

## Cusack U.S Economy Equation

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Received date: January 17, 2017, Accepted date: February 23, 2017, Published date: March 02, 2017

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### Abstract

Here is a paper that uses 11 variables in an equation that describes the US economy. It can be used to predict the peaks to crash and where it is in the economic cycle.

**Keywords:** Macroeconomics; Key economic indicators

### Introduction

GDP= $e^x$

Dow Jones Industrial Average= $\sin$

Standard and Poor's 500 Index= $\sin/e^x$

CPI= $e^x$

Unemployment= $\sin$

Commodities Index

Oil linear

Gold Production= $\text{constant}$

New Residential Construction= $\text{linear}$

Personal Income= $\text{linear}$

US Trade Balance= $\sin$

Global Stock Market= $e^x \sin$

Each one of these indicates is a  $\sin$ ,  $\cos$  or exponential function.

SO,

$y=y'$

$y=e^x$

$y=y'$

$y=\sin x+C1=\cos x+C2$

$x=1, Y=0.8415$  cf 0.86

$0.8415+C3=e^x$

Boundary condition

$x=1$

$C3=c=1.8768$

$Y=e^x-1.8768$

Now for the Fourier series:

$y=e^x-1.8768$

$y=asin x+bcos x$

$asin x+b \cos x=e^x-1.8768$

$a(0.86)+b(0.86)=0.8415$

$(a+b)=1$

$a=1-b$

$(1-b)\sin x+b \cos x=e^x-1.8768$

$0.86-b(0.86)-b(0.86)=e^1-1.8768$

$y=e^1-1.8768$

$Y=0.8415$

For a full cycle:

$1/2\pi=0.1592$

$0.1592x=6.28$

$x=39.467$

So from peak to trough= $39.4627(2)=78.93$  years

October 29, 1929+78.93=2007.9

November 4, 2007 Peak to crash

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S&P500=-(GDP\*CPI) e^x+0.8415(sin TDJIA\*sin T UnEmploy\*sin T US Trade Balance) sin x+x(oil production+mean house price +Personal Incxme)

For Annum 1990 X=1 Maximum:

$$400=(7113*391.4)e^Y * 0.7460+ (30,000+92,000+4878.6)X/1000$$

$$E^Y=0.1315 x=0.202=Y \text{ Output Energy}$$

S&P500=-(GDP\*CPI) e^Y+0.8415(sin TDJIA\*sin T UnEmploy\*sin T US Trade Balance) sin X+x (oil production+mean house price +Personal Incxme)

$$400=(7113*391.4)e^Y * 0.7460+ (30,000+92,000+4878.6)X/1000$$

$$e^Y=0.1315 x=0.202=Y \text{ Output Energy}$$

Since Y=e<sup>1-1.8768</sup>

$$Y=2.71828-1.8768$$

$$0.202=2.71828 -1.8768 (\pi/2)=e^Y$$

$$\pi/2 * Y=e^Y =\pi$$

$$Y=\ln \pi$$

Y=e<sup>1-1.8768</sup> Refer to Figure 1.

$$Y=0.8415$$

But Y=0.202 (dampened sine wave)

So,

$$Y=e^{0.1315}=1.1405$$

$$y=1/y$$

$$\ln x=1/x$$

### Conclusion

y=y' for the economy.

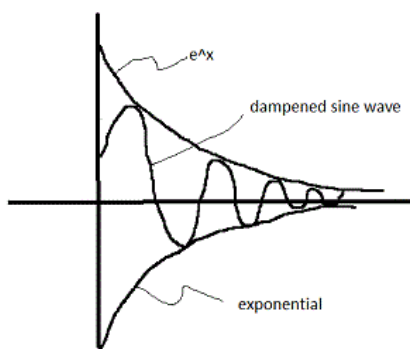


Figure 1: Dampened cosine curve.