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An Algorithm for Economics: from GDP to the Consumer

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Abstract

Recent economic tools include Structural Mechanics to solve outstanding problems. Some term it Econophysics or what I call Physical Economics. With the long-standing developments in structural engineering, namely Matric or the stiffness method, it is possible to make use of this theory to form a proof for an equation that links gross domestic product (GDP) to the individual consumer. This paper presents that solution with the knowledge of the stiffness coefficient. It is important because it links macroeconomics to microeconomics, in a solution that is possible to program, especially with the data of debit transactions.

Keywords: GDP; Optimum population density; Dampened cosine; Superforce; Stiffness method; Golden mean parabola

Introduction

It is well known to economists that Engineering Mechanics, or Structural Engineering techniques can be used to solve outstanding economic problems. In particular is the Matrix Method of Structural engineering which is useful here [1-3]. We can use this method to model an economy from the individual consumer or contributor, to a Nation's GDP, and in fact, the whole global economy. In this paper, I provide the calculations involved in developing a computer algorithm to this end. We begin with the US Economy [4-6].

Market Value

In Real Estate, the Market Value is the Net Operating Income divide by the Capitalization rate [7]:

M.V.=NOI/CR

For the US,

M.V.=M$

For the US Economy:

=$2 trillion/2%

$=1 \times 10^{14}$

Optimum population density

Optimum Population Density =c=3.0 [3]

ρ=M/Vol.

$1 \times 10^{14}/3=0.3333=1/c$

But $E=Mc^2$

$E/c^2=M$

$1/3^2=M=1/9=0.111$

The GDP Equation

Y=C+I+G+S+(EX-IM)

We know from AT Math, that Y=Y' is the optimum solution.

And M$=Y

$M\$=e^{-t}$ $M\$=1/2.71828^{\sim}1/c^3=1/c \times 1/c^2$

$=M\$ \times E/c^2$

$=M\$^2$

$=(1/9)^2=0.1234567$

$E=Mc^2=(0.111)(9)=1=100\%$

Continuing,

Y=Y'

GDP=M$=1/e

The Dampened Cosine Curve

$Y=e^{-1}\cos(2\pi t)$

$1/e=e^{-t}\cos(2\pi t)$

$1=\cos(2\pi t)$

t=1

But E=1/t

E=1=t

The Superforce

F=Ma

8/3=M(0.8415) [1]

M=π=t

E=1/t=1/π=31.8

E=W ×t

=Fdt

Fdt=1/π

(8/3)(d)(1)=1/π

d=119.4~M

E=1/t

dE/dt=Ln t

1=Ln t

t=0

t=M

M=t+Y

$Y=e^{-t}$ cons(2πt)

$=0.432(\cos(2\pi^2)$

=0.406~Re

∫freq=∫dM/dt

∫(1/π)=M

Ln t=M

Ln t=1

t=e

1/e=1/t=E=GDP=Y

Y=C+I+G+S+0

Let S=I

$1/e=C+G+S^2$

Let G=17%, S=1/7

$1/e=C+0.17=(1/7)^2$

C=0.1775~√π

C=17.5%

G=17%

I=14.3%

S=14.3%

Y=C+G+I+S

GDP=(1-sin 1)=Moment [1]

1/(1-sin1)=1/0.1580=Fd

=F(1/7)

$F=0.111=1/c^2$

$F=1/c^2$

$FL=1/c^2 \times 1/c$

Stiffness Equation

From Structural Engineering, we know,

F=ks [7]

K=[F/A]/[ΔL/L]

[(8/3)(1/c/L]/[ΔL/L]

=8/ΔL

k=8/ΔL=(π-e)=cuz=0.4233

ΔL=18.9

ε=ΔL/L=18.9/L

And,

σ=F/A

(8/3)/(1/cL)

=64/L

L=1/c=Vol.

E=M=Y=t

$E=Mc^2=c^2\times c^2=81$

L=1/c=vol.

$C^2=1$ C=√(1)=1

d/t=c=t

d=1/7=S

F=ks

$1/c=ks^2$

$1/c=k(1/7)^2$

k=1.633~1.623=Mass of a proton

Golden Mean Parabola

k=(π-e)=cuz=0.4233

k=(t-E)

k=[(1/E) -E]

$k=(1-E^2)/E$

Let k=1

$1(E)=1-E^2$

$E^2-E-1=0$

Golden Mean Parabola y=y’

k=1=E=t

$1=E=e^{-t}$

$\ln 1=\ln(e^{-t})$

0=-t

t=0

Dampened Cosine Curve

k=E=t=GDP=y=m$

An individual’s income his stiffness k.

But

k= [F/A]/[ΔL/L]

k=1

$F/A = \Delta L/L$

$FL = \Delta L\ A$

But $FL = 1/c^3$

$m\$ = 1/c^3 = \Delta LA$

$\Delta L = M.V./A$

$M\$/\Delta L = A$

$M.V./\Delta L = A$

[$2 Trillion/2%]/[2%] =A

2 trilllion/4%=A

A=0.5

Maxima:

$E_{min} = -1.25$ for the Golden Mean Parabola at t=0.5

(Note: 100%/8%=1.25;

8% is the historic ROI for the Stock Market;

It is a series of dampened cosine curves on an upward trend

The Individual GDP Contributor Equation:

m$=y=c+i+g+s+(Lending-Borrowing)

For the entire economy, a personal GPD Equation should be developed.

The aggregate equation:

$\sum m\$ = M\$ = Y = E = GDP$

This is possible with the technology of electronic debit transactions recording every transaction.

Conclusion

In this paper, we provide an algorithm for the entire economy from a Nation's GDP to individuals' transactions. With the availability of Structural Engineering software viz Matrix Structural Analysis, coupled with knowledge of the optimum spending levels, economists can then monitor and adjust the risk-free rate to optimize the overall performance of the global economy. The next stage is to write computer programs to compute these parameters so superior evaluation can be had.

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