The oliGARCH model of an individual's wealth

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the oliGARCH model of an individual's wealth. The paper ends with "The End"

Introduction

The **ordinary linear generalized auto-regressive with conditional heteroskedasticity** (oliGARCH) model of an individual's wealth is a robust mndel of an individual's wealth. In this paper, I describe the oliGARCH model of an individual's wealth.

The oliGARCH model

The oliGARCH model is given by the differential equation

$$a\frac{\partial W(t)}{\partial t} + bW(t) + ct + d + e\frac{\exp(-\frac{(x-\mu)^2}{2\sigma^2})}{\sqrt{2\pi}\sigma} = 0$$

where
$W(t)$ is wealth of the individual as a function of time
a, b, c, d, e are specific reals
t is time
x is any variable independent of time
$exp(x)$ is the exponential function

A solution to the oliGARCH model

A solution to the oliGARCH model is given by

$$W(t) = \frac{2ac\sigma - 2b\sigma(ct+d) - \sqrt{\frac{2}{\pi}}be\exp(-\frac{(x-\mu)^2}{2\sigma^2})}{2b^2\sigma} + fexp(-\frac{bt}{a})$$

where f is an arbitrary constant of integration

The End

There are exactly 729 different oliGARCHes

Soumadeep Ghosh

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Abstract

In this paper, I describe why there are exactly 729 different oliGARCHes. The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGARCH model of an individual's wealth. The question that naturally comes up now is - how many oliGARCHes are there?

There are exactly 729 different oliGARCHes

As there are exactly 6 coefficients in the solution to the oliGARCH model and each of them can take only one of 3 possible signs - positive, negative or zero - there are exactly $3^6 = 729$ different oliGARCHes.

The End

A result on the distribution of oliGARCHes in an economy

Soumadeep Ghosh

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Abstract

In this paper, I describe a result on the distribution of oliGARCHes in an economy. The paper ends with "The End"

Introduction

In a previous paper, I've described why there are exactly 14 sub-economies in an economy. In a previous paper, I've described the oliGARCH model of an individual's wealth. In a previous paper, I've described why there are exactly 729 different oliGARCHes. In this paper, I describe a result on the distribution of oliGARCHes in an economy.

A result on the distribution of oliGARCHes in an economy

We concern ourselves with the equation

$$o_1 + o_2 + o_3 + ... + o_{13} + o_{14} = 729$$

where o_i is the number of oliGARCHes in the i^{th} sub-economy

The number of solutions to this linear Diophantine equation is exactly

$$^{(729+14-1)}C_{(14-1)} =^{742} C_{13}$$

Thus, the number of oliGARCHes can be distributed in the economy in exactly 30389549665295896754977727868 different ways.

The End

The oliGAT model of time's wealth

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the oliGAT model of time's wealth. The paper ends with "The End"

Introduction

The **ordinary linear generalized auto-regressive time** (oliGAT) model of time's wealth is a robust mndel of time's wealth. In this paper, I describe the oliGAT model of time's wealth.

The oliGAT model

The oliGAT model is given by the differential equation

$$a\frac{\partial W(t)}{\partial t} + bW(t) + ct + d + e\frac{\exp(-\frac{(t-\mu)^2}{2\sigma^2})}{\sqrt{2\pi}\sigma} = 0$$

where
$W(t)$ is wealth of time as a function of time
a, b, c, d, e are specific reals
t is time
$exp(x)$ is the exponential function

A solution to the oliGAT model

A solution to the oliGAT model is given by

$$W(t) = \frac{exp(\frac{b\mu}{a} - \frac{bt}{a})(2aexp(\frac{b(t-\mu)}{a})(ac - b(ct+d)) - b^2eexp(\frac{b^2\sigma^2}{2a^2})erf(\frac{a(t-\mu)-b\sigma^2}{\sqrt{2}a\sigma}))}{2ab^2} + fexp(-\frac{bt}{a})$$

where
f is an arbitrary constant of integration
$erf(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}dt$ is the error function

The End

There is exactly 1 time

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe why there is exactly 1 time. The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGAT model of time's wealth. The question that naturally comes up now is - how many times are there?

There is exactly 1 time

As the oliGAT model has time t as a variable in the normal distribution function and can take only 1 of 3 possible signs - positive, negative or zero - there is exactly 1 time.

The End

A result on the distribution of time in an economy

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe a result on the distribution of time in an economy. The paper ends with "The End"

Introduction

In a previous paper, I've described why there are exactly 14 sub-economies in an economy. In a previous paper, I've described the oliGAT model of time's wealth. In a previous paper, I've described why there is exactly 1 time. In this paper, I describe a result on the distribution of time in an economy.

A result on the distribution of time in an economy

We concern ourselves with the equation

$$t_1 + t_2 + t_3 + ... + t_{13} + t_{14} = 1$$

where t_i is 1 if time in the i^{th} sub-economy and 0 if not.
The number of solutions to this linear Diophantine equation is exactly

$$^{(1+14-1)}C_{(14-1)} =^{14} C_{13}$$

Thus, time can be distributed in the economy in exactly 14 different ways.

The End

Accounting in an oliGARCHy using identical oliGARCHes, numenaire and money

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe accounting in an oliGARCHy using identical oliGARCHes, numenaire and money. The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGARCH model of an individual's wealth. In a previous paper, I've described how there are 729 oliGARCHes in the economy. Contrary to popular belief, accounting is possible in an oliGARCHy using identical oliGARCHes, numenaire and money. In this paper, I describe accounting in an oliGARCHy using identical oliGARCHes, numenaire and money.

Accounting in an oliGARCHy using identical oliGARCHes, numenaire and money

Recall the wealth of an individual in the oliGARCH model is

$$W(t) = \frac{2ac\sigma - 2b\sigma(ct+d) - \sqrt{\frac{2}{\pi}}be\exp(-\frac{(x-\mu)^2}{2\sigma^2})}{2b^2\sigma} + f\exp(-\frac{bt}{a})$$

To introduce accounting in an oliGARCHy, we simply find solutions to

$$nW(t) = \int_0^m W(t)dx$$

where
$n = 729$
x is the numenaire
m is money
$W(t)$ is the wealth of identical oliGARCHes

Real solutions to the equation

There exist at least 7 real solutions to the equation above, available upon request.

The End

Finance in an oliGARCHy using identical oliGARCHes, numenaire and risk-free rate

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe finance in an oliGARCHy using identical oliGARCHes, numenaire and risk-free rate. The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGARCH model of an individual's wealth. In a previous paper, I've described how there are 729 oliGARCHes in the economy. In a previous paper, I've described accounting in an oliGARCHy using identical oliGARCHes, numenaire and money. Contrary to popular belief, finance is possible in an oliGARCHy using identical oliGARCHes, numenaire and risk-free rate. In this paper, I describe finance in an oliGARCHy using identical oliGARCHes, numenaire and risk-free rate.

Finance in an oliGARCHy using identical oliGARCHes, numenaire and risk-free rate

Recall the wealth of an individual in the oliGARCH model is

$$W(t) = \frac{2ac\sigma - 2b\sigma(ct+d) - \sqrt{\frac{2}{\pi}}be\exp(-\frac{(x-\mu)^2}{2\sigma^2})}{2b^2\sigma} + f\exp(-\frac{bt}{a})$$

After introduction of accounting, to introduce finance in an oliGARCHy, we simply find solutions to

$$\frac{W(t+1)}{W(t)} = 1 + r_f + p_w$$

where
x is the numenaire
$W(t)$ is the wealth of identical oliGARCHes at time t
r_f is the risk-free rate
p_w is the wealth premium

Real solutions to the equation

There exist at least 7 real solutions to the equation above, available upon request.

The End

Discounted oliGARCHy

Soumadeep Ghosh

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Abstract

In this paper, I describe the discounted oliGARCHy using identical oliGARCHes, numenaire, money and discount rate. The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGARCH model of an individual's wealth. In a previous paper, I've described how there are 729 oliGARCHes in the economy. Contrary to popular belief, a discounted oliGARCHy is possible using identical oliGARCHes, numenaire, money and discount rate. In this paper, I describe the discounted oliGARCHy using identical oliGARCHes, numenaire, money and discount rate.

The discounted oliGARCHy using identical oliGARCHes, numenaire, money and discount rate

Recall the wealth of an individual in the oliGARCH model is

$$W(t) = \frac{2ac\sigma - 2b\sigma(ct+d) - \sqrt{\frac{2}{\pi}}be\exp(-\frac{(x-\mu)^2}{2\sigma^2})}{2b^2\sigma} + f\exp(-\frac{bt}{a})$$

The discounted oliGARCHy is given by the equation

$$n(W(t) + \frac{W(t)}{1+r} + \frac{W(t)}{(1+r)^2}) = \int_0^m (W(t) + \frac{W(t)}{1+r} + \frac{W(t)}{(1+r)^2})dx$$

where
$n = \frac{729}{3} = 243$
x is the numenaire
m is money
$W(t)$ is the wealth of identical oliGARCHes at time t
r is the discount rate

Real solutions to the equation

There exist at least 7 real solutions to the equation above, available upon request.

The End

The standard oliGARCHy

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe an oliGARCHy and a particular type of oliGARCHy called **the standard oliGARCHy**. The paper ends with "The End"

Introduction

In a previous paper, I've described the theory of economic gearing.
In a previous paper, I've described 14 statistical solutions to population.
In a previous paper, I've described the oliGARCH model of an individual's wealth.
Contrary to popular belief, there exists a class of economies called oliGARCHies that has much larger wealth alongwith loss-reserving than is possible through the theory of economic gearing, albeit with higher risk.

In this paper, I describe the oliGARCHy and a particular type of oliGARCHy called **the standard oliGARCHy**.

The oliGARCHy

An oliGARCHy is an economy with $1 \leq D \leq 14$ **districts**,
each with a number of oliGARCHs and a number of non-oliGARCHs, i.e,

$$\sum_{i=1}^{D} o_i = 729$$

$$\sum_{i=1}^{D} n_i = 48524 - 729$$

$$\sum_{i=1}^{D} (o_i + n_i) = 48524$$

where
o_i is the number of oliGARCHs in the i^{th} district
n_i is the number of non-oliGARCHs in the i^{th} district

The standard oliGARCHy

The standard oliGARCHy is given by $D = 9$.

The value of o_i are

$$o_1 = 85, o_2 = 84, o_3 = 83, o_4 = 82, o_5 = 81, o_6 = 80, o_7 = 79, o_8 = 78, o_9 = 77$$

The value of n_i are

$$p_1 = 5315, p_2 = 5314, p_3 = 5313, p_4 = 5312, p_5 = 5311, p_6 = 5310, p_7 = 5309, p_8 = 5308, p_9 = 5303$$

Self-statistics of a district

We define the **responsibility statistic** of each district as

$$r_i = \frac{p_i}{o_i}$$

where

$$1 \leq i \leq D$$

which are rational constants.

We then define the **sum** ($S = \sum_{i=1}^{D} r_i$) and **mean** ($\mu = \frac{S}{D}$) of the responsibility statistics, both of which are rational constants.
We then define the **standard deviations** ($\sigma_i = \sqrt{\frac{(r_i - \mu)^2}{D}}$) of the responsibility statistics, all of which are real constants.
We then define the **z-scores** ($z_i = \frac{r_i - \mu}{\sigma_i}$) of the responsibility statistics, all of which are real constants.
These self-statistics can be used to find anomalies and risk in the i^{th} district.

Cross-statistics of two non-identical districts

We define the **mobility statistic** of each pair of **non-identical** districts as

$$r_{i,j} = \frac{p_i}{o_j}$$

where $1 \leq i \neq j \leq D$
which are rational constants.
The mobility-statistic can be used to find trade opportunities and risk in the oliGARCHy.
The mobility-statistic can also be used to define many cross-statistics of two non-identical districts (like those for the responsibility statistic) that can be used to find economic opportunities and risk in the oliGARCHy.

The End

Recapitalization of the non-oliGARCHs in the standard oliGARCHy

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe recapitalization of the non-oliGARCHs in the standard oliGARCHy.
The paper ends with "The End"

Introduction

In a previous paper, I've described the oliGARCHy and a particular type of oliGARCHy called the standard oliGARCHy.
In this paper, I describe recapitalization of the non-oliGARCHs in the standard oliGARCHy.

Recapitalization of the non-oliGARCHs in the standard oliGARCHy

The mathematics of recapitalization of the non-oliGARCHs in the standard oliGARCHy is

$$\sum_{i=1}^{D} w_i n_i = T$$

where
$w_i \geq 3$ is the wealth of each non-oliGARCH in the i^{th} district
T is the total wealth supplied to the non-oliGARCHs

14 solutions to the recapitalization of the non-oliGARCHs in the standard oliGARCHy

1. $$T = 4914127, w_1 = 164, w_2 = 164, w_3 = 164, w_4 = 164, w_5 = 149, w_6 = 73, w_7 = 41, w_8 = 3, w_9 = 3$$

2. $$T = 7633323, w_1 = 273, w_2 = 270, w_3 = 197, w_4 = 197, w_5 = 113, w_6 = 113, w_7 = 113, w_8 = 110, w_9 = 51$$

3. $$T = 7798356, w_1 = 275, w_2 = 275, w_3 = 256, w_4 = 187, w_5 = 187, w_6 = 117, w_7 = 69, w_8 = 51, w_9 = 51$$

4. $$T = 9631420, w_1 = 330, w_2 = 330, w_3 = 321, w_4 = 276, w_5 = 205, w_6 = 162, w_7 = 93, w_8 = 93, w_9 = 3$$

5. $$T = 20690713, w_1 = 463, w_2 = 463, w_3 = 463, w_4 = 463, w_5 = 422, w_6 = 422, w_7 = 414, w_8 = 393, w_9 = 393$$

6. $$T = 21392997, w_1 = 615, w_2 = 537, w_3 = 497, w_4 = 435, w_5 = 406, w_6 = 406, w_7 = 406, w_8 = 363, w_9 = 363$$

7. $$T = 35950465, w_1 = 936, w_2 = 891, w_3 = 832, w_4 = 832, w_5 = 753, w_6 = 685, w_7 = 628, w_8 = 606, w_9 = 606$$

8.
$$T = 39431575, w_1 = 845, w_2 = 845, w_3 = 845, w_4 = 845, w_5 = 845, w_6 = 845, w_7 = 785, w_8 = 785, w_9 = 785$$

9.
$$T = 40892650, w_1 = 900, w_2 = 900, w_3 = 900, w_4 = 900, w_5 = 900, w_6 = 845, w_7 = 785, w_8 = 785, w_9 = 785$$

10.
$$T = 42683331, w_1 = 1000, w_2 = 979, w_3 = 979, w_4 = 979, w_5 = 900, w_6 = 845, w_7 = 785, w_8 = 785, w_9 = 785$$

11.
$$T = 45101271, w_1 = 1168, w_2 = 1168, w_3 = 1077, w_4 = 979, w_5 = 900, w_6 = 845, w_7 = 785, w_8 = 785, w_9 = 785$$

12.
$$T = 50063733, w_1 = 1161, w_2 = 1072, w_3 = 1072, w_4 = 1072, w_5 = 1010, w_6 = 1010, w_7 = 1010, w_8 = 1010, w_9 = 1010$$

13.
$$T = 56358065, w_1 = 1274, w_2 = 1274, w_3 = 1267, w_4 = 1256, w_5 = 1216, w_6 = 1130, w_7 = 1065, w_8 = 1065, w_9 = 1065$$

14.
$$T = 63298556, w_1 = 1482, w_2 = 1394, w_3 = 1394, w_4 = 1349, w_5 = 1300, w_6 = 1250, w_7 = 1250, w_8 = 1250, w_9 = 1250$$

The End

The oliGARCHic partition of a natural number

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe the concept of an oliGARCHic partition of a natural number.
The paper ends with "The End"

Introduction

The concept of an oliGARCHic partition of a natural number is paramount to an oliGARCHy.
In this paper, I describe the concept of an oliGARCHic partition of a natural number.

The oliGARCHic partition of a natural number

For a natural number n and a natural number D,
an **oliGARCHic partition of** n **of length** D exists
if there exist $w_i > 0$ and $p_i > 0$ for $1 \leq i \leq D$ such that

$$n = \sum_{i=1}^{D} \frac{w_i}{p_i}$$

The End

Four oliGARCHic partitions of 5 of length 9 and Ghosh's number

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe four oliGARCHic partitions of 5 of length 9 and Ghosh's number.
The paper ends with "The End"

Introduction

In a previous paper, I've described the concept of an oliGARCHic partition of a natural number.
In this paper, I describe four oliGARCHic partitions of 5 each of length 9 and Ghosh's number.

Four oliGARCHic partitions of 5 of length 9

For

$$p_1 = 5315, p_2 = 5314, p_3 = 5313, p_4 = 5312, p_5 = 5311, p_6 = 5310, p_7 = 5309, p_8 = 5308, p_9 = 5303$$

and any of

1. $w_1 = 1063, w_2 = 2657, w_3 = 1771, w_4 = 1328, w_5 = 5311, w_6 = 2478, w_7 = 5309, w_8 = 1327, w_9 = 5303$
2. $w_1 = 1063, w_2 = 2657, w_3 = 3542, w_4 = 1328, w_5 = 5311, w_6 = 708, w_7 = 5309, w_8 = 1327, w_9 = 5303$
3. $w_1 = 2126, w_2 = 2657, w_3 = 1771, w_4 = 1328, w_5 = 5311, w_6 = 1416, w_7 = 5309, w_8 = 1327, w_9 = 5303$
4. $w_1 = 3189, w_2 = 2657, w_3 = 1771, w_4 = 1328, w_5 = 5311, w_6 = 354, w_7 = 5309, w_8 = 1327, w_9 = 5303$

we have

$$5 = \sum_{i=1}^{9} \frac{w_i}{p_i}$$

Ghosh's number

The number

$$G = 5 \prod_{i=1}^{9} p_i = 16796886773988739989634052508288000$$

is called **Ghosh's number**.

The End

Ghosh's second number

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe Ghosh's second number.
The paper ends with "The End"

Introduction

In a previous paper, I've described Ghosh's number.
In this paper, I describe Ghosh's second number.

Ghosh's second number

The prime factorization of Ghosh's number is

$$G = 2^{10} \cdot 3^3 \cdot 5^3 \cdot 7^1 \cdot 11^1 \cdot 23^1 \cdot 47^1 \cdot 59^1 \cdot 83^1 \cdot 113^1 \cdot 1063^1 \cdot 1327^1 \cdot 2657^1 \cdot 5303^1 \cdot 5309^1$$

The primes are

$$2, 3, 5, 7, 11, 23, 47, 59, 83, 113, 1063, 1327, 2657, 5303, 5309$$

The powers are

$$10, 3, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1$$

The primes raised to their respective powers are

$$1024, 27, 125, 7, 11, 23, 47, 59, 83, 113, 1063, 1327, 2657, 5303, 5309$$

whose sum $G_2 = 17178$ is called **Ghosh's second number**.

The End

Ghosh's third number

Soumadeep Ghosh

Kolkata, India

Abstract

In this paper, I describe Ghosh's third number.
The paper ends with "The End"

Introduction

In a previous paper, I've described Ghosh's number.
In a previous paper, I've described Ghosh's second number.
In this paper, I describe Ghosh's third number.

Ghosh's third number

The prime factorization of Ghosh's second number is

$$G_2 = 2^1 \cdot 3^1 \cdot 7^1 \cdot 409^1$$

The primes are

$$2, 3, 7, 409$$

The powers are

$$1, 1, 1, 1$$

The primes raised to their respective powers are

$$2, 3, 7, 409$$

whose sum $G_3 = 421$ is called **Ghosh's third number**.

The End