

```

Exit[]

g = FinancialData["DAX", "1.1.2005"];

g = g[[1 ;; 767]];

g2 = Import["c:\\out.dat", "Table"];

g2 = Transpose[Transpose[g2][[1 ;; 2]]];

d = Differences[Log[#2] & @@@ g2];

n = Length[d]; Ls = Sort[d]; F = Table[{Ls[[i]], i / n}, {i, 1, n}];

fi = Table[{i / (n - 1), Ls[[i]]}, {i, n}];

Length[fi]

114

g[[1]]

{{2005, 1, 3}, 4291.53}

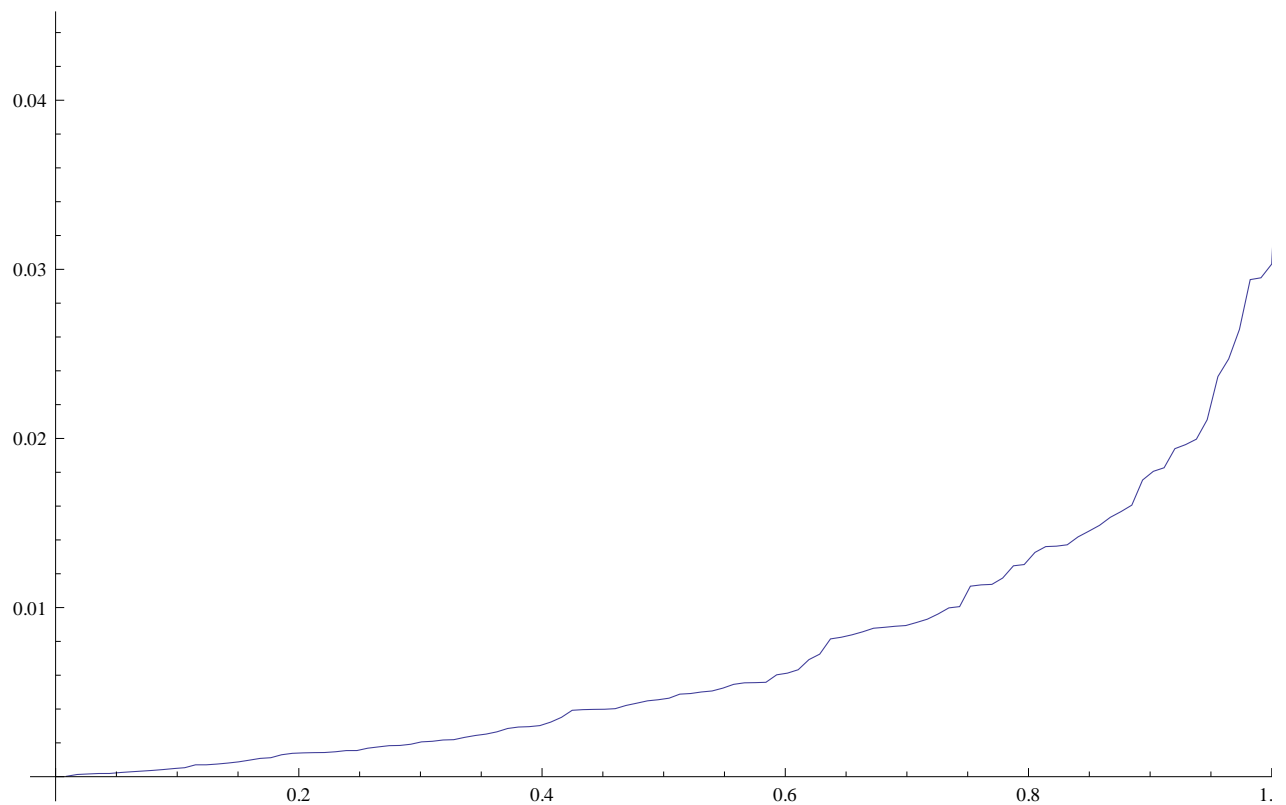
fi[[Length[fi]]]

{ $\frac{766}{765}$ , 0.0260509}

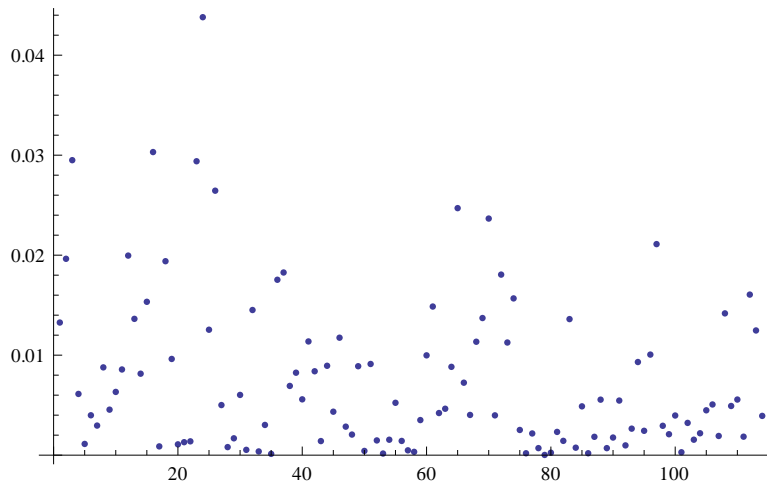
f1 = fi;

ListPlot[fi, PlotStyle -> {PointSize[Small]}, PlotRange -> All, Joined -> True]

```



ListPlot[d]



```
fi[[1]]
```

```
{0, -0.016}
```

```
Binomial[1028, 510] // N
```

```
6.93693 × 10307
```

```
Po[a_, b_] := If[b == 0, 1, If[b == -1, 0, a^b]];
```

```
bi = Table[Binomial[Length[fi] - 1, i], {i, 0, Length[fi] - 1}];
```

```
B[P_, t_] :=
```

```
  Simplify[Sum[bi[[i + 1]] P[[i + 1]] Po[1 - t, 767 - i] Po[t, i], {i, 0, 767}] // N];
```

```
DB[P_, t_] :=
```

```
  Simplify[Sum[bi[[i + 1]] P[[i + 1]] (- (767 - i) Po[1 - t, 767 - i - 1] Po[t, i] + i  
    Po[1 - t, 767 - i] Po[t, i - 1]) // N, {i, 0, 767}] // N];
```

```
D[ Po[1 - t, 767 - i] Po[t, i], t]
```

```
If[767 - i == 0, 1, If[767 - i == -1, 0, (1 - t)767-i]] If[i == 0, 0, If[i == -1, 0, i t-1+i]] +  
If[767 - i == 0, 0, If[767 - i == -1, 0, - (767 - i) (1 - t)766-i]] If[i == 0, 1, If[i == -1, 0, ti]]
```

```
Bt[t0_, fi0_] := Module[{fi = fi0, e, n, j, i, f, t = t0},
```

```
  e = fi; n = Length[e]; f = Table[0, {i, 1, n}];
```

```
  For[i = 1, i ≤ n, i++,
```

```
    For[j = 1, j ≤ n - i, j++,
```

```
      f[[j]] = -e[[j]] + e[[j + 1]] + (1 - t) f[[j]] + t f[[j + 1]];
      e[[j]] = e[[j]] (1 - t) + e[[j + 1]] t;
```

```
    ]
```

```
  ]; Print[#[[2]] / #[[1]] &[f[[1]]]];
```

```
  e[[1]]
```

```
]
```

Bt[0.88, fi]

0.0235926

{0.88115, 0.00474628}

#[[2]] / #[[1]] &[{1.0026143790849626`, 0.5973347306778085`}]

0.595777

Expand[D[Bt[0.4, fi], t]]

{0.0117647+5.20417×10⁻¹⁸ t + 2.25514×10⁻¹⁷ t² - 3.6169×10⁻¹⁶ t³ + 1.67249×10⁻¹⁵ t⁴ -
3.87624×10⁻¹⁵ t⁵ + 4.86286×10⁻¹⁵ t⁶ - 3.25434×10⁻¹⁵ t⁷ + 9.30896×10⁻¹⁶ t⁸, 0.00863184+
0.0746988 t - 0.695646 t² + 2.654 t³ - 5.7468 t⁴ + 7.53966 t⁵ - 6.01777 t⁶ + 2.71878 t⁷ - 0.534549 t⁸}

{0.0117647+5.20417×10⁻¹⁸ t + 2.25514×10⁻¹⁷ t² - 3.70797×10⁻¹⁶ t³ + 1.67943×10⁻¹⁵ t⁴ -
3.83547×10⁻¹⁵ t⁵ + 4.81082×10⁻¹⁵ t⁶ - 3.2435×10⁻¹⁵ t⁷ + 9.33498×10⁻¹⁶ t⁸,
0.00863184+0.0746988 t - 0.695646 t² + 2.654 t³ - 5.7468 t⁴ +
7.53966 t⁵ - 6.01777 t⁶ + 2.71878 t⁷ - 0.534549 t⁸}

D[-0.016 + 0.002877280254603279 t + 0.0031124496857333626 t² - 0.0027604986750069532 t³, t]

0.00287728+0.0062249 t - 0.0082815 t²

{0.3007843137254773`, -0.0010592351269937098`}

B[fi, 1 / 500]

{0.00200523, -0.0142007}

N[fi[[2, 2]], 200]

-0.0150409

-0.015040906581798907`

-0.015040906581798907

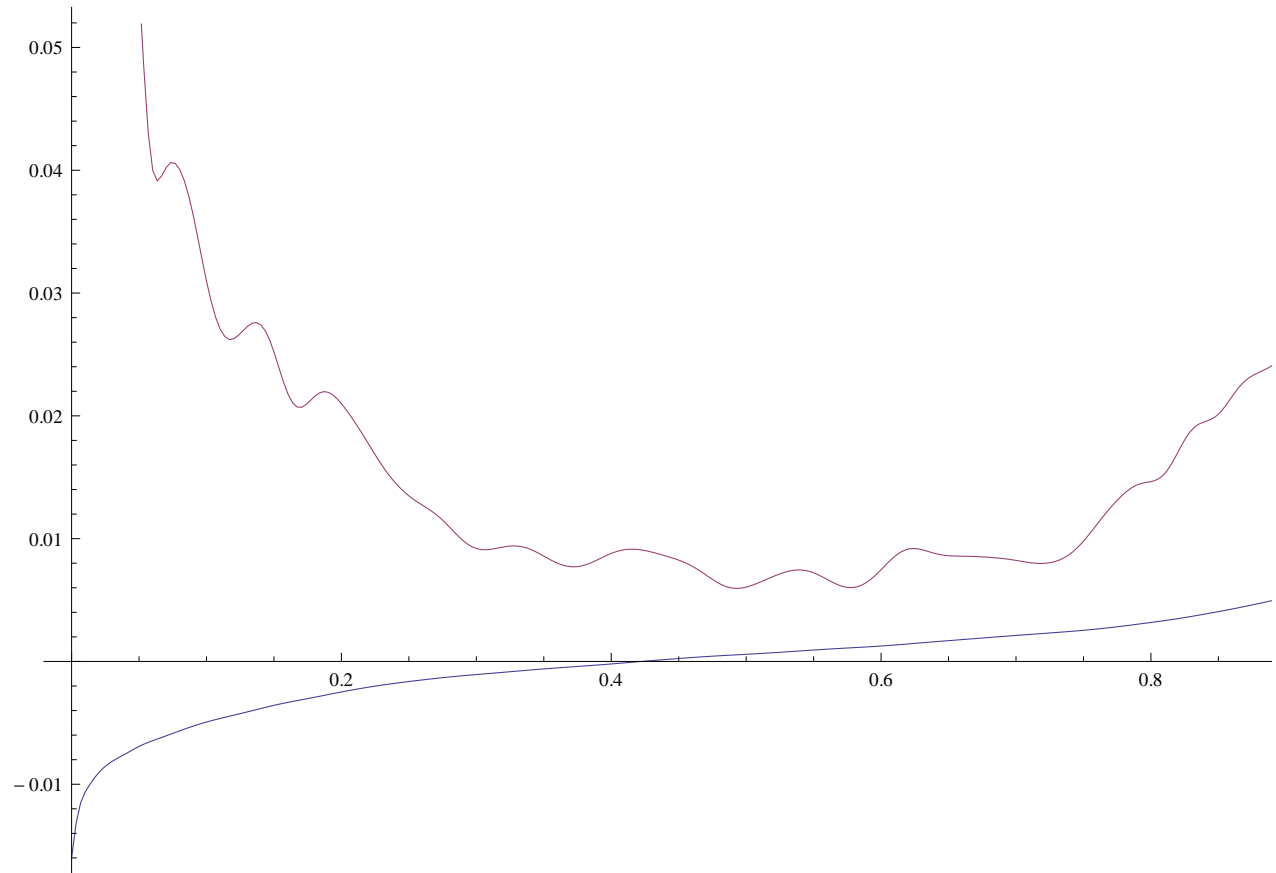
Length[fi]

768

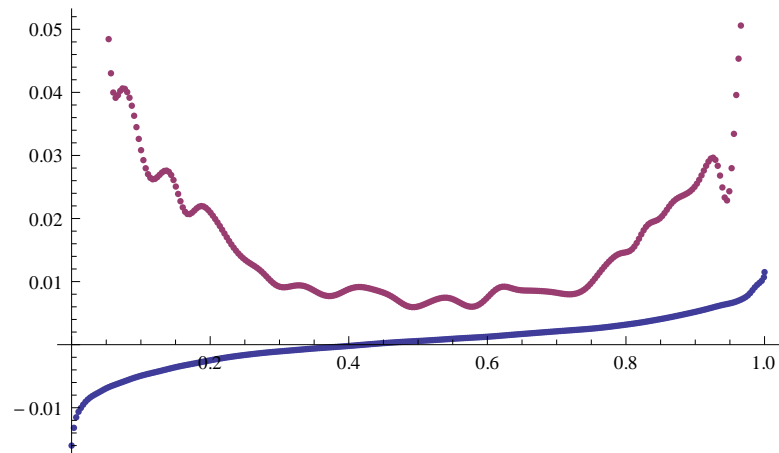
```

nN = 300; tt = Table[B[fi, t / nN], {t, 0, nN}];
dt = Table[{tt[[t + 1, 1]], #[[2]] / #[[1]] & [DB[fi, t / nN]]}, {t, 0, nN - 1}];
ListPlot[{tt, dt}, Joined -> True]

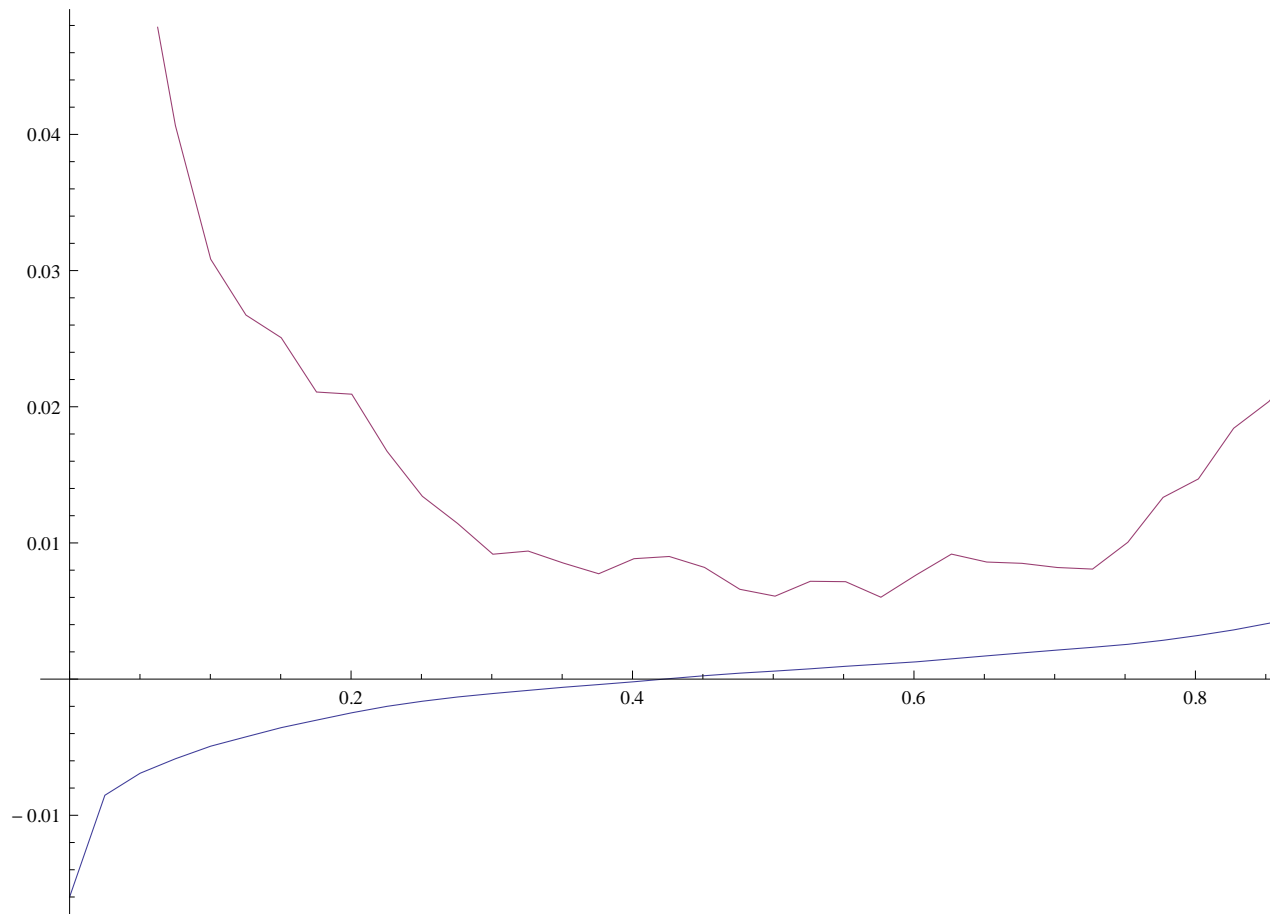
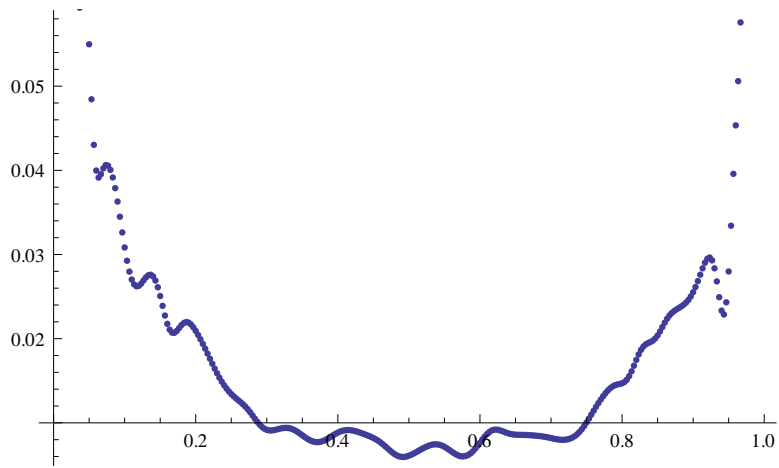
```



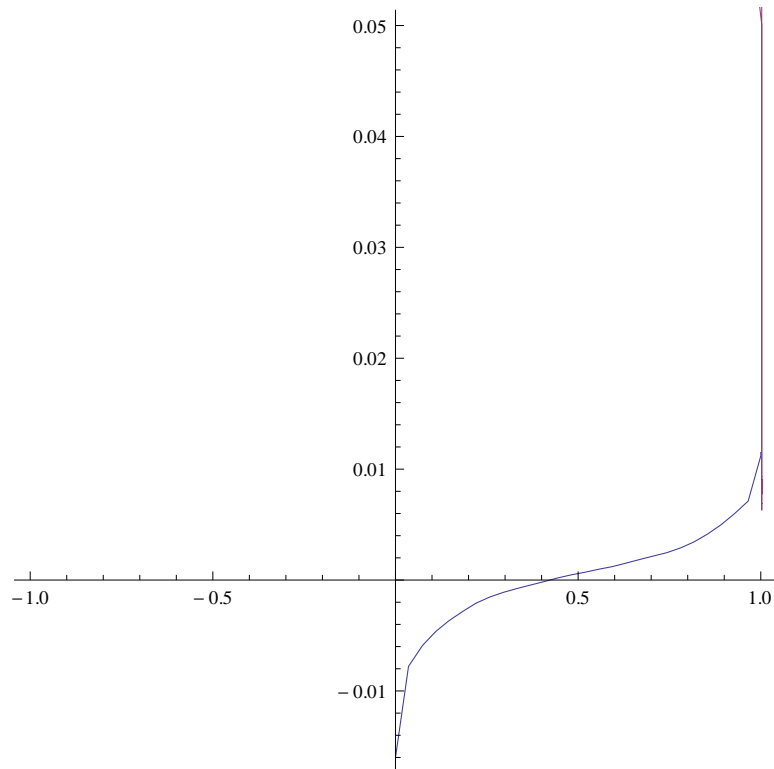
```
ListPlot[{tt, dt}]
```



```
test = Table[{i / nN // N, #[[2]]} & [dt[[i + 1]]], {i, 0, nN - 1}];
```

ListPlot[test]

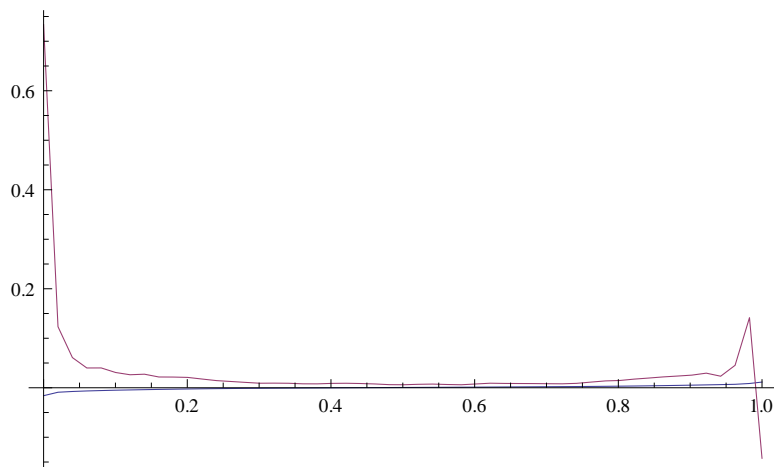
```
ParametricPlot[{B[fi, t], DB[fi, t]}, {t, 0, 1},
  AspectRatio -> 1, PlotPoints -> 28, MaxRecursion -> 0]
```



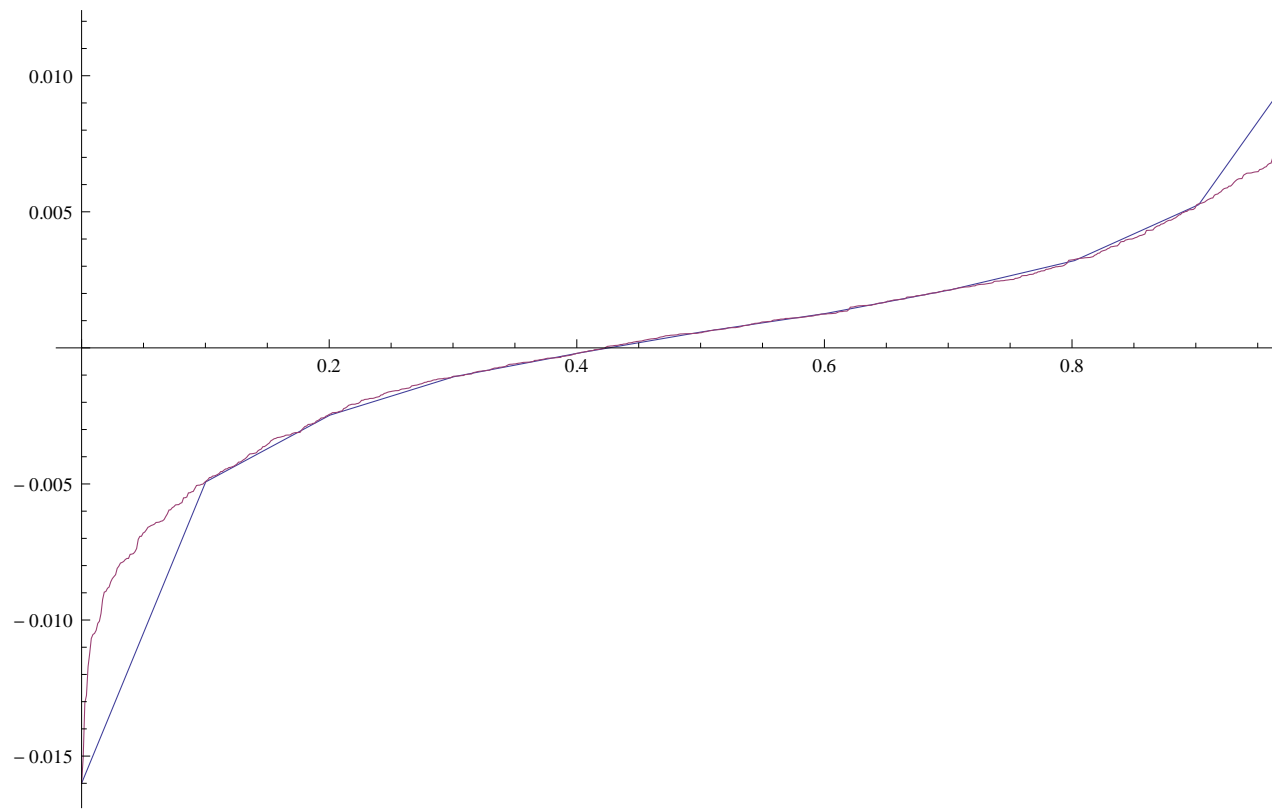
```
nN = 50; tt = Table[B[fi, i / nN], {i, 0, nN}];
```

```
dd = Table[
  {tt[[i + 1, 1]], (#[[2]] / #[[1]]) & [D[B[fi, t], t] /. t -> i / nN]}, {i, 0, nN}] // N;
```

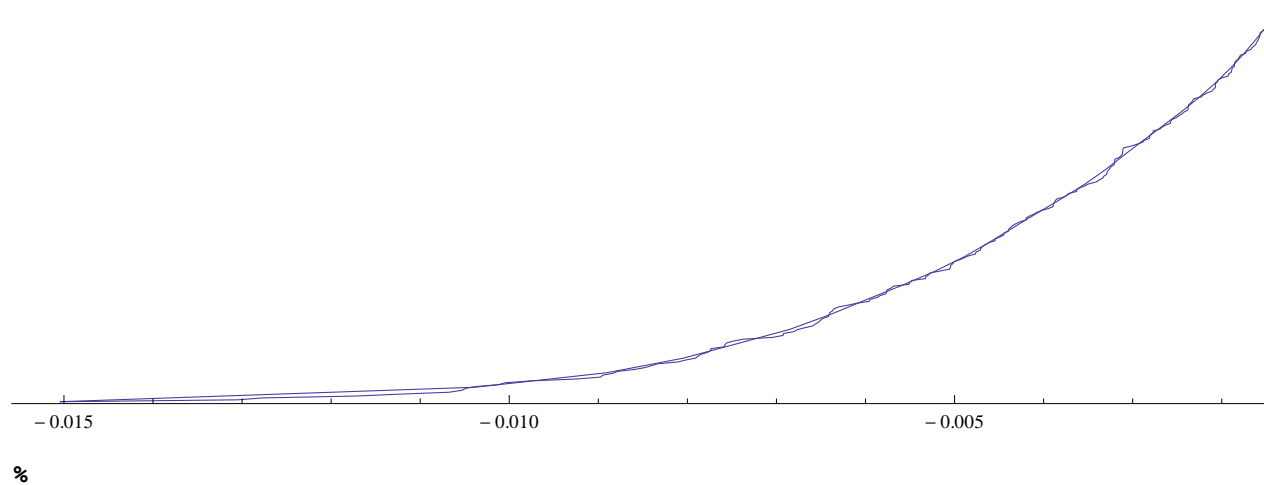
```
ListPlot[{tt, dd}, Joined -> True, PlotRange -> All]
```



```
ListPlot[{tt, fi}, Joined → True, PlotRange → All]
```



```
Show[ListPlot[B[F, #] & /@ tt, Joined → True],  
ListPlot[F, Joined → True, PlotStyle → {PointSize[Small]}]]
```




```
f = Normal[Series[-Cos[3 x], {x, 0.5, 10}]]
```

```
-0.0707372 + 2.99248 (-0.5 + x) + 0.318317 (-0.5 + x)^2 - 4.48873 (-0.5 + x)^3 -  
0.238738 (-0.5 + x)^4 + 2.01993 (-0.5 + x)^5 + 0.0716214 (-0.5 + x)^6 - 0.432842 (-0.5 + x)^7 -  
0.0115106 (-0.5 + x)^8 + 0.0541052 (-0.5 + x)^9 + 0.00115106 (-0.5 + x)^10
```

```
Plot[{f, g, Inverse[-Cos[3 y], y] /. y -> x}, {x, 0, 1}]
```

Inverse::nonopt : Options expected (instead of y) beyond position

1 in Inverse[-Cos[3 y], y]. An option must be a rule or a list of rules. >>

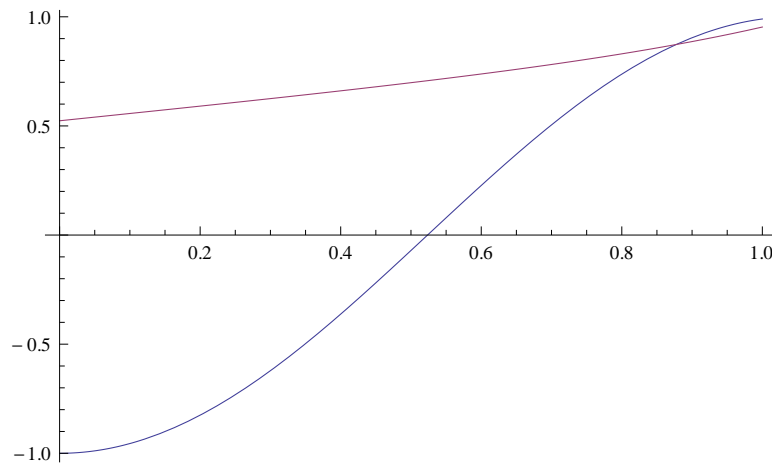
Inverse::nonopt : Options expected (instead of 0.000020428571428571428`) beyond position

1 in Inverse[-1., 0.0000204286]. An option must be a rule or a list of rules. >>

Inverse::nonopt : Options expected (instead of 0.02042859183673469`) beyond position 1 in

Inverse[-0.998123, 0.0204286]. An option must be a rule or a list of rules. >>

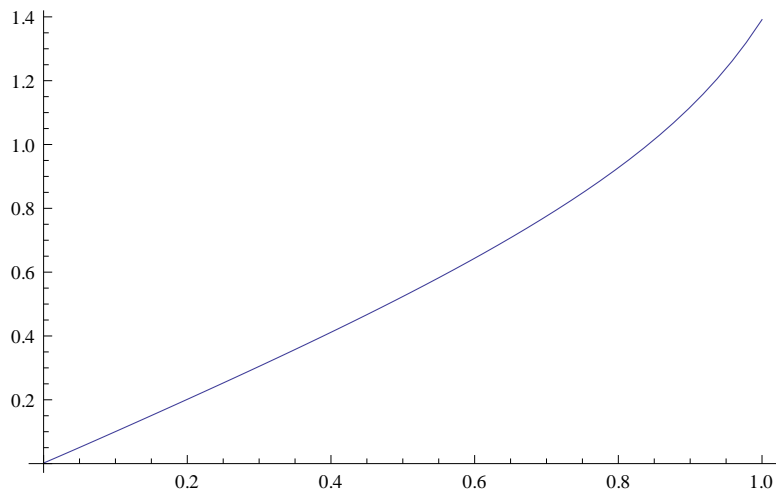
General::stop : Further output of Inverse::nonopt will be suppressed during this calculation. >>



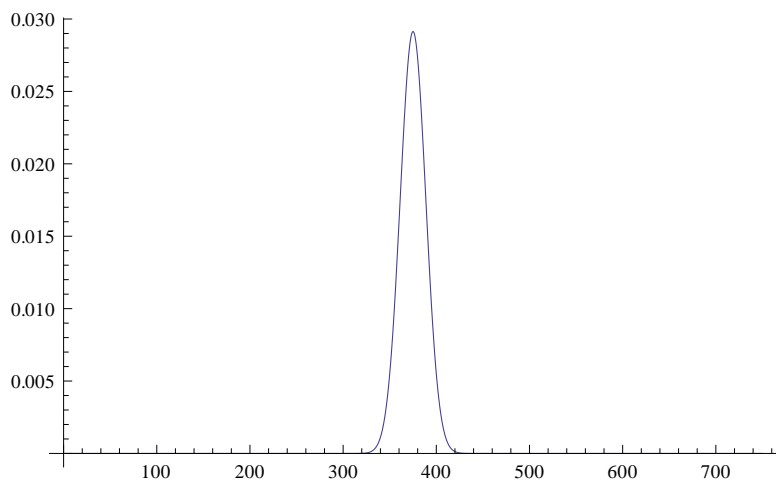
```
g = Normal[InverseSeries[Series[-Cos[3 x], {x, 0.5, 10}]]]
```

```
0.5 + 0.33417 (0.0707372 + x) - 0.0118786 (0.0707372 + x)^2 +  
0.0568196 (0.0707372 + x)^3 - 0.00902878 (0.0707372 + x)^4 + 0.0265961 (0.0707372 + x)^5 -  
0.00767575 (0.0707372 + x)^6 + 0.0167681 (0.0707372 + x)^7 -  
0.00689638 (0.0707372 + x)^8 + 0.0122862 (0.0707372 + x)^9 - 0.00641364 (0.0707372 + x)^10
```

```
Plot[g, {x, 0, 1}]
```



```
Plot[PDF[NormalDistribution[p nN, Sqrt[nN p (1 - p)]], x], {x, 0, 750}, PlotRange -> All]
```



```
p = 0.001; nN = 750; m = 50; Plot[n!, {n, 0, 1000}, PlotRange -> All]
```

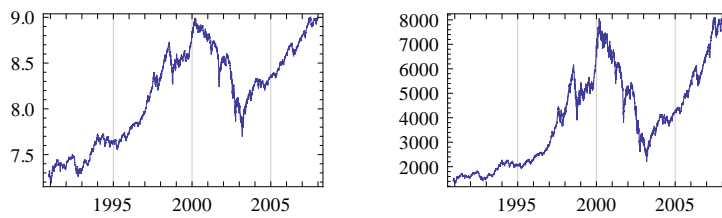
```
Binomial[1000, 400]
```

```
496 527 238 625 422 886 115 073 562 889 623 132 621 341 353 659 827 604 662 932 184 012 645 905 732 096 \
457 382 164 964 136 575 507 417 172 339 042 089 778 751 904 887 857 092 411 910 579 077 412 408 539 948 \
204 974 129 778 390 437 393 954 251 676 800 524 680 653 478 266 662 364 352 619 244 180 931 154 020 701 \
111 982 328 000 776 980 305 955 525 649 501 369 943 202 079 996 789 539 150
```

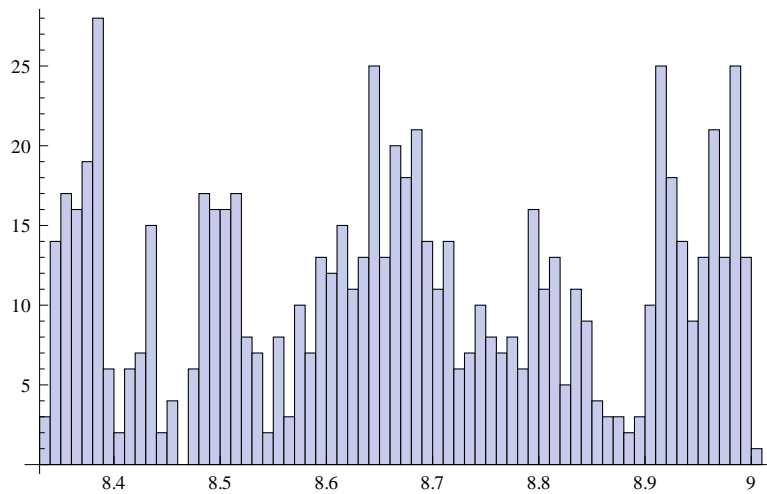
```
g[[1]]
```

```
{{1990, 11, 26}, 1443.2}
```

```
GraphicsRow[{DateListPlot[{{#1, Log[#2]} & @@@ g, Joined → True},
  DateListPlot[{g}, Joined → True]]]
```

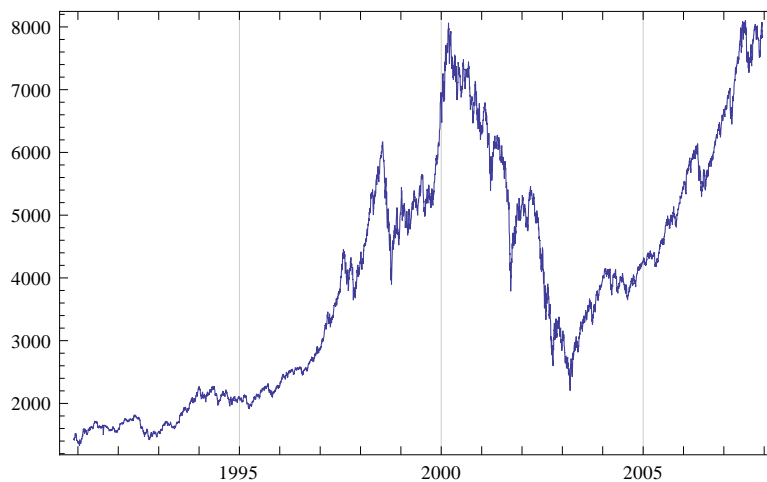


```
Histogram[Log[#2] & @@@ g, HistogramCategories → 50]
```

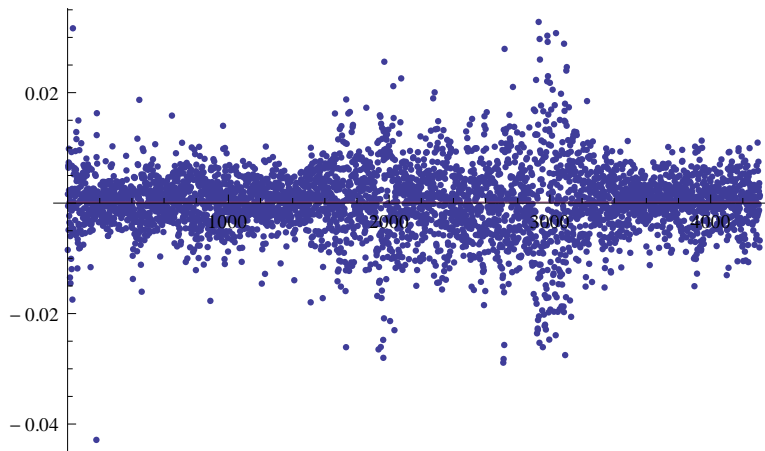


```
d = Differences[Log[10, #2] & @@@ g];
```

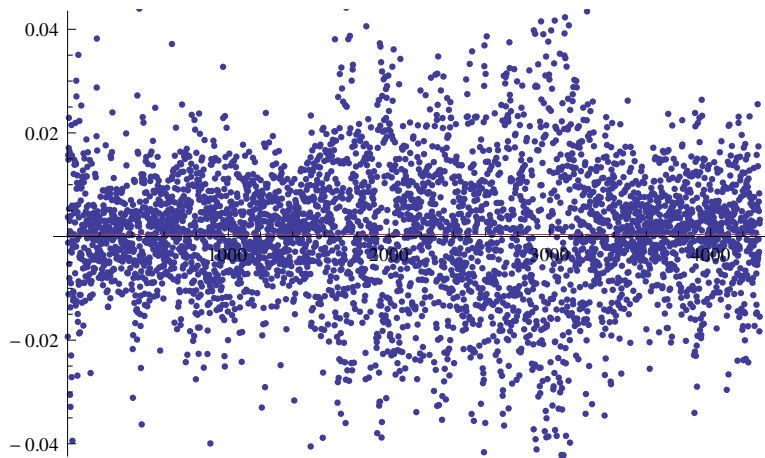
```
DateListPlot[{g}, Joined → True]
```



```
Show[ListPlot[d, PlotRange -> All], Plot[{, Mean[d]}, {x, 0, Length[d]}]]
```



```
Show[ListPlot[10 ^ d - 1], Plot[{, 10 ^ Mean[d] - 1}, {x, 0, Length[d]}]]
```



```
Mean[d]
```

```
Log[10, g[[Length[g], 2]] / g[[1, 2]]] / Length[d]
```

```
0.000357102
```

```
0.000357102
```

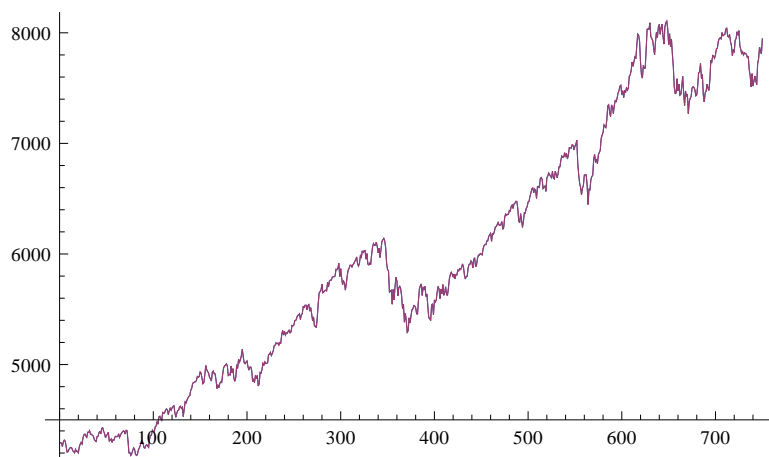
```
U = {g[[1, 2]]};
```

```
For[i = 0, i < Length[d], i++,
```

```
  AppendTo[U, U[[i + 1]] 10 ^ (d[[i + 1]])];
```

```
]
```

```
ListPlot[{U, #2 & @@@ g}, Joined -> True]
```



```
<< Histograms`
```

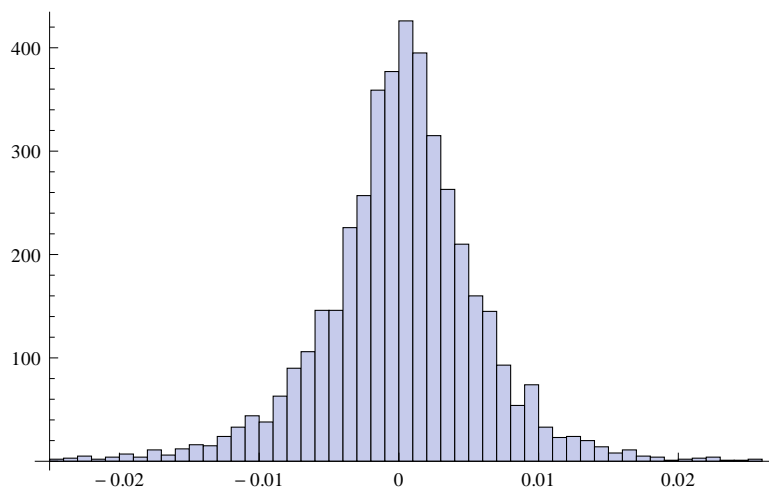
HistogramCategories::shdw :

Symbol HistogramCategories appears in multiple contexts {Histograms`, Global`}; definitions in context Histograms` may shadow or be shadowed by other definitions.

Histogram::shdw :

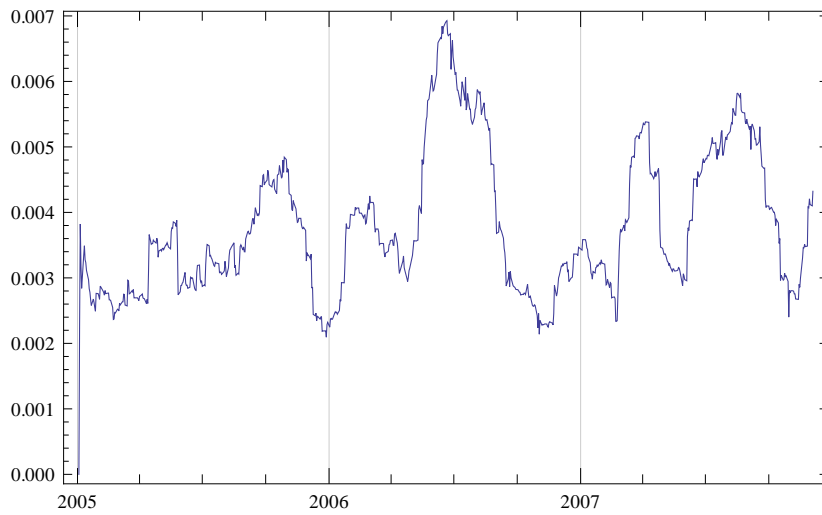
Symbol Histogram appears in multiple contexts {Histograms`, Global`}; definitions in context Histograms` may shadow or be shadowed by other definitions.

```
Histogram[d, HistogramCategories -> 80; HistogramRange -> {-0.025, 0.025}]
```

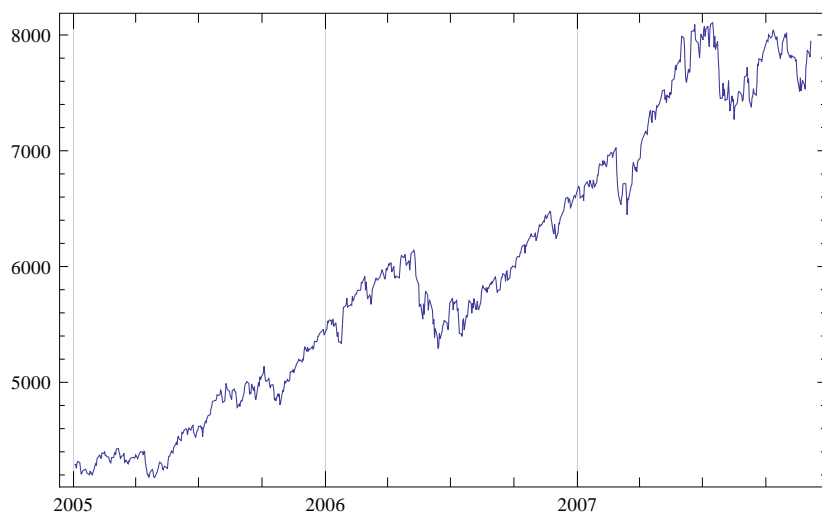


```
sd[i_, n_] := If[i == 1, 0, StandardDeviation[d[[Max[i - n + 1, 1] ;; i]]]]
```

```
DateListPlot[Table[{g[[i, 1]], sd[i, 30]}, {i, 1, Length[d]}], Joined -> True]
```



```
DateListPlot[{g}, Joined -> True]
```



```
vd = FinancialData["VIX", "1.1.2005"];
```

FinancialData::notent : VIX is not a known entity in FinancialData.

g

```
{{{2005, 2, 24}, 0.22}, {{2005, 6, 23}, 0.22}, {{2005, 9, 22}, 0.22}, {{2005, 12, 22}, 0.25},
{{2006, 2, 23}, 0.25}, {{2006, 6, 22}, 0.25}, {{2006, 9, 21}, 0.25}, {{2006, 12, 21}, 0.28},
{{2007, 2, 22}, 0.28}, {{2007, 6, 21}, 0.28}, {{2007, 9, 20}, 0.28}}
```