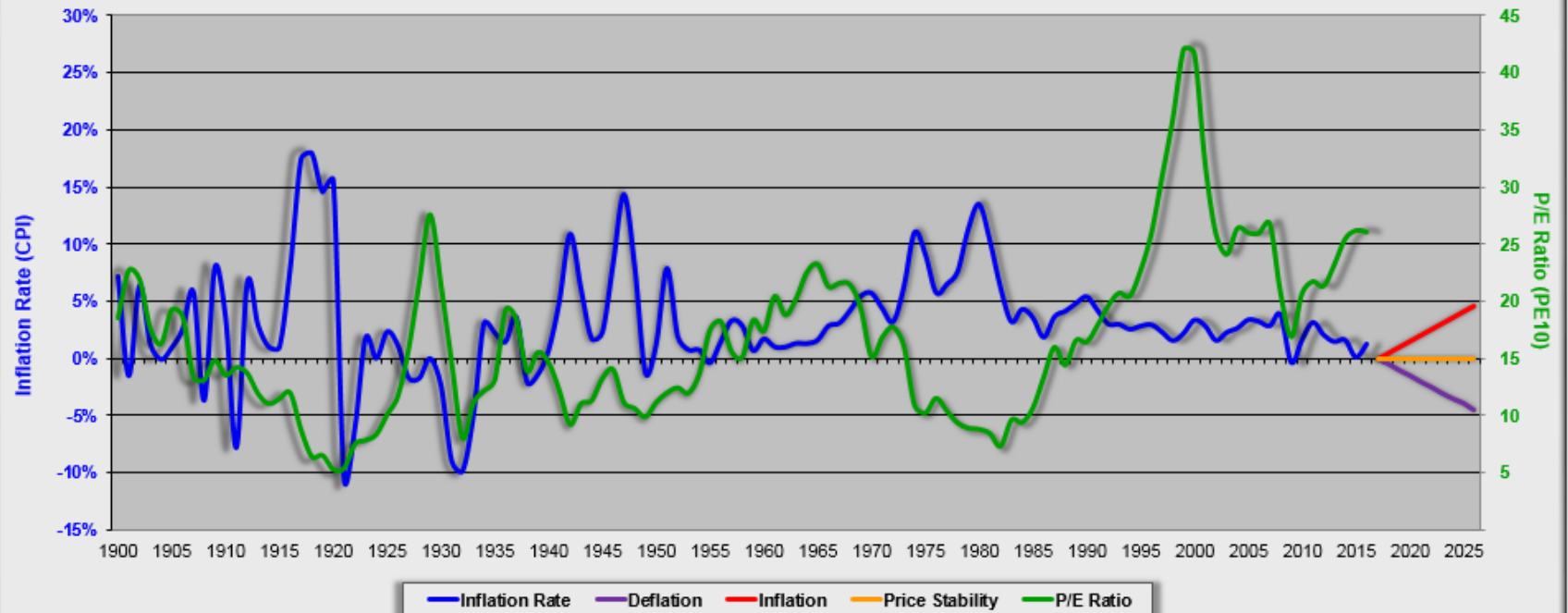
- A Trend Toward Price Stability Increases P/E Ratios
- Rising Inflation Decreases P/E's; Deflation Decreases P/E's
- **Crestmont Designates The Impact Of Inflation On P/E's As The "Y Curve Effect"**
- Slide 21 Reflects A Sideways "Y" Created By The Impact Of Rising Inflation Or Deflation On The P/E Ratio; A Fork Occurs As Inflation Departs From Price Stability
- The Chart Indicates Future Trends In The Inflation Rate Are Likely To Drive P/E Ratios Lower





## RELATIONSHIP OF INFLATION & PRICE/EARNINGS RATIOS (1900 - 2016)

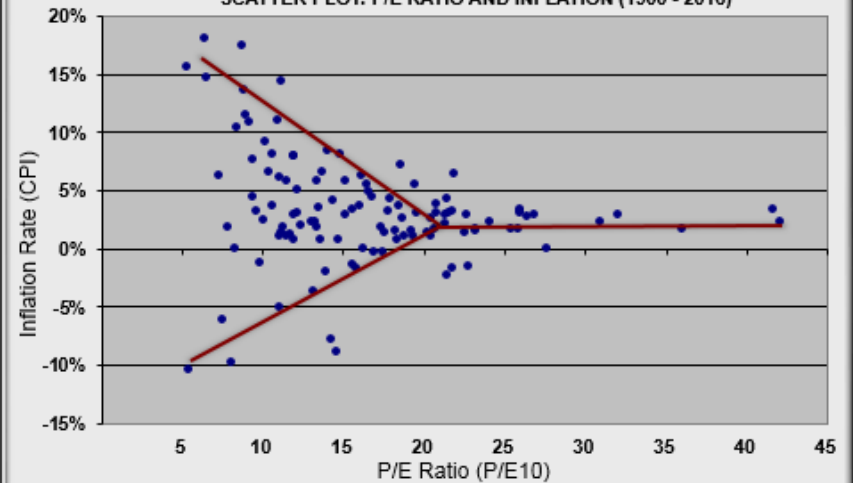
HISTORY OF INFLATION TRENDS (CPI; left scale) AND THE PRICE/EARNINGS RATIO (right scale)



AVERAGE P/E RATIO BY RANGE OF INFLATION

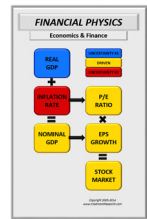
CPI RANGE		ALL PERIODS (1900-2016)		EXCL. LATE 1990s+ (1900-1994)	
BEG	END	AVG CPI	AVG P/E	AVG CPI	AVG P/E
less than	0.00%	-3.8%	14	-4.0%	14
0.00%	0.99%	0.5%	18	0.6%	16
1.00%	1.99%	1.4%	19	1.4%	16
2.00%	2.99%	2.6%	22	2.6%	16
3.00%	3.99%	3.3%	19	3.3%	16
4.00%	4.99%	4.3%	16	4.3%	16
5.00%	5.99%	5.5%	15	5.5%	15
6.00%	9.99%	7.3%	13	7.3%	13
10.0%	and more	13.7%	8	13.7%	8

SCATTER PLOT: P/E RATIO AND INFLATION (1900 - 2016)

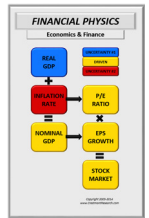




# RECAP



- This Methodology Of Predicting EPS Trends Is Fundamentally-Based And Confirmed Historically
- P/E Ratios Trend Based Upon Trends In The Inflation Rate Toward Or Away From Price Stability
- Based Upon The Prediction Of EPS Into The Intermediate Future, An Investor Need Only A Perspective On Inflation To Determine The Return Environment Available In The Stock Market Over The Next 5, 10, Or 20 Years
- From Current Low Levels Of Inflation, Increases Or Decreases In The Inflation Rate Are A Key Risk And Could Be Detrimental To P/E Ratios If Either Occurs



# IMPLICATIONS

- The Economy And Earnings Can Be Expected To Grow Over The Long-Term, Yet Cycle Over Shorter Periods
- Relatively Low Inflation, If Sustained, Should Result In The Market P/E Ratio Near 20
- 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

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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](mailto:Info@CrestmontResearch.com)

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