Gaussian Peak Modified With Offset

$$y = a * \exp(-0.5 * ((x-b)/c)^d) + \text{Offset}$$

Tue Dec 13 22:04:48 2011 local server time

Coefficients

$y = a * \exp(-0.5 * ((x-b)/c)^d) + \text{Offset}$

Fitting target of sum of squared absolute error = 3.9201134499496877E+07

a = 2.4180382432808139E+05

b = -8.1881193989106483E+04

c = 1.1142124215594478E+05

d = -4.4803720002887495E+00

Offset = -3.4116571244660867E+04

Coefficient and Fit Statistics

From scipy.odr.odrpack and http://www.scipy.org/Cookbook/OLS

Degrees of freedom (error): 39.0
Degrees of freedom (regression): 4.0
R-squared: 0.999714934233
R-squared adjusted: 0.999685696719
Model F-statistic: 34192.883707
Model F-statistic p-value: 1.11022302463e-16
Model log-likelihood: -363.833880919
AIC: 16.7651764054
BIC: 16.9679252275
Root Mean Squared Error (RMSE): 943.893465911

a = 2.4180382432808139E+05
        std err squared: 7.87535E+07
        t-stat: 2.72476E+01
        p-stat: 0.00000E+00
        95% confidence intervals: [2.23854E+05, 2.59754E+05]
b = -8.1881193989106483E+04
        std err squared: 2.22269E+08
        t-stat: -5.49218E+00
        p-stat: 2.62490E-06
        95% confidence intervals: [-1.12037E+05, -5.17255E+04]
c = 1.1142124215594478E+05
        std err squared: 1.89430E+08
        t-stat: 8.09551E+00
        p-stat: 7.06136E-10
        95% confidence intervals: [8.35823E+04, 1.39260E+05]
d = -4.4803720002887495E+00
        std err squared: 2.94152E-01
        t-stat: -8.26091E+00
        p-stat: 4.26098E-10
        95% confidence intervals: [-5.57740E+00, -3.38335E+00]
Offset = -3.4116571244660867E+04
        std err squared: 8.34527E+07
        t-stat: -3.73461E+00
        p-stat: 6.00090E-04
        95% confidence intervals: [-5.25944E+04, -1.56388E+04]

Coefficient Covariance Matrix
[7.83493952e+01 -1.16809906e+02   1.05817370e+02 -4.01298539e-03 -8.04689016e+01]
[-1.16809906e+02   2.21128313e+02 -2.03998326e+02   7.99858223e-03   1.23222139e+02]
[1.05817370e+02 -2.03998326e+02   1.88457615e+02 -7.40039675e-03 -1.11813117e+02]
[-4.01298539e-03   7.99858223e-03 -7.40039675e-03   2.92643225e-07   4.26798982e-03]
[-8.04689016e+01   1.23222139e+02 -1.11813117e+02   4.26798982e-03   8.30245427e+01]

Error Statistics

	Absolute Error	Relative Error
Minimum:	-2.107256E+03	-1.997210E-01
Maximum:	2.442980E+03	9.181373E-02
Mean:	-6.116303E-05	-1.197525E-03
Std. Error of Mean:	1.439424E+02	5.504374E-03
Median:	-9.578261E+00	-8.665169E-05
Variance:	8.909349E+05	1.302820E-03
Standard Deviation:	9.438935E+02	3.609460E-02
Pop. Variance (N-1):	8.909349E+05	1.302820E-03
Pop. Std Dev (N-1):	9.438935E+02	3.609460E-02
Variation:	-1.543242E+07	-3.014099E+01
Skew:	1.766265E-01	-3.164948E+00
Kurtosis:	2.742834E-01	1.929426E+01

Data Statistics

	X	Y
Minimum:	2.500000E+03	1.055100E+04
Maximum:	1.000000E+06	2.080230E+05
Mean:	8.295359E+04	1.441943E+05
Std. Error of Mean:	2.253248E+04	8.525429E+03
Median:	5.624900E+04	1.659075E+05
Variance:	2.183165E+10	3.125366E+09
Standard Deviation:	1.477554E+05	5.590497E+04
Pop. Variance (N-1):	2.183165E+10	3.125366E+09
Pop. Std Dev (N-1):	1.477554E+05	5.590497E+04
Variation:	1.781181E+00	3.877057E-01
Skew:	5.448604E+00	-9.591997E-01
Kurtosis:	3.078496E+01	-2.368081E-01

Source Code in C++


```cpp
// To the best of my knowledge this code is correct.
// If you find any errors or problems please contact
// me at zunzun@zunzun.com.
//       James


#include

// sum of squared absolute error

double Gaussian_Modified2D_model(double x_in)
{
    double temp;
    temp = 0.0;

    // coefficients
    double a = 2.4180382432808139E+05;
    double b = -8.1881193989106483E+04;
    double c = 1.1142124215594478E+05;
    double d = -4.4803720002887495E+00;
    double Offset = -3.4116571244660867E+04;

    temp = a * exp(-0.5 * pow((x_in-b) / c, d));
    temp = temp + Offset;
    return temp;
}
```

Source Code in Java


```java
// To the best of my knowledge this code is correct.
// If you find any errors or problems please contact
// me at zunzun@zunzun.com.
//      James


import java.lang.Math;

// sum of squared absolute error

class Gaussian_Modified2D
{
    double Gaussian_Modified2D_model(double x_in)
    {
        double temp;
        temp = 0.0;

        // coefficients
        double a = 2.4180382432808139E+05;
        double b = -8.1881193989106483E+04;
        double c = 1.1142124215594478E+05;
        double d = -4.4803720002887495E+00;
        double Offset = -3.4116571244660867E+04;

        temp = a * Math.exp(-0.5 * Math.pow((x_in-b) / c, d));
        temp = temp + Offset;
        return temp;
    }
}
```

Source Code in Python


```python
# To the best of my knowledge this code is correct.
# If you find any errors or problems please contact
# me at zunzun@zunzun.com.
#      James


import math

# sum of squared absolute error

def Gaussian_Modified2D_model(x_in):
    temp = 0.0

    # coefficients
    a = 2.4180382432808139E+05
    b = -8.1881193989106483E+04
    c = 1.1142124215594478E+05
    d = -4.4803720002887495E+00
    Offset = -3.4116571244660867E+04

    temp = a * math.exp(-0.5 * math.pow((x_in-b) / c, d))
    temp = temp + Offset
    return temp
```

```
Source Code in C#


// To the best of my knowledge this code is correct.
// If you find any errors or problems please contact
// me at zunzun@zunzun.com.
//      James


using System;

// sum of squared absolute error

class Gaussian_Modified2D
{
    double Gaussian_Modified2D_model(double x_in)
    {
        double temp;
        temp = 0.0;

        // coefficients
        double a = 2.4180382432808139E+05;
        double b = -8.1881193989106483E+04;
        double c = 1.1142124215594478E+05;
        double d = -4.4803720002887495E+00;
        double Offset = -3.4116571244660867E+04;

        temp = a * Math.Exp(-0.5 * Math.Pow((x_in-b) / c, d));
        temp = temp + Offset;
        return temp;
    }
}
```

Source Code in SCILAB


```
// To the best of my knowledge this code is correct.
// If you find any errors or problems please contact
// me at zunzun@zunzun.com.
//      James

// sum of squared absolute error

function y=Gaussian_Modified2D_model(x_in)
    temp = 0.0

    // coefficients
    a = 2.4180382432808139E+05
    b = -8.1881193989106483E+04
    c = 1.1142124215594478E+05
    d = -4.4803720002887495E+00
    Offset = -3.4116571244660867E+04

    temp = a * exp(-0.5 * power((x_in-b) / c, d))
    temp = temp + Offset

    y = temp
endfunction
```

Source Code in MATLAB


```matlab
% To the best of my knowledge this code is correct.
% If you find any errors or problems please contact
% me at zunzun@zunzun.com.
%      James

% sum of squared absolute error

function y=Gaussian_Modified2D_model(x_in)
    temp = 0.0;

    % coefficients
    a = 2.4180382432808139E+05;
    b = -8.1881193989106483E+04;
    c = 1.1142124215594478E+05;
    d = -4.4803720002887495E+00;
    Offset = -3.4116571244660867E+04;

    temp = a .* exp(-0.5 .* power((x_in-b) ./ c, d));
    temp = temp + Offset;

    y = temp;
```

Source Code in VBA


```vba
' To the best of my knowledge this code is correct.
' If you find any errors or problems please contact
' me at zunzun@zunzun.com.
'       James



' sum of squared absolute error

Public Function Gaussian_Modified2D_model(x_in)

    temp = 0.0

    ' coefficients
    a = 2.4180382432808139E+05
    b = -8.1881193989106483E+04
    c = 1.1142124215594478E+05
    d = -4.4803720002887495E+00
    Offset = -3.4116571244660867E+04

    temp = a * Exp(-0.5 * Application.WorksheetFunction.power((x_in-b) / c, d))
    temp = temp + Offset
    Gaussian_Modified2D_model = temp
End Function
```

Histogram of Top Income
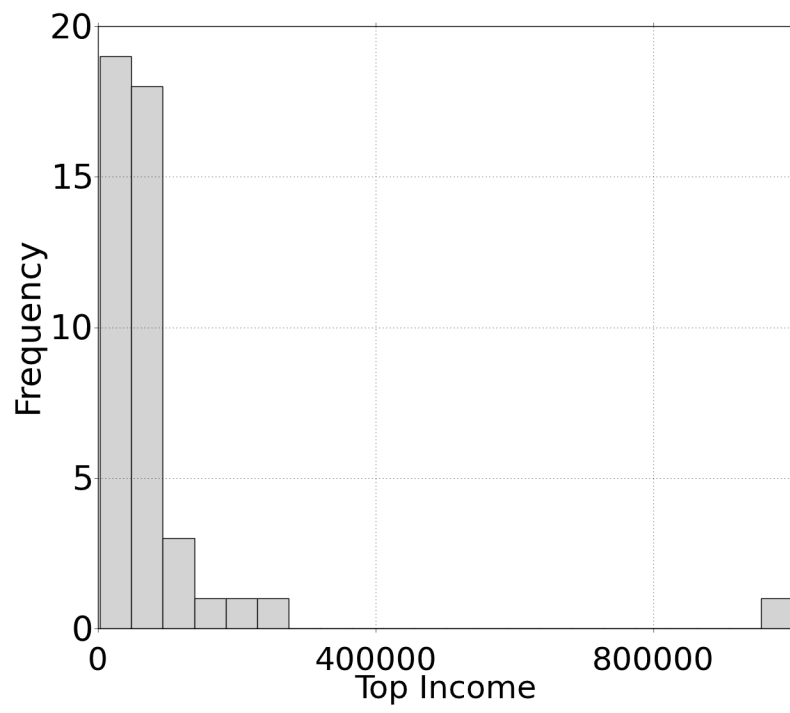
Histogram of Cumulative Number
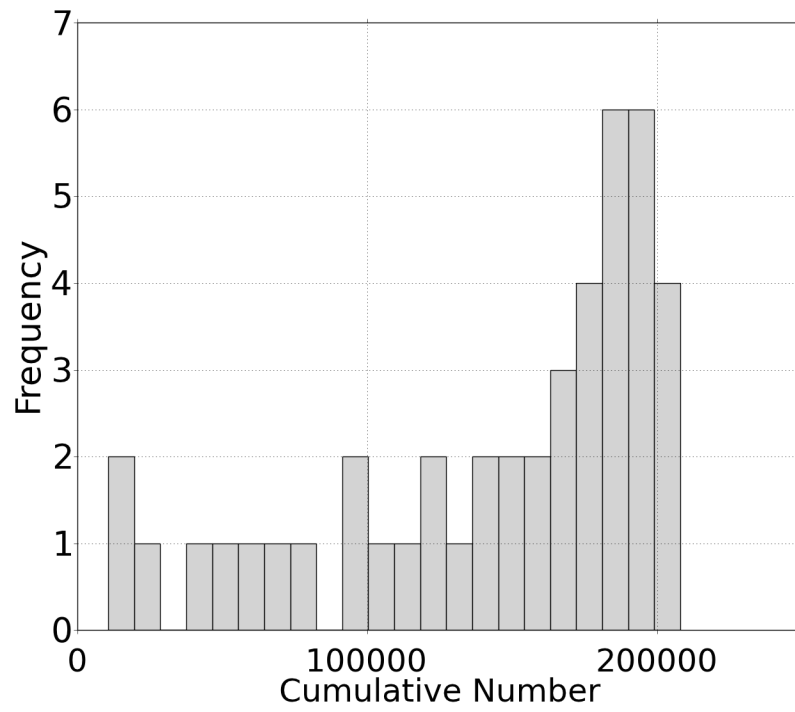
Histogram of Absolute Error
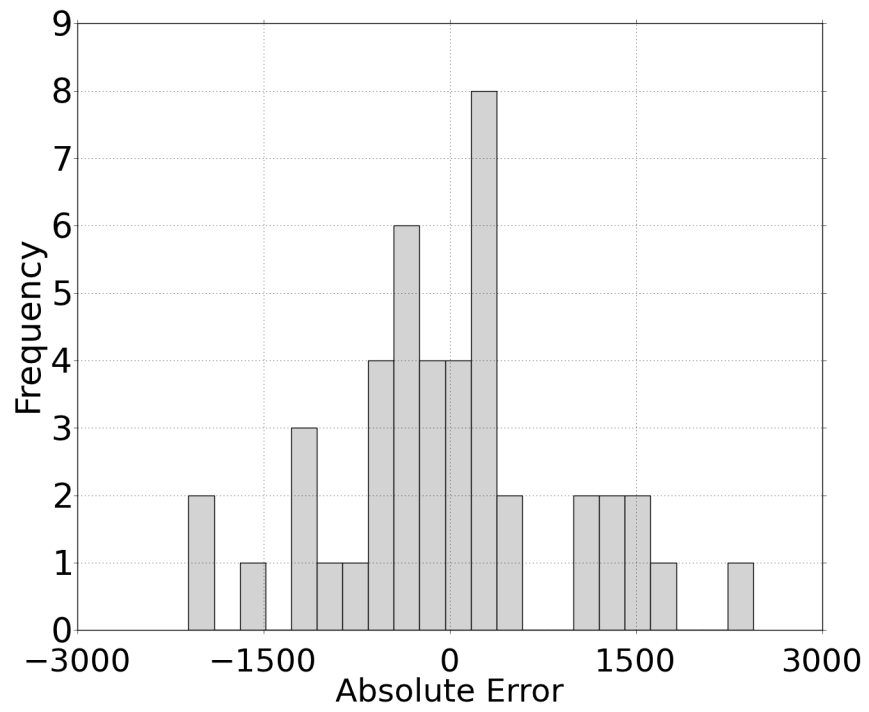
Histogram of Relative Error
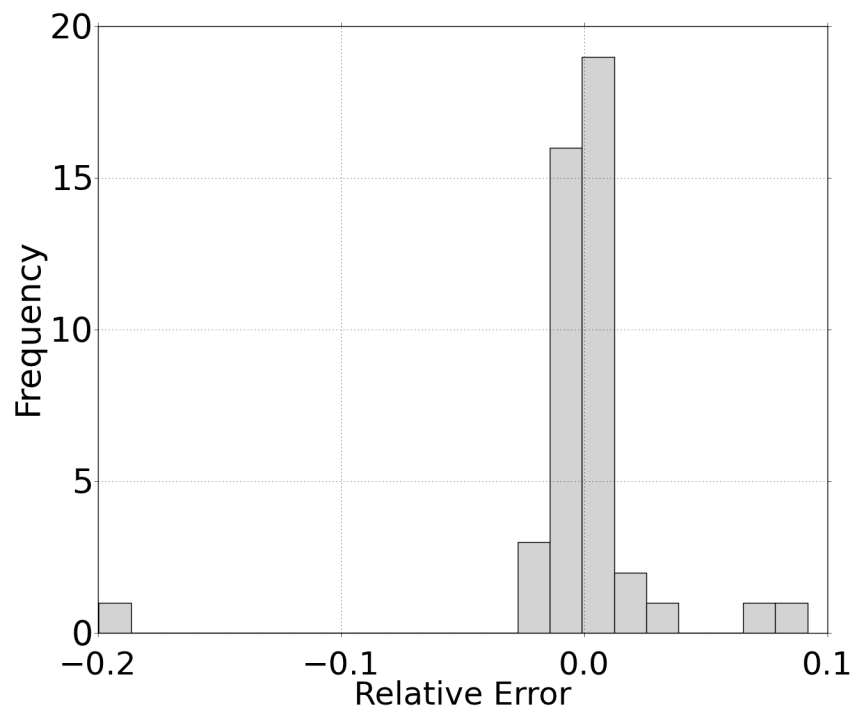
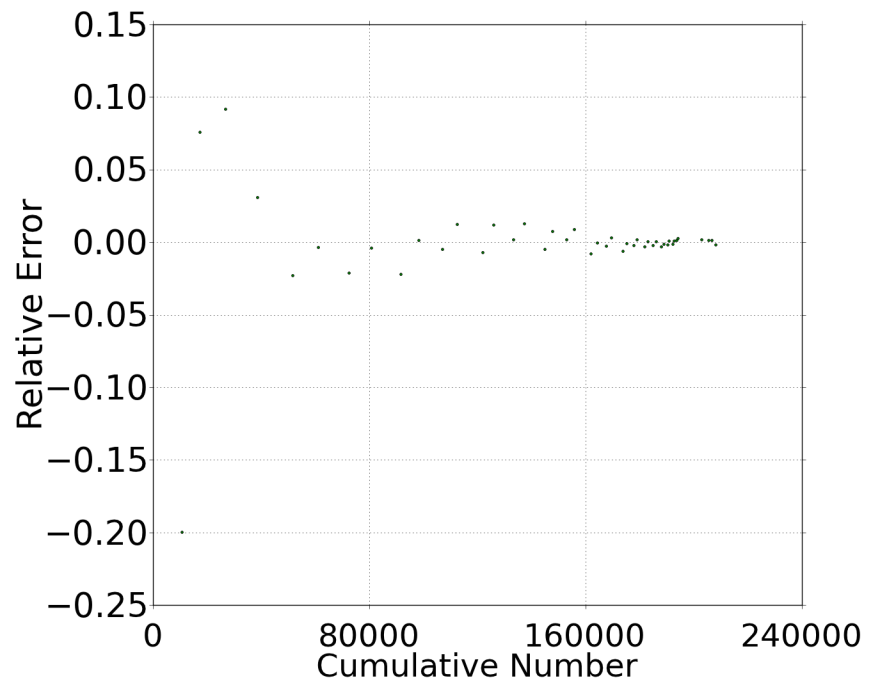Histogram of Percent Error
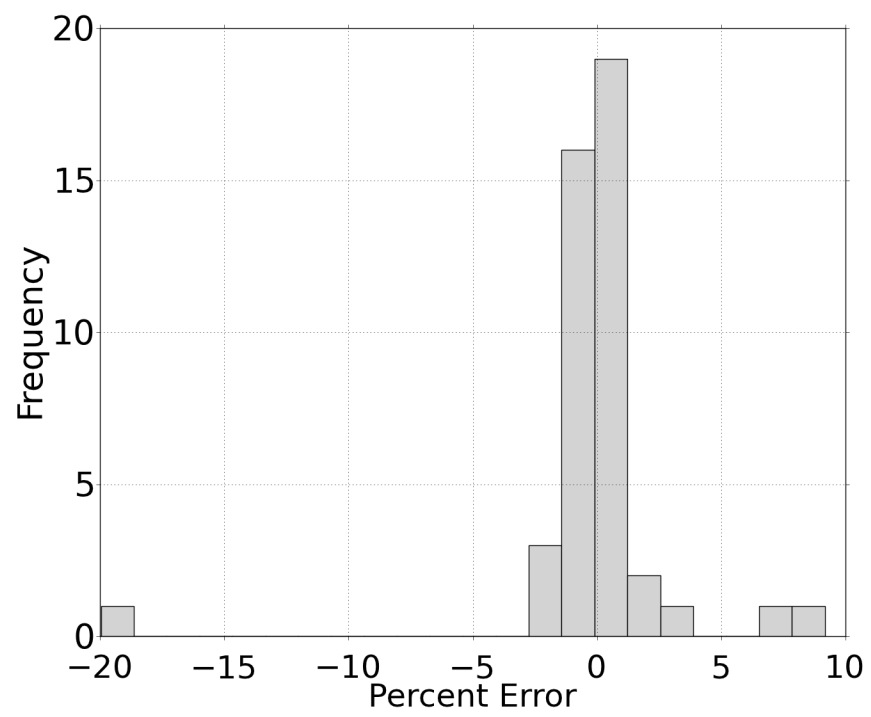
Absolute Error vs. Top Income
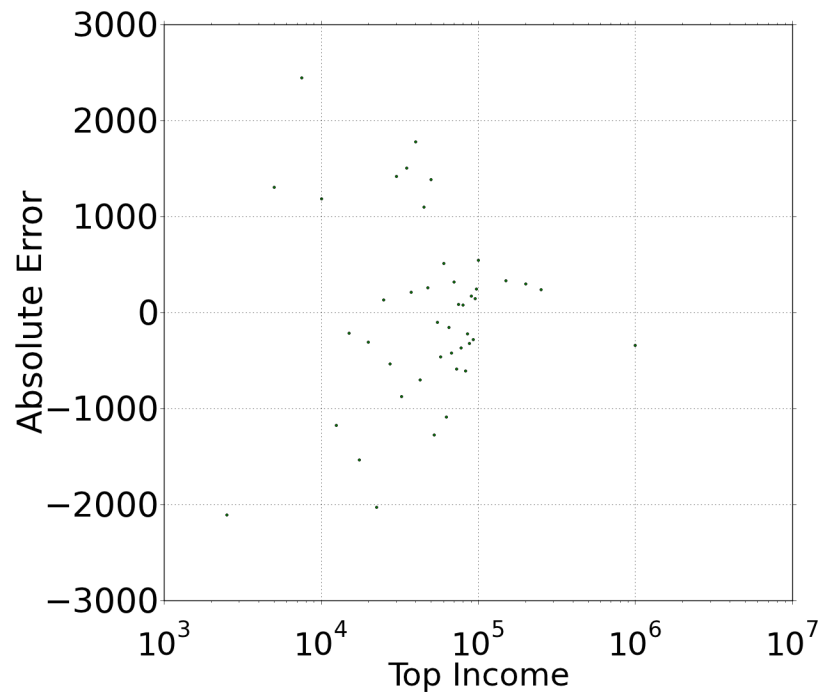
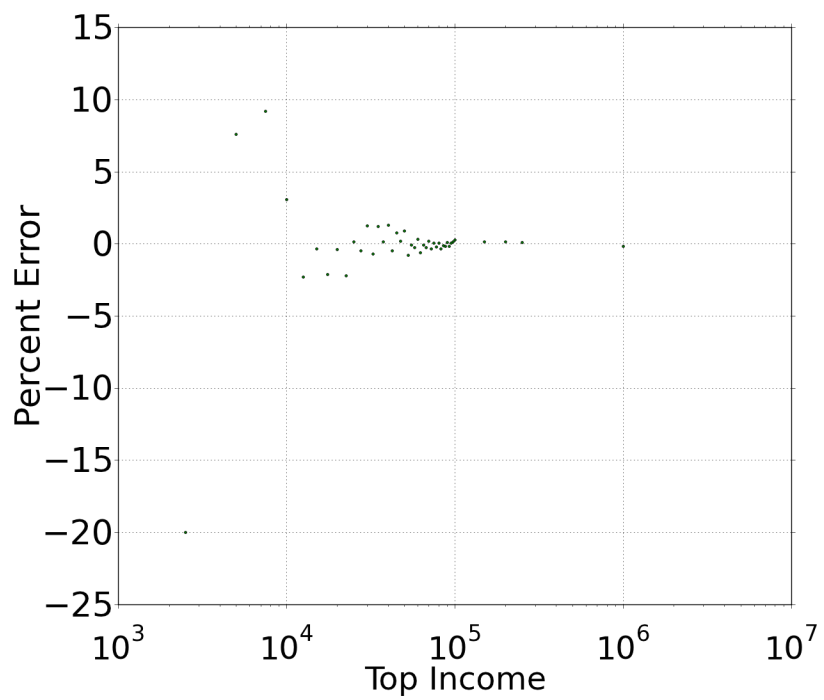Absolute Error vs. Cumulative Number
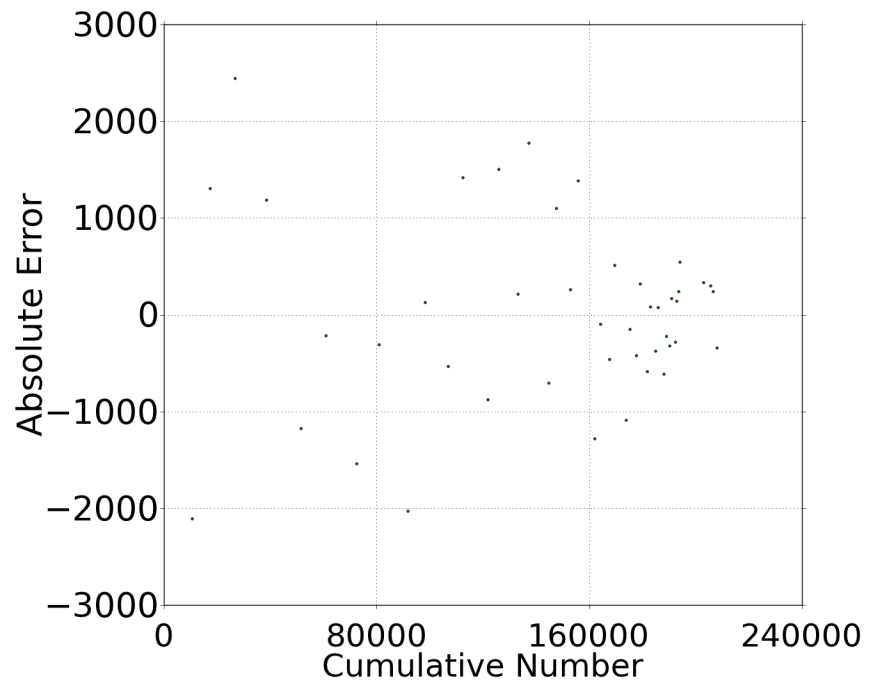
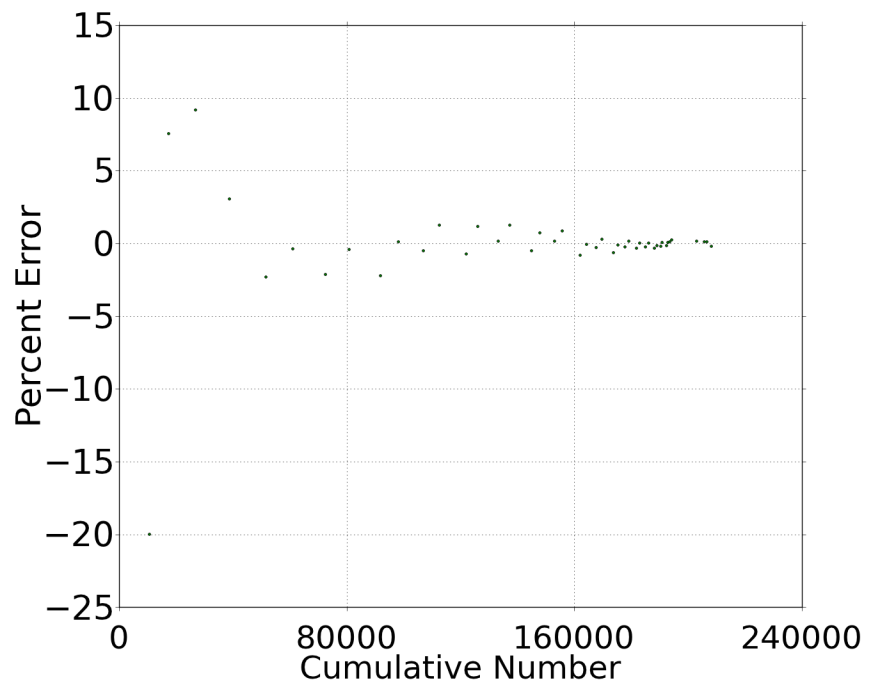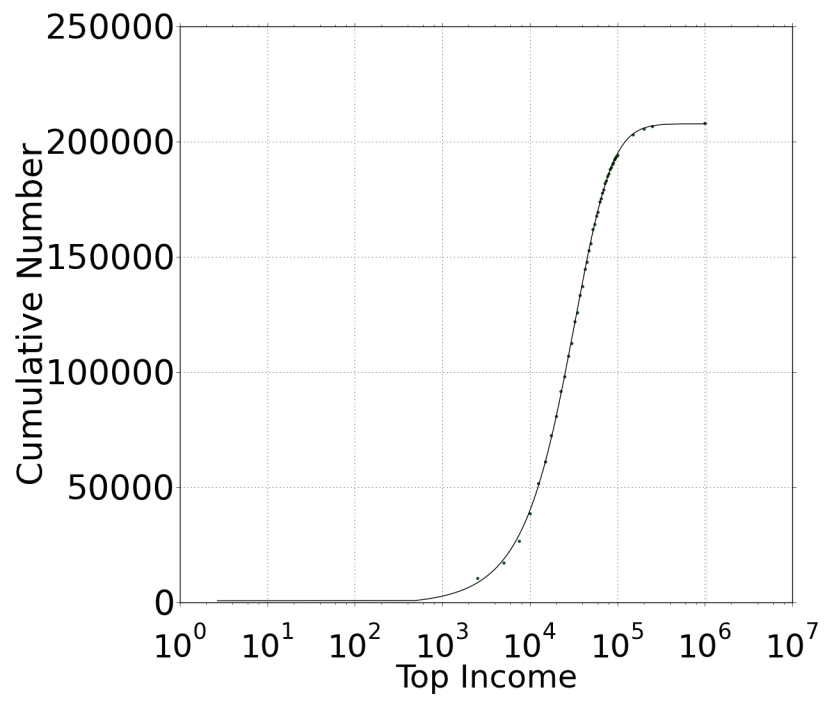Relative Error vs. Top Income
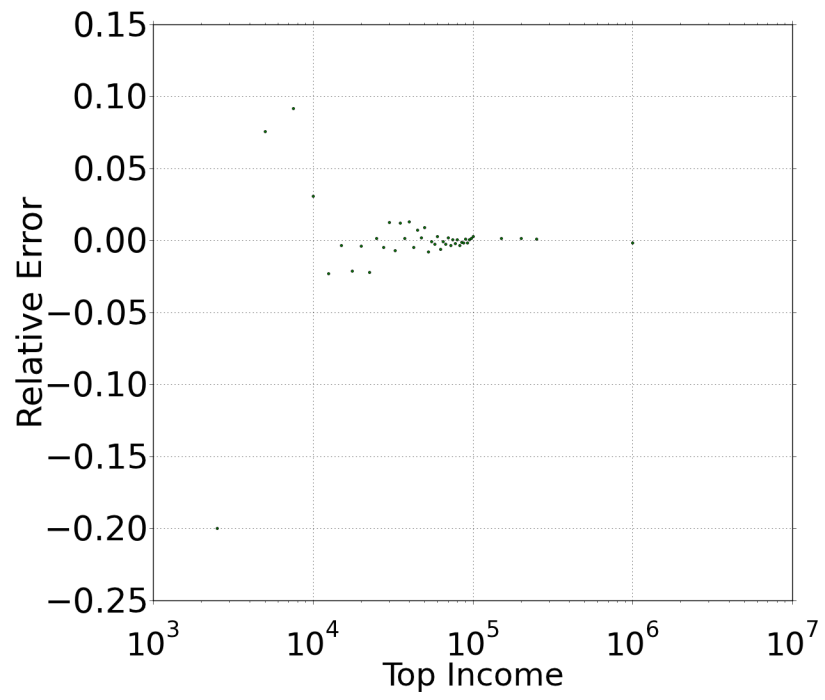
Relative Error vs. Cumulative Number
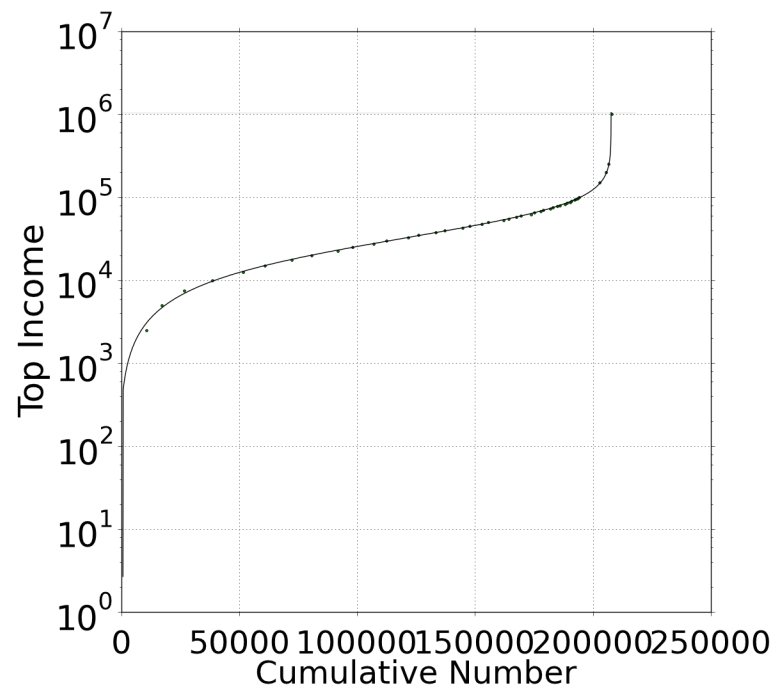
Percent Error vs. Top Income

Percent Error vs. Cumulative Number

Cumulative Number vs. Top Income with model

Top Income vs. Cumulative Number with model

Luke 1:26-33

And in the sixth month the angel Gabriel was sent from God unto a city of Galilee, named Nazareth, To a virgin espoused to a man whose name was Joseph, of the house of David; and the virgin's name was Mary. And the angel came in unto her, and said, Hail, thou that art highly favoured, the Lord is with thee: blessed art thou among women. And when she saw him, she was troubled at his saying, and cast in her mind what manner of salutation this should be. And the angel said unto her, Fear not, Mary: for thou hast found favour with God. And, behold, thou shalt conceive in thy womb, and bring forth a son, and shalt call his name JESUS. He shall be great, and shall be called the Son of the Highest: and the Lord God shall give unto him the throne of his father David: And he shall reign over the house of Jacob for ever; and of his kingdom there shall be no end.