In[1]:=

```
(* Changes from version 1:

MM data entered & changes made to allow it to be used instead
of non-interest bearing cash if desired, although it was decided
in the end not to use it.  Whether or not to use it depends on
the definition of BlendedInstrument below.

Some other definitions were rewritten so that they can work
with either MM data or non-interest-bearing cash.  The rewriting
was in the sections containing
        (* Max "Max Deviation" for various alphas *)
and
        (* Average of "Squared Deviation" for various alphas *)
because before, "alpha=0" == MaleSeventy, but now, "alpha=0"
could mean MaleSeventy mixed with MM fluctuation.

For similar reasons, the definition of
        UnhedgedVsHedgedDeviations
had to be changed (and "MaleSeventy" changed to "person").
Also, in the
        (* All Persons, Both Criteria, All Instruments *)
sections, an extra line had to be added to give "100% Money
Market" variations (which, if non-interest-bearing cash is still
used, just repeats the previous line).

I considered changing the definition of AllYears to make the
        periods 13 months (12 hedging periods), but decided not
        to.
*)

MainMatrix ={
(*
{"","M 60","F 60","M 65","F 65","M 70","F 70","M 75","F 75","Sh Indx",
"Int Indx","Lng Indx","Sh Corp","Int Corp","LongCorp"},
{"Oct-02,,,,,,,,,7.86,7.28,7.67,7.88,6.64,5.98},
{"Nov-02,,,,,,,,,7.86,7.21,7.47,7.86,6.56,5.75},
{"Dec-02,,,,,,,,,7.81,7.17,7.46,7.86,6.56,5.79},
*)
{"Jan-03",603,573,652,616,720,673,795,752,7.94,7.44,7.79,7.98,6.75,6.05},
{"Feb-03",605,575,654,618,722,674,796,752,7.92,7.41,7.77,7.99,6.75,6.07},
{"Mar-03",599,569,648,612,716,668,793,748,7.98,7.59,7.99,8.04,6.87,6.25},
{"Apr-03",589,559,638,602,706,660,782,739,7.99,7.58,7.91,8.07,6.88,6.18},
{"May-03",587,557,636,600,704,669,785,741,8.03,7.68,8.08,8.12,6.96,6.33},
{"Jun-03",571,541,620,584,688,642,765,723,8.12,7.95,8.51,8.2,7.15,6.67},
{"Jul-03",563,533,612,576,680,632,755,714,8.13,7.92,8.39,8.23,7.16,6.58},
{"Aug-03",576,546,625,589,693,648,770,728,8.02,7.53,7.66,8.16,6.91,6.02},
```

In[1]:=

```
{"Oct-03",578,548,627,591,695,650,771,732,8.16,7.87,8.22,8.26,7.15,6.44},
{"Nov-03",579,549,628,592,696,651,771,731,8.11,7.75,8.03,8.24,7.08,6.33},
{"Dec-03",581,551,630,594,698,653,773,732,8.12,7.78,8.08,8.25,7.11,6.36},
{"Jan-04",584,554,633,597,701,655,776,736,8.17,7.87,8.2,8.3,7.18,6.45},
{"Feb-04",576,546,625,589,693,649,769,730,8.19,7.96,8.34,8.33,7.25,6.57},
{"Mar-04",576,546,625,589,693,648,767,729,8.26,8.07,8.5,8.39,7.33,6.67},
{"Apr-04",569,539,618,582,686,642,762,723,8.3,8.16,8.62,8.43,7.4,6.76},
{"May-04",581,551,630,594,698,653,773,734,8.17,7.87,8.15,8.33,7.19,6.41},
{"Jun-04",584,554,633,597,701,656,776,737,8.15,7.8,8.09,8.31,7.13,6.37},
{"Jul-04",592,562,641,605,709,665,783,749,8.15,7.85,8.16,8.32,7.16,6.42},
{"Aug-04",590,560,639,603,707,663,782,744,8.2,7.95,8.3,8.36,7.25,6.53},
{"Sep-04",585,555,634,598,702,658,777,737,8.3,8.16,8.62,8.43,7.41,6.78},
{"Oct-04",580,550,629,593,697,654,771,732,8.3,8.19,8.7,8.44,7.44,6.84},
{"Nov-04",578,548,627,591,695,651,769,730,8.34,8.28,8.83,8.47,7.51,6.95},
{"Dec-04",578,548,627,591,695,651,769,730,8.28,8.17,8.67,8.43,7.43,6.84},
{"Jan-05",573,543,622,586,690,647,765,726,8.31,8.28,8.89,8.47,7.52,6.99},
{"Feb-05",572,542,621,585,689,645,763,724,8.3,8.33,9.12,8.47,7.56,7.18},
{"Mar-05",571,541,620,584,688,644,763,723,8.27,8.25,9.02,8.46,7.51,7.11},
{"Apr-05",578,548,627,591,695,651,770,731,8.25,8.17,8.9,8.44,7.46,7.04},
{"May-05",575,545,624,588,692,648,768,729,8.31,8.32,9.16,8.5,7.57,7.24},
{"Jun-05",569,539,618,582,686,643,764,723,8.36,8.44,9.39,8.54,7.65,7.4},
{"Jul-05",568,538,617,581,685,641,763,722,8.39,8.51,9.54,8.57,7.7,7.53},
{"Aug-05",566,536,615,579,683,639,761,721,8.34,8.38,9.32,8.55,7.61,7.35},
{"Sep-05",566,536,615,579,683,640,761,721,8.42,8.53,9.57,8.61,7.73,7.55},
{"Oct-05",583,553,632,596,700,650,763,723,8.37,8.4,9.27,8.6,7.64,7.29},
{"Nov-05",576,546,625,589,693,650,770,730,8.35,8.3,9.09,8.59,7.57,7.14},
{"Dec-05",579,549,628,592,696,652,774,733,8.38,8.34,9.16,8.63,7.61,7.2},
{"Jan-06",575,545,624,588,692,648,770,728,8.42,8.43,9.36,8.66,7.67,7.36},
{"Feb-06",577,547,626,590,694,650,772,731,8.43,8.4,9.28,8.68,7.66,7.27},
{"Mar-06",582,552,631,595,699,655,777,735,8.43,8.41,9.38,8.7,7.67,7.37},
{"Apr-06",592,562,639,601,709,662,784,742,8.42,8.31,9.05,8.71,7.6,7.09},
{"May-06",595,565,644,605,712,665,787,745,8.44,8.27,8.88,8.74,7.57,6.95},
{"Jun-06",598,568,648,608,715,668,790,748,8.46,8.27,8.86,8.75,7.58,6.94},
{"Jul-06",595,565,644,606,712,664,787,744,8.46,8.27,8.89,8.78,7.58,6.96},
{"Aug-06",597,567,646,608,714,667,789,747,8.55,8.39,9.07,8.84,7.68,7.1},
{"Sep-06",594,564,640,608,711,665,786,745,8.62,8.56,9.35,8.92,7.82,7.32},
{"Oct-06",594,564,640,608,711,665,786,745,8.67,8.65,9.5,8.98,7.89,7.46},
{"Nov-06",592,562,638,606,709,663,784,743,8.71,8.71,9.61,9.03,7.95,7.56},
{"Dec-06",591,561,640,600,708,662,783,742,8.77,8.82,9.82,9.09,8.05,7.74},
{"Jan-07",578,548,633,597,699,659,777,740,8.76,8.76,9.62,9.1,8.01,7.57},
{"Feb-07",587,556,641,605,707,666,785,747,8.78,8.74,9.56,9.12,8.01,7.52},
{"Mar-07",582,551,636,601,703,662,781,743,8.87,8.91,9.86,9.21,8.16,7.77},
{"Apr-07",583,552,624,601,703,661,779,741,8.9,8.89,9.7,9.24,8.15,7.62},
{"May-07",586,555,641,604,705,663,781,742,8.93,8.95,9.8,9.29,8.2,7.7},
{"Jun-07",590,561,645,610,710,669,785,749,8.9,8.84,9.63,9.26,8.11,7.56},
{"Jul-07",598,568,652,617,717,676,793,756,8.93,8.8,9.53,9.28,8.08,7.47},
{"Aug-07",600,569,654,617,718,677,795,757,9.01,8.89,9.64,9.35,8.15,7.52},
```

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{"Sep-07",600,570,654,617,718,677,795,756,9.1,9.04,9.81,9.39,8.23,7.59},
{"Oct-07",600,572,654,618,718,676,794,756,9.16,9.1,9.86,9.46,8.29,7.64},
{"Nov-07",599,569,652,616,716,675,794,754,9.21,9.19,10.04,9.52,8.37,7.77]
{"Dec-07",593,563,647,611,710,670,785,747,9.37,9.42,10.28,9.63,8.52,7.89]
{"Jan-08",602,579,655,618,718,677,793,753,9.4,9.43,10.26,9.63,8.51,7.86},
{"Feb-08",594,564,647,610,708,667,761,743,9.59,9.66,10.38,9.78,8.68,7.86]
{"Mar-08",609,580,661,625,721,681,793,756,9.68,9.73,10.36,9.82,8.7,7.81},
{"Apr-08",610,581,662,626,721,681,792,756,9.68,9.73,10.38,9.75,8.65,7.8},
{"May-08",614,584,665,629,726,686,797,760,9.6,9.65,10.38,9.72,8.61,7.81},
{"Jun-08",614,584,665,626,727,687,798,761,9.57,9.52,10.16,9.74,8.55,7.66]
{"Jul-08",622,591,674,638,737,696,810,772,9.58,9.52,10.23,9.73,8.52,7.71]
{"Aug-08",625,595,678,641,742,701,815,777,9.6,9.52,10.15,9.72,8.47,7.58},
{"Sep-08",623,593,675,641,739,698,812,775,9.66,9.6,10.28,9.74,8.49,7.68},
{"Oct-08",623,593,676,640,740,699,814,776,9.55,9.26,9.86,9.4,8,7.24},
{"Nov-08",627,596,680,644,746,705,818,781,9.54,8.87,9.15,9.1,7.47,6.57},
{"Dec-08",621,589,675,639,741,700,815,777,9.74,9.38,10.01,9.07,7.63,7.11]
{"Jan-09",609,576,665,626,731,689,807,767,9.91,9.9,11.15,9.18,7.99,8.04},
{"Feb-09",603,571,660,623,728,685,804,765,9.93,9.76,10.45,9.36,8.01,7.59]
{"Mar-09",598,563,651,613,715,674,790,751,9.89,9.65,10.27,9.32,7.89,7.39]
{"Apr-09",590,559,644,606,709,667,784,747,9.96,9.82,10.46,9.36,7.97,7.37]
{"May-09",581,551,633,597,697,656,771,733,10.01,9.84,10.33,9.56,8.17,7.4]
{"Jun-09",585,555,636,600,699,658,772,734,10.09,9.93,10.46,9.83,8.44,7.73
{"Jul-09",588,567,639,603,702,662,773,735,10.1,10.03,10.76,9.93,8.62,8.03
{"Aug-09",585,554,638,601,700,659,772,733,10.17,10.28,11.16,10.1,8.96,8.4
{"Sep-09",568,536,621,583,681,640,753,713,10.25,10.42,11.39,10.24,9.12,8.
{"Oct-09",557,526,609,573,670,630,742,704,10.31,10.57,11.69,10.33,9.28,8.
{"Nov-09",552,521,605,569,666,625,738,700,10.35,10.63,11.58,10.42,9.38,8.
{"Dec-09",551,521,604,567,664,624,736,698,10.45,10.84,11.76,10.51,9.54,8.
{"Jan-10",550,520,604,567,664,623,735,697,10.33,10.57,11.35,10.47,9.41,8.
{"Feb-10",559,529,611,575,671,632,743,706,10.45,10.79,11.6,10.61,9.62,8.9
{"Mar-10",560,532,612,578,673,635,744,708,10.47,10.82,11.57,10.64,9.67,8.
{"Apr-10",563,534,614,579,674,635,743,707,10.45,10.79,11.52,10.68,9.72,8.
{"May-10",562,534,614,578,673,635,742,706,10.49,10.93,11.84,10.72,9.88,9.
{"Jun-10",550,521,601,566,662,623,731,695,10.53,11.06,12.01,10.68,9.86,9.
{"Jul-10",541,513,593,558,654,615,724,688,10.6,11.3,12.46,10.73,10.02,9.4
};
```

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.13},
46}
```

In[3]:=

```
Dates = Transpose[MainMatrix][[1]]
```

```
General::spell1:
   Possible spelling error: new symbol name "Dates"
     is similar to existing symbol "Date".
```

Out[3]=

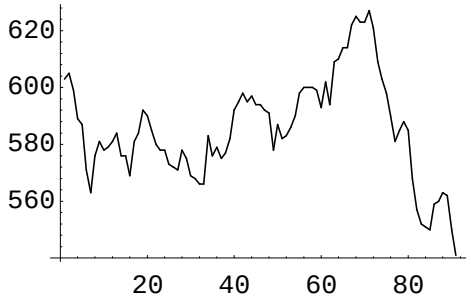
```
{Jan-03, Feb-03, Mar-03, Apr-03, May-03, Jun-03, Jul-03, Aug-03,
  Sep-03, Oct-03, Nov-03, Dec-03, Jan-04, Feb-04, Mar-04, Apr-04,
  May-04, Jun-04, Jul-04, Aug-04, Sep-04, Oct-04, Nov-04, Dec-04,
  Jan-05, Feb-05, Mar-05, Apr-05, May-05, Jun-05, Jul-05, Aug-05,
  Sep-05, Oct-05, Nov-05, Dec-05, Jan-06, Feb-06, Mar-06, Apr-06,
  May-06, Jun-06, Jul-06, Aug-06, Sep-06, Oct-06, Nov-06, Dec-06,
  Jan-07, Feb-07, Mar-07, Apr-07, May-07, Jun-07, Jul-07, Aug-07,
  Sep-07, Oct-07, Nov-07, Dec-07, Jan-08, Feb-08, Mar-08, Apr-08,
  May-08, Jun-08, Jul-08, Aug-08, Sep-08, Oct-08, Nov-08, Dec-08,
  Jan-09, Feb-09, Mar-09, Apr-09, May-09, Jun-09, Jul-09, Aug-09,
  Sep-09, Oct-09, Nov-09, Dec-09, Jan-10, Feb-10, Mar-10, Apr-10,
  May-10, Jun-10, Jul-10}
```

In[4]:=

```
MaleSixty = Transpose[MainMatrix][[2]]
ListPlot[%, PlotJoined->True];
```

Out[4]=

```
{603, 605, 599, 589, 587, 571, 563, 576, 581, 578, 579, 581, 584,
  576, 576, 569, 581, 584, 592, 590, 585, 580, 578, 578, 573, 572,
  571, 578, 575, 569, 568, 566, 566, 583, 576, 579, 575, 577, 582,
  592, 595, 598, 595, 597, 594, 594, 592, 591, 578, 587, 582, 583,
  586, 590, 598, 600, 600, 600, 599, 593, 602, 594, 609, 610, 614,
  614, 622, 625, 623, 623, 627, 621, 609, 603, 598, 590, 581, 585,
  588, 585, 568, 557, 552, 551, 550, 559, 560, 563, 562, 550, 541}
```

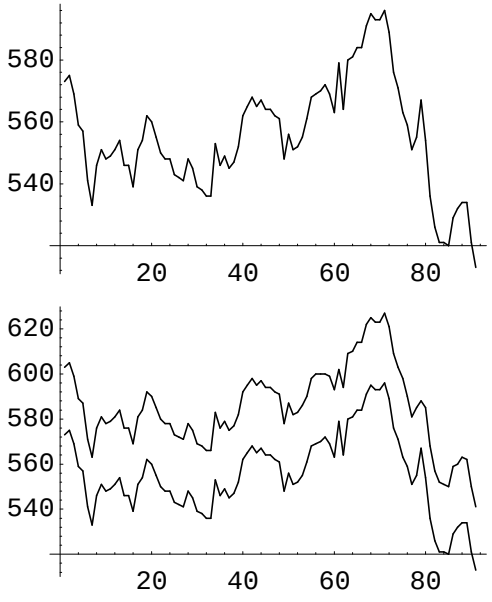


In[6]:=

```
FemaleSixty = Transpose[MainMatrix][[3]]
ListPlot[%, PlotJoined->True];
Show[%, %%%];
```

Out[6]=

```
{573, 575, 569, 559, 557, 541, 533, 546, 551, 548, 549, 551, 554,
  546, 546, 539, 551, 554, 562, 560, 555, 550, 548, 548, 543, 542,
  541, 548, 545, 539, 538, 536, 536, 553, 546, 549, 545, 547, 552,
  562, 565, 568, 565, 567, 564, 564, 562, 561, 548, 556, 551, 552,
  555, 561, 568, 569, 570, 572, 569, 563, 579, 564, 580, 581, 584,
  584, 591, 595, 593, 593, 596, 589, 576, 571, 563, 559, 551, 555,
  567, 554, 536, 526, 521, 521, 520, 529, 532, 534, 534, 521, 513}
```

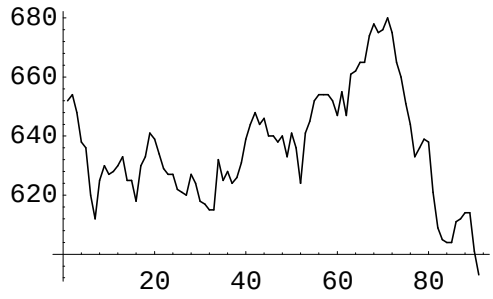


In[9]:=

```
MaleSixtyFive = Transpose[MainMatrix][[4]]
ListPlot[%, PlotJoined->True];
```

Out[9]=

```
{652, 654, 648, 638, 636, 620, 612, 625, 630, 627, 628, 630, 633,
  625, 625, 618, 630, 633, 641, 639, 634, 629, 627, 627, 622, 621,
  620, 627, 624, 618, 617, 615, 615, 632, 625, 628, 624, 626, 631,
  639, 644, 648, 644, 646, 640, 640, 638, 640, 633, 641, 636, 624,
  641, 645, 652, 654, 654, 654, 652, 647, 655, 647, 661, 662, 665,
  665, 674, 678, 675, 676, 680, 675, 665, 660, 651, 644, 633, 636,
  639, 638, 621, 609, 605, 604, 604, 611, 612, 614, 614, 601, 593}
```

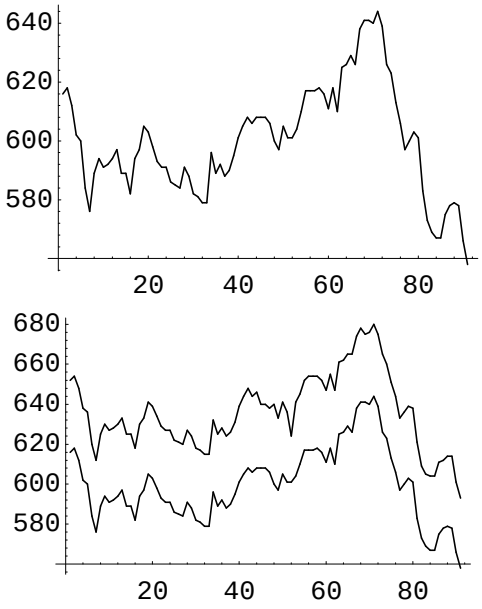


In[11]:=

```
FemaleSixtyFive = Transpose[MainMatrix][[5]]
ListPlot[%, PlotJoined->True];
Show[%, %%%];
```

Out[11]=

```
{616, 618, 612, 602, 600, 584, 576, 589, 594, 591, 592, 594, 597,
  589, 589, 582, 594, 597, 605, 603, 598, 593, 591, 591, 586, 585,
  584, 591, 588, 582, 581, 579, 579, 596, 589, 592, 588, 590, 595,
  601, 605, 608, 606, 608, 608, 608, 606, 600, 597, 605, 601, 601,
  604, 610, 617, 617, 617, 618, 616, 611, 618, 610, 625, 626, 629,
  626, 638, 641, 641, 640, 644, 639, 626, 623, 613, 606, 597, 600,
  603, 601, 583, 573, 569, 567, 567, 575, 578, 579, 578, 566, 558}
```

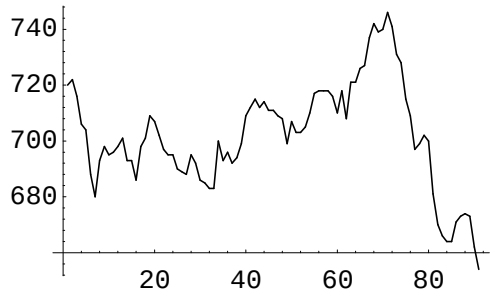


In[14]:=

```
MaleSeventy = Transpose[MainMatrix][[6]]
ListPlot[%, PlotJoined->True];
```

Out[14]=

```
{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701,
  693, 693, 686, 698, 701, 709, 707, 702, 697, 695, 695, 690, 689,
  688, 695, 692, 686, 685, 683, 683, 700, 693, 696, 692, 694, 699,
  709, 712, 715, 712, 714, 711, 711, 709, 708, 699, 707, 703, 703,
  705, 710, 717, 718, 718, 718, 716, 710, 718, 708, 721, 721, 726,
  727, 737, 742, 739, 740, 746, 741, 731, 728, 715, 709, 697, 699,
  702, 700, 681, 670, 666, 664, 664, 671, 673, 674, 673, 662, 654}
```

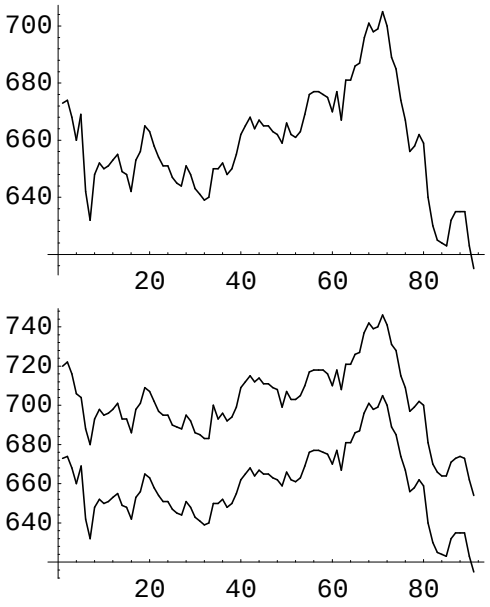


In[16]:=

```
FemaleSeventy = Transpose[MainMatrix][[7]]
ListPlot[%, PlotJoined->True];
Show[%, %%%];
```

Out[16]=

```
{673, 674, 668, 660, 669, 642, 632, 648, 652, 650, 651, 653, 655,
  649, 648, 642, 653, 656, 665, 663, 658, 654, 651, 651, 647, 645,
  644, 651, 648, 643, 641, 639, 640, 650, 650, 652, 648, 650, 655,
  662, 665, 668, 664, 667, 665, 665, 663, 662, 659, 666, 662, 661,
  663, 669, 676, 677, 677, 676, 675, 670, 677, 667, 681, 681, 686,
  687, 696, 701, 698, 699, 705, 700, 689, 685, 674, 667, 656, 658,
  662, 659, 640, 630, 625, 624, 623, 632, 635, 635, 635, 623, 615}
```

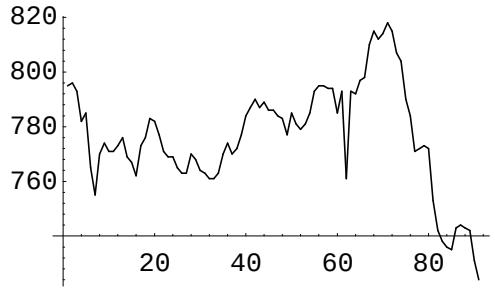


In[19]:=

```
MaleSeventyFive = Transpose[MainMatrix][[8]]
ListPlot[%, PlotJoined->True];
```

Out[19]=

```
{795, 796, 793, 782, 785, 765, 755, 770, 774, 771, 771, 773, 776,
  769, 767, 762, 773, 776, 783, 782, 777, 771, 769, 769, 765, 763,
  763, 770, 768, 764, 763, 761, 761, 763, 770, 774, 770, 772, 777,
  784, 787, 790, 787, 789, 786, 786, 784, 783, 777, 785, 781, 779,
  781, 785, 793, 795, 795, 794, 794, 785, 793, 761, 793, 792, 797,
  798, 810, 815, 812, 814, 818, 815, 807, 804, 790, 784, 771, 772,
  773, 772, 753, 742, 738, 736, 735, 743, 744, 743, 742, 731, 724}
```

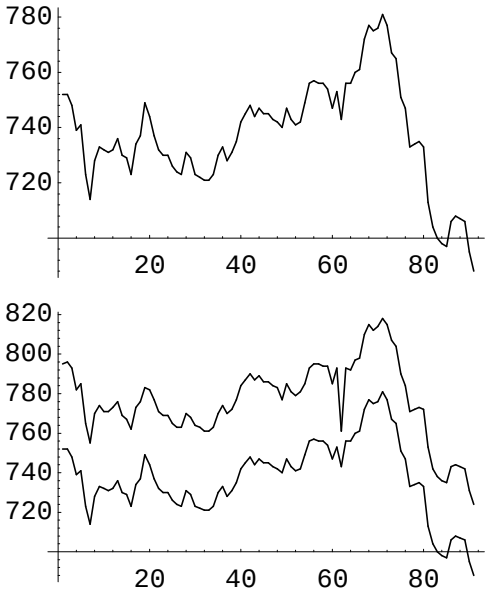


In[21]:=

```
FemaleSeventyFive = Transpose[MainMatrix][[9]]
ListPlot[%, PlotJoined->True];
Show[%, %%%];
```

Out[21]=

```
{752, 752, 748, 739, 741, 723, 714, 728, 733, 732, 731, 732, 736,
  730, 729, 723, 734, 737, 749, 744, 737, 732, 730, 730, 726, 724,
  723, 731, 729, 723, 722, 721, 721, 723, 730, 733, 728, 731, 735,
  742, 745, 748, 744, 747, 745, 745, 743, 742, 740, 747, 743, 741,
  742, 749, 756, 757, 756, 756, 754, 747, 753, 743, 756, 756, 760,
  761, 772, 777, 775, 776, 781, 777, 767, 765, 751, 747, 733, 734,
  735, 733, 713, 704, 700, 698, 697, 706, 708, 707, 706, 695, 688}
```



In[24]:=

```
Map[N[Apply[Plus,#]/Length[#]]&,{MaleSixty, FemaleSixty,
MaleSixtyFive, FemaleSixtyFive, MaleSeventy, FemaleSeventy,
MaleSeventyFive, FemaleSeventyFive}] (*to get averages*)
```

Out[24]=

```
{585.44, 555.484, 636.099, 600.055, 702., 659.088, 776.374, 737.352}
```

In[25]:=

```
Map[Max[#]-Min[#]&,{MaleSixty, FemaleSixty,
MaleSixtyFive, FemaleSixtyFive, MaleSeventy, FemaleSeventy,
MaleSeventyFive, FemaleSeventyFive}] (*to the the range*)
```

Out[25]=

```
{86, 83, 87, 86, 92, 90, 94, 93}
```

In[26]:=

```
ShortIndex = Transpose[MainMatrix][[10]]
```

Out[26]=

```
{7.94, 7.92, 7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02, 8.16, 8.11,
  8.12, 8.17, 8.19, 8.26, 8.3, 8.17, 8.15, 8.15, 8.2, 8.3, 8.3, 8.34,
  8.28, 8.31, 8.3, 8.27, 8.25, 8.31, 8.36, 8.39, 8.34, 8.42, 8.37,
  8.35, 8.38, 8.42, 8.43, 8.43, 8.42, 8.44, 8.46, 8.46, 8.55, 8.62,
  8.67, 8.71, 8.77, 8.76, 8.78, 8.87, 8.9, 8.93, 8.9, 8.93, 9.01,
  9.1, 9.16, 9.21, 9.37, 9.4, 9.59, 9.68, 9.68, 9.6, 9.57, 9.58, 9.6,
  9.66, 9.55, 9.54, 9.74, 9.91, 9.93, 9.89, 9.96, 10.01, 10.09, 10.1,
  10.17, 10.25, 10.31, 10.35, 10.45, 10.33, 10.45, 10.47, 10.45,
  10.49, 10.53, 10.6}
```

In[27]:=

```
IntIndex = Transpose[MainMatrix][[11]]
```

Out[27]=

```
{7.44, 7.41, 7.59, 7.58, 7.68, 7.95, 7.92, 7.53, 7.56, 7.87, 7.75,
  7.78, 7.87, 7.96, 8.07, 8.16, 7.87, 7.8, 7.85, 7.95, 8.16, 8.19,
  8.28, 8.17, 8.28, 8.33, 8.25, 8.17, 8.32, 8.44, 8.51, 8.38, 8.53,
  8.4, 8.3, 8.34, 8.43, 8.4, 8.41, 8.31, 8.27, 8.27, 8.27, 8.39,
  8.56, 8.65, 8.71, 8.82, 8.76, 8.74, 8.91, 8.89, 8.95, 8.84, 8.8,
  8.89, 9.04, 9.1, 9.19, 9.42, 9.43, 9.66, 9.73, 9.73, 9.65, 9.52,
  9.52, 9.52, 9.6, 9.26, 8.87, 9.38, 9.9, 9.76, 9.65, 9.82, 9.84,
  9.93, 10.03, 10.28, 10.42, 10.57, 10.63, 10.84, 10.57, 10.79,
  10.82, 10.79, 10.93, 11.06, 11.3}
```

In[28]:=

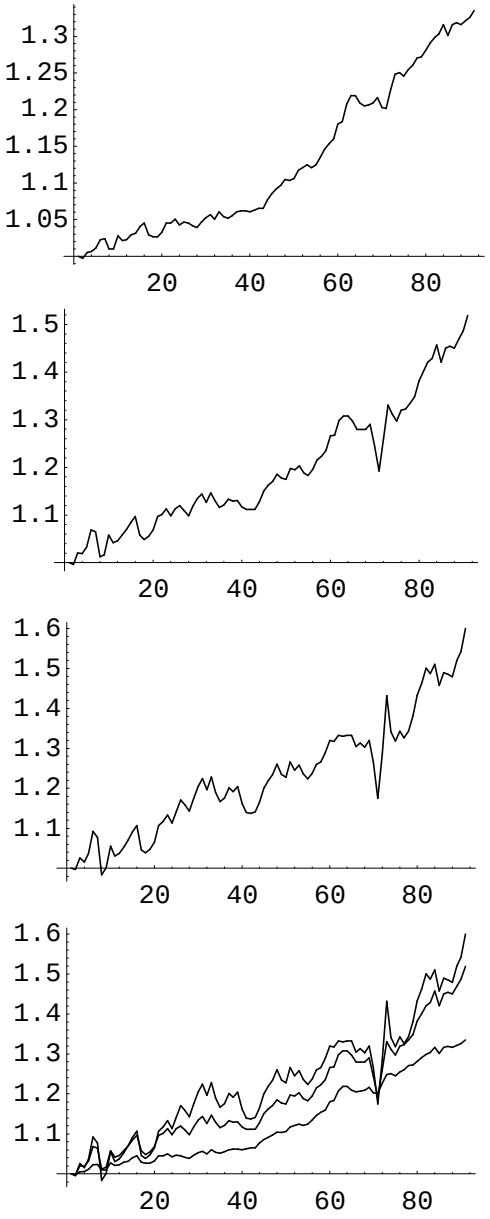
```
LongIndex = Transpose[MainMatrix][[12]]
```

Out[28]=

```
{7.79, 7.77, 7.99, 7.91, 8.08, 8.51, 8.39, 7.66, 7.8, 8.22, 8.03,
  8.08, 8.2, 8.34, 8.5, 8.62, 8.15, 8.09, 8.16, 8.3, 8.62, 8.7, 8.83,
  8.67, 8.89, 9.12, 9.02, 8.9, 9.16, 9.39, 9.54, 9.32, 9.57, 9.27,
  9.09, 9.16, 9.36, 9.28, 9.38, 9.05, 8.88, 8.86, 8.89, 9.07, 9.35,
  9.5, 9.61, 9.82, 9.62, 9.56, 9.86, 9.7, 9.8, 9.63, 9.53, 9.64,
  9.81, 9.86, 10.04, 10.28, 10.26, 10.38, 10.36, 10.38, 10.38, 10.16,
  10.23, 10.15, 10.28, 9.86, 9.15, 10.01, 11.15, 10.45, 10.27, 10.46,
  10.33, 10.46, 10.76, 11.16, 11.39, 11.69, 11.58, 11.76, 11.35,
  11.6, 11.57, 11.52, 11.84, 12.01, 12.46}
```

In[29]:=

```
Show[
ListPlot[ShortIndex/ShortIndex[[1]],PlotJoined->True],
ListPlot[IntIndex/IntIndex[[1]],PlotJoined->True],
ListPlot[LongIndex/LongIndex[[1]],PlotJoined->True]];
```



In[30]:=

```
ShortCorp = Transpose[MainMatrix][[13]]
```

Out[30]=

```
{7.98, 7.99, 8.04, 8.07, 8.12, 8.2, 8.23, 8.16, 8.15, 8.26, 8.24,
  8.25, 8.3, 8.33, 8.39, 8.43, 8.33, 8.31, 8.32, 8.36, 8.43, 8.44,
  8.47, 8.43, 8.47, 8.47, 8.46, 8.44, 8.5, 8.54, 8.57, 8.55, 8.61,
  8.6, 8.59, 8.63, 8.66, 8.68, 8.7, 8.71, 8.74, 8.75, 8.78, 8.84,
  8.92, 8.98, 9.03, 9.09, 9.1, 9.12, 9.21, 9.24, 9.29, 9.26, 9.28,
  9.35, 9.39, 9.46, 9.52, 9.63, 9.63, 9.78, 9.82, 9.75, 9.72, 9.74,
  9.73, 9.72, 9.74, 9.4, 9.1, 9.07, 9.18, 9.36, 9.32, 9.36, 9.56,
  9.83, 9.93, 10.1, 10.24, 10.33, 10.42, 10.51, 10.47, 10.61, 10.64,
  10.68, 10.72, 10.68, 10.73}
```

In[31]:=

```
IntCorp = Transpose[MainMatrix][[14]]
```

Out[31]=

```
{6.75, 6.75, 6.87, 6.88, 6.96, 7.15, 7.16, 6.91, 6.93, 7.15, 7.08,
  7.11, 7.18, 7.25, 7.33, 7.4, 7.19, 7.13, 7.16, 7.25, 7.41, 7.44,
  7.51, 7.43, 7.52, 7.56, 7.51, 7.46, 7.57, 7.65, 7.7, 7.61, 7.73,
  7.64, 7.57, 7.61, 7.67, 7.66, 7.67, 7.6, 7.57, 7.58, 7.58, 7.68,
  7.82, 7.89, 7.95, 8.05, 8.01, 8.01, 8.16, 8.15, 8.2, 8.11, 8.08,
  8.15, 8.23, 8.29, 8.37, 8.52, 8.51, 8.68, 8.7, 8.65, 8.61, 8.55,
  8.52, 8.47, 8.49, 8, 7.47, 7.63, 7.99, 8.01, 7.89, 7.97, 8.17,
  8.44, 8.62, 8.96, 9.12, 9.28, 9.38, 9.54, 9.41, 9.62, 9.67, 9.72,
  9.88, 9.86, 10.02}
```

In[32]:=

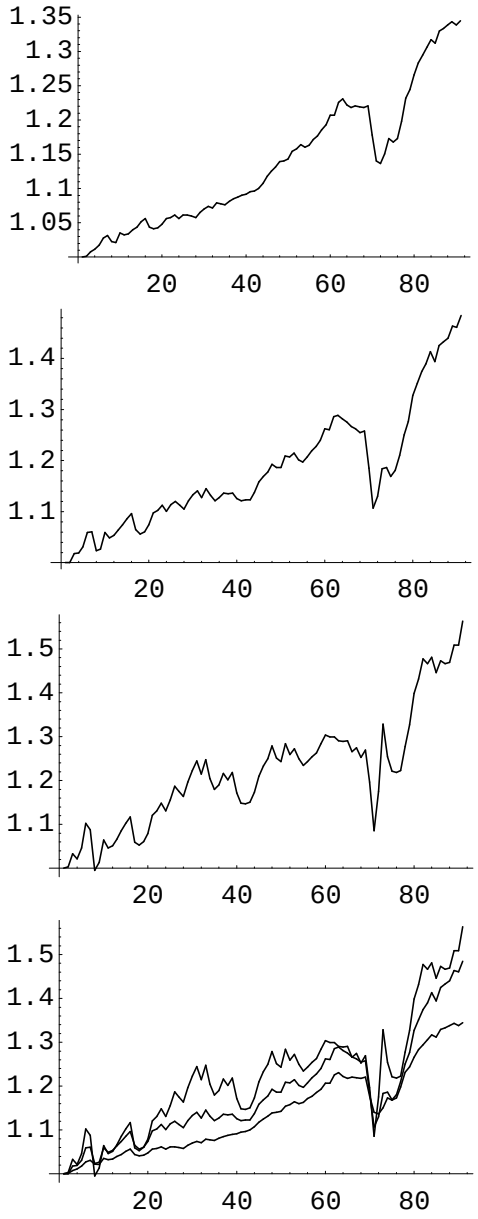
```
LongCorp = Transpose[MainMatrix][[15]]
```

Out[32]=

```
{6.05, 6.07, 6.25, 6.18, 6.33, 6.67, 6.58, 6.02, 6.13, 6.44, 6.33,
  6.36, 6.45, 6.57, 6.67, 6.76, 6.41, 6.37, 6.42, 6.53, 6.78, 6.84,
  6.95, 6.84, 6.99, 7.18, 7.11, 7.04, 7.24, 7.4, 7.53, 7.35, 7.55,
  7.29, 7.14, 7.2, 7.36, 7.27, 7.37, 7.09, 6.95, 6.94, 6.96, 7.1,
  7.32, 7.46, 7.56, 7.74, 7.57, 7.52, 7.77, 7.62, 7.7, 7.56, 7.47,
  7.52, 7.59, 7.64, 7.77, 7.89, 7.86, 7.86, 7.81, 7.8, 7.81, 7.66,
  7.71, 7.58, 7.68, 7.24, 6.57, 7.11, 8.04, 7.59, 7.39, 7.37, 7.4,
  7.73, 8.03, 8.46, 8.66, 8.94, 8.87, 8.96, 8.75, 8.91, 8.87, 8.89,
  9.13, 9.13, 9.46}
```

In[33]:=

```
Show[
ListPlot[ShortCorp/ShortCorp[[1]],PlotJoined->True],
ListPlot[IntCorp/IntCorp[[1]],PlotJoined->True],
ListPlot[LongCorp/LongCorp[[1]],PlotJoined->True]];
```



In[34]:=

```
hedgedincome[person_,instrument_] :=
     person * (instrument/instrument[[1]])
(* Check the Definition:  *)
Take[ MaleSeventy ,3]
Take[ ShortIndex  ,3]
Take[ hedgedincome[MaleSeventy, ShortIndex]  ,3]
722 * (7.92/7.94)
716 * (7.98/7.94)
```

Out[36]=

```
{720, 722, 716}
```

Out[37]=

```
{7.94, 7.92, 7.98}
```

Out[38]=

```
{720., 720.181, 719.607}
```

Out[39]=

```
720.181
```

Out[40]=

```
719.607
```

In[41]:=

```
AllYears[vector_] := Table[Take[RotateLeft[vector,i],12],
                                          {i,0,Length[vector]-12}]
(* Check the Definition *)
AllYears[{Jan03,Feb03,Mar03,Apr03,May03,June03,July03,Aug03,
Sept03,Oct03,Nov03,Dec03,Jan04,Feb04,March04}]
```

```
General::spell1:
   Possible spelling error: new symbol name "May03"
     is similar to existing symbol "Mar03".
```

Out[43]=

```
{{Jan03, Feb03, Mar03, Apr03, May03, June03, July03, Aug03, Sept03,
   Oct03, Nov03, Dec03}, {Feb03, Mar03, Apr03, May03, June03, July03,
   Aug03, Sept03, Oct03, Nov03, Dec03, Jan04},
  {Mar03, Apr03, May03, June03, July03, Aug03, Sept03, Oct03, Nov03,
   Dec03, Jan04, Feb04}, {Apr03, May03, June03, July03, Aug03,
   Sept03, Oct03, Nov03, Dec03, Jan04, Feb04, March04}}
```

In[44]:=

```
Length[AllYears[MaleSeventy]]
```

Out[44]=

```
80
```

In[45]:=

```
(* Check Logic *)
Take[ AllYears[MaleSeventy] ,3]
Take[ AllYears[ShortIndex]  ,3]
Map[f[#[[1]],#[[2]]]&,
   Transpose[{ Take[AllYears[MaleSeventy],3],
                                    Take[AllYears[ShortIndex],3]}]]
Map[hedgedincome[#[[1]],#[[2]]]&,
   Transpose[{ Take[AllYears[MaleSeventy],3],
                                    Take[AllYears[ShortIndex],3]}]]
(* Make Definition *)
AllYearsHedgedIncome[person_,instrument_] :=
     Map[hedgedincome[#[[1]],#[[2]]]&,
     Transpose[{ AllYears[person],AllYears[instrument]}]]
(* Check Definition *)
Take[   AllYearsHedgedIncome[MaleSeventy,ShortIndex]   ,3]
```

Out[46]=

```
{{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698},
  {722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701},
  {716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701, 693}}
```

Out[47]=

```
{{7.94, 7.92, 7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02, 8.16, 8.11,
   8.12}, {7.92, 7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02, 8.16,
   8.11, 8.12, 8.17}, {7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02,
   8.16, 8.11, 8.12, 8.17, 8.19}}
```

Out[48]=

```
{f[{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698},
   {7.94, 7.92, 7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02, 8.16, 8.11,
    8.12}], f[{722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698,
    701}, {7.92, 7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02, 8.16,
    8.11, 8.12, 8.17}], f[{716, 706, 704, 688, 680, 693, 698, 695,
    696, 698, 701, 693}, {7.98, 7.99, 8.03, 8.12, 8.13, 8.02, 8.02,
    8.16, 8.11, 8.12, 8.17, 8.19}]}
```

Out[49]=

```
{{720., 720.181, 719.607, 710.446, 711.98, 703.597, 696.272, 699.982,
   705.033, 714.257, 710.902, 713.824},
  {722., 721.424, 712.24, 713.778, 705.374, 698.03, 701.75, 706.813,
   716.061, 712.697, 715.626, 723.128},
  {716., 706.885, 708.411, 700.07, 692.782, 696.474, 701.499,
   710.677, 707.338, 710.246, 717.69, 711.237}}
```

Out[53]=

```
{{720., 720.181, 719.607, 710.446, 711.98, 703.597, 696.272, 699.982,
   705.033, 714.257, 710.902, 713.824},
  {722., 721.424, 712.24, 713.778, 705.374, 698.03, 701.75, 706.813,
   716.061, 712.697, 715.626, 723.128},
  {716., 706.885, 708.411, 700.07, 692.782, 696.474, 701.499,
   710.677, 707.338, 710.246, 717.69, 711.237}}
```

In[54]:=

```
MaxDeviation[vector_] := Max[Abs[vector - vector[[1]]]]
(* Check *)
MaxDeviation[AllYears[MaleSeventy][[2]]]
AllYears[MaleSeventy][[2]]
AllYears[MaleSeventy][[2]]-AllYears[MaleSeventy][[2,1]]
```

Out[56]=

```
42
```

Out[57]=

```
{722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701}
```

Out[58]=

```
{0, -6, -16, -18, -34, -42, -29, -24, -27, -26, -24, -21}
```

In[59]:=

```
SquaredDeviation[vector_] :=
Sqrt[Apply[Plus,(vector-vector[[1]])^2]/Length[vector]]//N
(* Check the Definition *)
SquaredDeviation[{a,b,c}]^2
SquaredDeviation[AllYears[MaleSeventy][[2]]]
(AllYears[MaleSeventy][[2]]- AllYears[MaleSeventy][[2]][[1]])^2
Sqrt[(0+36+256+324+1156+1764+841+576+729+676+576+441)/12]//N
```

Out[61]=

```
                        2              2
0.333333 ((-1. a + b)  + (-1. a + c) )
```

Out[62]=

```
24.7908
```

Out[63]=

```
{0, 36, 256, 324, 1156, 1764, 841, 576, 729, 676, 576, 441}
```

Out[64]=

```
24.7908
```

In[65]:=

```
Take[  Map[f,                AllYears[MaleSeventy]]  ,3]
Take[  Map[MaxDeviation,     AllYears[MaleSeventy]]  ,3]
Take[  Map[SquaredDeviation, AllYears[MaleSeventy]]  ,3]
```

Out[65]=

```
{f[{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698}],
  f[{722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701}],
  f[{716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701, 693}]}
```

Out[66]=

```
{40, 42, 36}
```

Out[67]=

```
{22.3495, 24.7908, 20.6074}
```

In[68]:=

```
MM = (* VMSXX from Jan 2003 to July 2010, essentially arbitrary units
        (the units come from $10,000.00 on 8/1/2000) *)
{10872.88, 10884.05, 10893.23, 10902.82, 10911.38, 10919.74,
10927.69, 10935.25, 10942.39, 10949.46, 10956.32, 10963.38,
10970.26, 10977.36, 10984.09, 10990.98, 10997.41, 11004.64,
11012.45, 11021.83, 11033.12, 11046.24, 11059.57, 11074.76,
11091.81, 11111.67, 11130.77, 11155.06, 11176.05, 11202.63,
11231.65, 11257.72, 11288.15, 11318.38, 11353.37, 11388.47,
11425.53, 11466.30, 11503.74, 11545.22, 11589.45, 11635.71,
11680.42, 11731.78, 11787.54, 11830.60, 11883.58, 11936.61,
11983.43, 12037.05, 12084.17, 12134.74, 12187.25, 12243.64,
12290.07, 12345.33, 12397.10, 12450.48, 12502.75, 12550.16,
12599.67, 12651.78, 12686.71, 12721.68, 12747.71, 12772.14,
12796.13, 12821.59, 12842.90, 12867.21, 12894.50, 12923.50,
12949.08, 12969.71, 12982.62, 12991.94, 12998.45, 13003.09,
13006.71, 13009.27, 13011.64, 13013.91, 13015.78, 13017.13,
13017.87, 13018.34, 13018.47, 13018.59, 13018.72, 13019.19,
13019.97};
Length[ShortIndex]
Length[MM]
```

Out[69]=

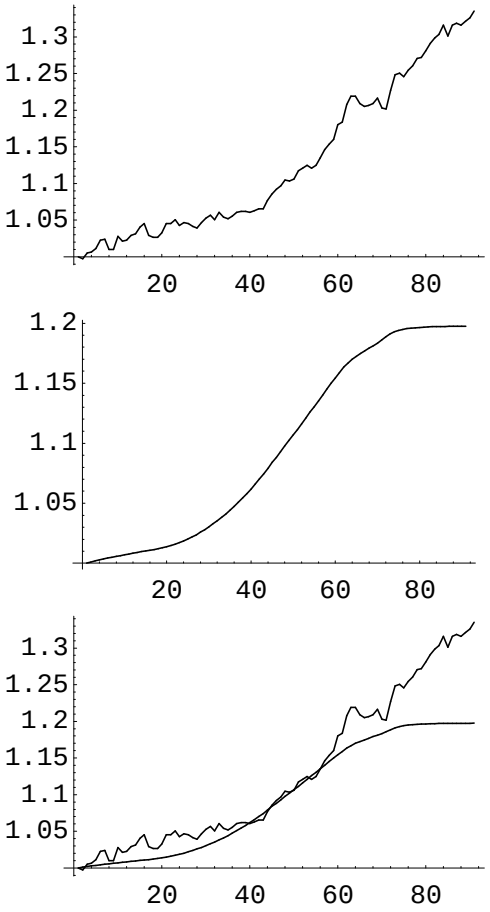
```
91
```

Out[70]=

```
91
```

In[71]:=

```
ListPlot[ShortIndex/ShortIndex[[1]],PlotJoined->True];
ListPlot[MM/MM[[1]],PlotJoined->True];
Show[%,%%];
```



In[74]:=

```
BlendedInstrument[instrument_,alpha_] :=
          alpha*instrument/instrument[[1]] +
          (1-alpha)*MM[[1]]/MM[[1]]
(* alpha is the % in the variable instrument.
   1-alpha is the % in Money Market.
   Blending in this way reflects an unrebalanced portfolio.
 *)
(* Checks *)
Take[  BlendedInstrument[ShortIndex,1]   ,3]

(* these should be the same since alpha=0  *)
{Take[  BlendedInstrument[ShortIndex,0]   ,3] ,
 Take[  BlendedInstrument[LongCorp,  0]   ,3] }

Take[  BlendedInstrument[ShortIndex,.5]  ,3]
Take[  AllYearsHedgedIncome[MaleSeventy,
       BlendedInstrument[ShortIndex,1]]  ,3]
Take[  AllYearsHedgedIncome[MaleSeventy,
       BlendedInstrument[ShortIndex,0]]  ,3]
```

Out[77]=

```
{1., 0.997481, 1.00504}
```

Out[79]=

```
{{1., 1., 1.}, {1., 1., 1.}}
```

Out[80]=

```
{1., 0.998741, 1.00252}
```

Out[81]=

```
{{720., 720.181, 719.607, 710.446, 711.98, 703.597, 696.272, 699.982,
   705.033, 714.257, 710.902, 713.824},
  {722., 721.424, 712.24, 713.778, 705.374, 698.03, 701.75, 706.813,
   716.061, 712.697, 715.626, 723.128},
  {716., 706.885, 708.411, 700.07, 692.782, 696.474, 701.499,
   710.677, 707.338, 710.246, 717.69, 711.237}}
```

Out[82]=

```
{{720., 722., 716., 706., 704., 688., 680., 693., 698., 695., 696.,
   698.}, {722., 716., 706., 704., 688., 680., 693., 698., 695.,
   696., 698., 701.}, {716., 706., 704., 688., 680., 693., 698.,
   695., 696., 698., 701., 693.}}
```

In[83]:=

```
Take[
Map[MaxDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,1]]  ]
,3]
(* Of all three years, what's the maximum "Max Deviation"? *)
Max[Take[
Map[MaxDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,1]]  ]
,3]]
(* Max "Max Deviation" for various alphas *)
Table[  Evaluate[Max[Take[
Map[MaxDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,alpha]]  ]
,3] ],{alpha,0,1,1/10}]]
(* The last (alpha=1) entry should equal the previous result;
   the first (alpha=0) entry should equal two results from now. *)
{MaxDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[1]]],
MaxDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[2]]],
MaxDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[3]]]}
Max[%]
```

Out[83]=

```
{23.728, 23.9697, 23.218}
```

Out[85]=

```
23.9697
```

Out[87]=

```
{42., 40.2011, 38.4012, 36.6005, 34.7988, 32.9962, 31.1927, 29.3883,
  27.583, 25.7768, 23.9697}
```

Out[89]=

```
{40., 42., 36.}
```

Out[90]=

```
42.
```

In[91]:=

```
(* Max "Max Deviation" for various alphas & all years, not just
     the first three years*)
Table[  Evaluate[Max[
Map[MaxDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,alpha]]  ]
    ],{alpha,0,1,1/10}]]

(* Make a Definition *)
MaxMaxDeviation[person_,instrument_,alpha_]:=
 Max[
Map[MaxDeviation,
AllYearsHedgedIncome[person,BlendedInstrument[instrument,alpha]]  ]
    ]

(* Check the Definition *)
Table[Evaluate[MaxMaxDeviation[MaleSeventy,ShortIndex,alpha],
               {alpha,0,1,1/10}]]
```

Out[92]=

```
{76., 69.9968, 65.2106, 60.6276, 56.2351, 52.0215, 57.6228, 63.7113,
  69.6656, 75.49, 81.1888}
```

Out[96]=

```
{76., 69.9968, 65.2106, 60.6276, 56.2351, 52.0215, 57.6228, 63.7113,
  69.6656, 75.49, 81.1888}
```

In[97]:=

```
(* Optimal  alpha *)
FindMinimum[
MaxMaxDeviation[MaleSeventy,ShortIndex,alpha]  ,{alpha,0,1}]
(* Make a Definition *)
OptimalAlphaMaxCriterion[person_,instrument_] :=
FindMinimum[
MaxMaxDeviation[person,instrument,alpha]  ,{alpha,0,1}]
(* Check the Definition *)
OptimalAlphaMaxCriterion[MaleSeventy,ShortIndex]
```

Out[98]=

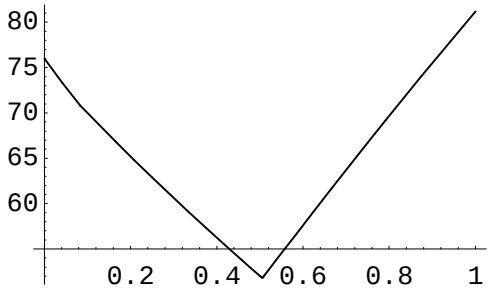
```
{51.7737, {alpha -> 0.50601}}
```

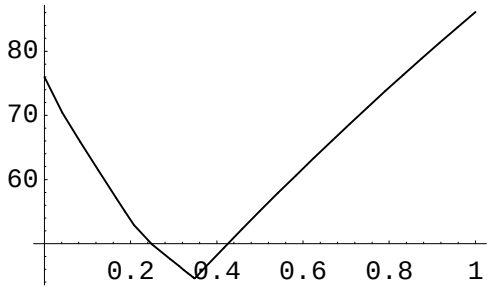
Out[102]=

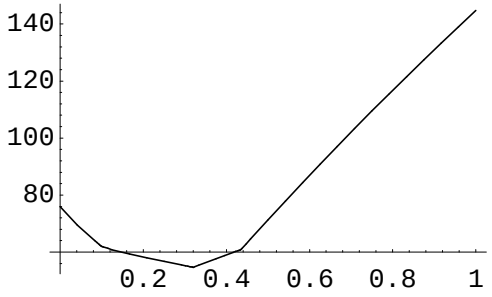
```
{51.7737, {alpha -> 0.50601}}
```

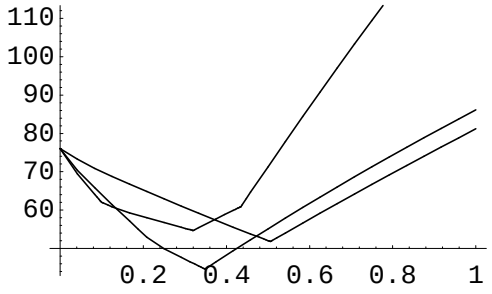
In[103]:=

```
Plot[MaxMaxDeviation[MaleSeventy,ShortIndex,alpha]  ,{alpha,0,1}];
Plot[MaxMaxDeviation[MaleSeventy,IntIndex,alpha]  ,{alpha,0,1}];
Plot[MaxMaxDeviation[MaleSeventy,LongIndex,alpha]  ,{alpha,0,1}];
Show[{%,%%,%%%}];
InputForm[%]>>b:\MaleSeventyMaxMaxIndex.txt
```



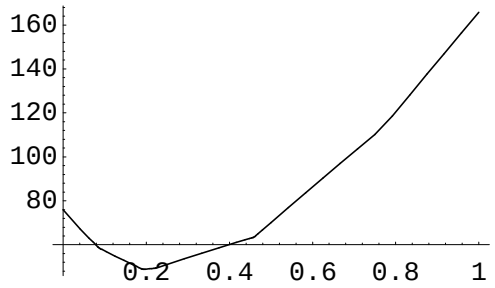






In[108]:=

```
Plot[MaxMaxDeviation[MaleSeventy,LongCorp,alpha]  ,{alpha,0,1}];
InputForm[%]>>b:\MaleSeventyMaxMaxLCorp.txt
```



In[110]:=

```
Max[Map[MaxDeviation,AllYears[MaleSeventy]] ]
MaxMaxDeviation[MaleSeventy,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[MaleSeventy,ShortIndex]
OptimalAlphaMaxCriterion[MaleSeventy,ShortCorp]
OptimalAlphaMaxCriterion[MaleSeventy,IntIndex]
OptimalAlphaMaxCriterion[MaleSeventy,IntCorp]
OptimalAlphaMaxCriterion[MaleSeventy,LongIndex]
OptimalAlphaMaxCriterion[MaleSeventy,LongCorp]
```

Out[110]=

```
76
```

Out[111]=

```
76.
```

Out[112]=

```
{51.7737, {alpha -> 0.50601}}
```

Out[113]=

```
{48.6292, {alpha -> 0.275281}}
```

Out[114]=

```
{44.5734, {alpha -> 0.34862}}
```

Out[115]=

```
{49.4935, {alpha -> 0.150622}}
```

Out[116]=

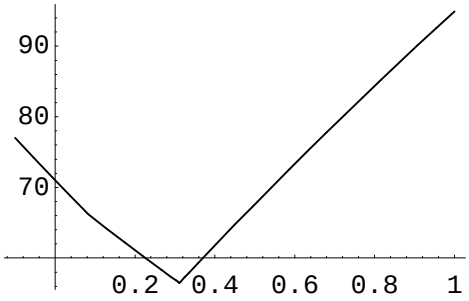
```
{54.652, {alpha -> 0.320381}}
```

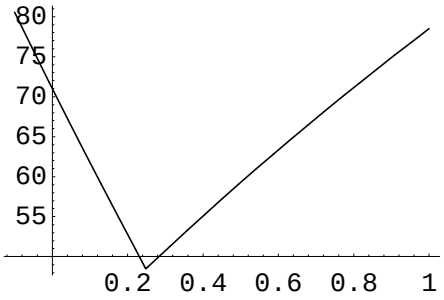
Out[117]=

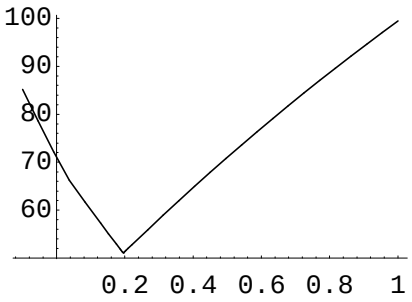
```
{48.7916, {alpha -> 0.191705}}
```

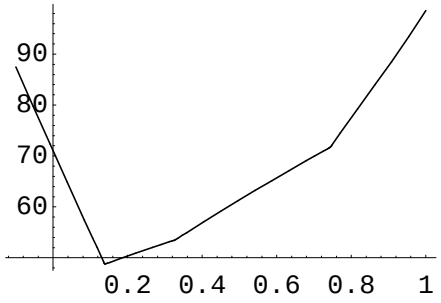
In[118]:=

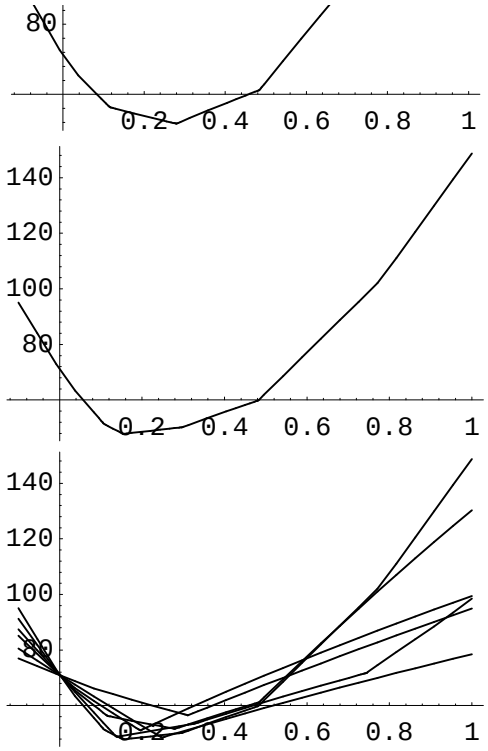
```
Plot[MaxMaxDeviation[MaleSixtyFive,ShortIndex,alpha]  ,{alpha,-.1,1}];
Plot[MaxMaxDeviation[MaleSixtyFive,ShortCorp,alpha]  ,{alpha,-.1,1}];
Plot[MaxMaxDeviation[MaleSixtyFive,IntIndex,alpha]  ,{alpha,-.1,1}];
Plot[MaxMaxDeviation[MaleSixtyFive,IntCorp,alpha]  ,{alpha,-.1,1}];
Plot[MaxMaxDeviation[MaleSixtyFive,LongIndex,alpha]  ,{alpha,-.1,1}];
Plot[MaxMaxDeviation[MaleSixtyFive,LongCorp,alpha]  ,{alpha,-.1,1}];
Show[{%,%%,%%%,%%%%,%%%%%,%%%%%%}];
InputForm[%]>>b:\MaxMaxMaleSixtyFive.txt
```











In[126]:=

```
(* Define Average *)
AverageUnsimplified[vector_] := Apply[Plus,vector]/Length[vector]
(* Check Definition *)
AverageUnsimplified[{a,b,c}]
```

Out[129]=

$$\frac{a + b + c}{3}$$

In[130]:=

```
Average[vector_]:=N[AverageUnsimplified[vector]]

Take[
Map[SquaredDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,1]]  ]
,3]
(* Of all three years, what's the average of the
      "Squared Deviation"? *)
Average[
Take[
Map[SquaredDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,1]]  ]
,3]]
(* Check *)
(12.1329+12.3106+11.8571)/3
(%%%%%[[1]]+%%%%%[[2]]+%%%%%[[3]])/3
```

Out[131]=

```
{12.1329, 12.3106, 11.8571}
```

Out[133]=

```
12.1002
```

Out[135]=

```
12.1002
```

Out[136]=

```
12.1002
```

In[137]:=

```
(* Average of "Squared Deviation" for various alphas *)
Table[  Evaluate[Average[Take[
Map[SquaredDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,alpha]]  ]
,3] ],{alpha,0,1,1/10}]]
(* The last (alpha=1) entry should equal the previous result;
   the first (alpha=0) entry should equal two results from now. *)
{SquaredDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[1]]],
SquaredDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[2]]],
SquaredDeviation[AllYearsHedgedIncome[
MaleSeventy,BlendedInstrument[ShortIndex,0]][[3]]]}
Average[%]
```

Out[138]=

```
{22.5826, 21.4484, 20.3253, 19.2151, 18.1203, 17.0438, 15.989,
  14.9607, 13.9646, 13.008, 12.1002}
```

Out[140]=

```
{22.3495, 24.7908, 20.6074}
```

Out[141]=

```
22.5826
```

In[142]:=

```
(* Average of "Squared Deviation" for various alphas &
   all years, not just the first three years*)
Table[  Evaluate[Average[
Map[SquaredDeviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[ShortIndex,alpha]]  ]
    ],{alpha,0,1,1/10}]]

(* Make a Definition *)
AverageSquaredDeviation[person_,instrument_,alpha_]:=
 Average[
Map[SquaredDeviation,
AllYearsHedgedIncome[person,BlendedInstrument[instrument,alpha]]  ]
    ]
(* Check the Definition *)
Table[Evaluate[AverageSquaredDeviation[
                                      MaleSeventy,ShortIndex,alpha],
                {alpha,0,1,1/10}]]
```

Out[143]=

```
{14.7042, 14.5329, 14.5491, 14.7334, 15.0511, 15.4584, 15.9302,
  16.458, 17.0396, 17.6759, 18.368}
```

Out[147]=

```
{14.7042, 14.5329, 14.5491, 14.7334, 15.0511, 15.4584, 15.9302,
  16.458, 17.0396, 17.6759, 18.368}
```

In[148]:=

```
(* Optimal  alpha *)
FindMinimum[
AverageSquaredDeviation[
                   MaleSeventy,ShortIndex,alpha]  ,{alpha,0,1.5}]
(* Make a definition *)
OptimalAlphaSquaredCriterion[person_,instrument_] :=
FindMinimum[
AverageSquaredDeviation[
                         person,instrument,alpha]  ,{alpha,0,1.5}]
(* Check the definition *)
OptimalAlphaSquaredCriterion[MaleSeventy,ShortIndex]
```

Out[149]=

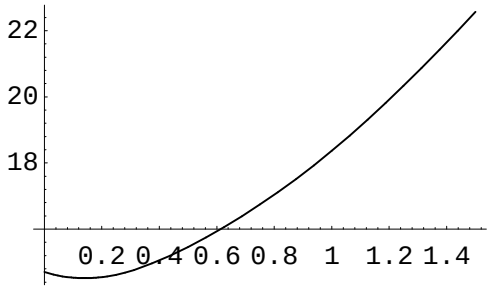
```
{14.518, {alpha -> 0.140808}}
```

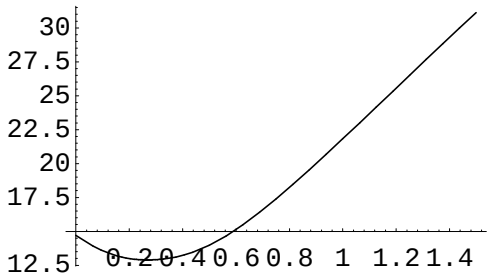
Out[153]=

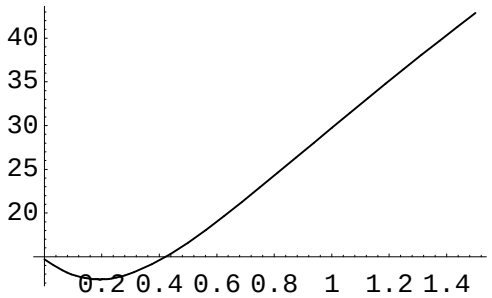
```
{14.518, {alpha -> 0.140808}}
```

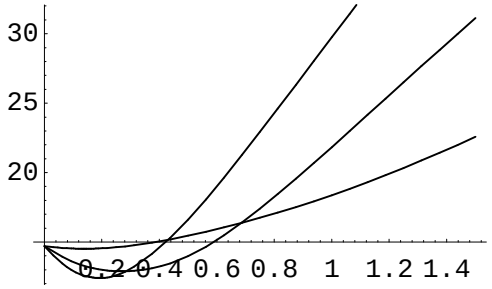
In[154]:=

```
Plot[AverageSquaredDeviation[
          MaleSeventy,ShortIndex,alpha]  ,{alpha,0,1.5}];
Plot[AverageSquaredDeviation[
          MaleSeventy,IntIndex,  alpha]  ,{alpha,0,1.5}];
Plot[AverageSquaredDeviation[
          MaleSeventy,LongIndex, alpha]  ,{alpha,0,1.5}];
Show[{%,%%,%%%}];
InputForm[%]>>b:\ASDMaleSeventy.txt
```



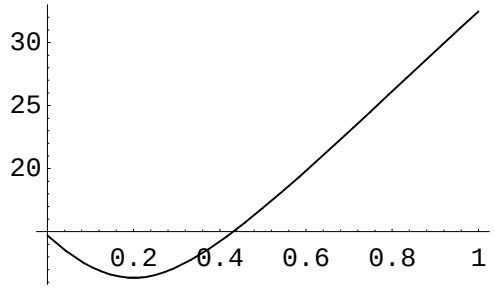






In[159]:=

```
Plot[AverageSquaredDeviation[
          MaleSeventy,LongCorp,alpha]  ,{alpha,0,1}];
InputForm[%]>>b:\ASDMaleSeventyLCorp.txt
```



In[161]:=

```
Average[Map[SquaredDeviation,AllYears[MaleSeventy]] ]
AverageSquaredDeviation[
                        MaleSeventy,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[MaleSeventy,ShortIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,ShortCorp]
OptimalAlphaSquaredCriterion[MaleSeventy,IntIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,IntCorp]
OptimalAlphaSquaredCriterion[MaleSeventy,LongIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,LongCorp]
```

Out[161]=

```
14.7042
```

Out[162]=

```
14.7042
```

Out[163]=

```
{14.518, {alpha -> 0.140808}}
```

Out[164]=

```
{13.6208, {alpha -> 0.274623}}
```

Out[165]=

```
{12.8982, {alpha -> 0.26922}}
```

Out[166]=

```
{12.359, {alpha -> 0.233366}}
```

Out[167]=

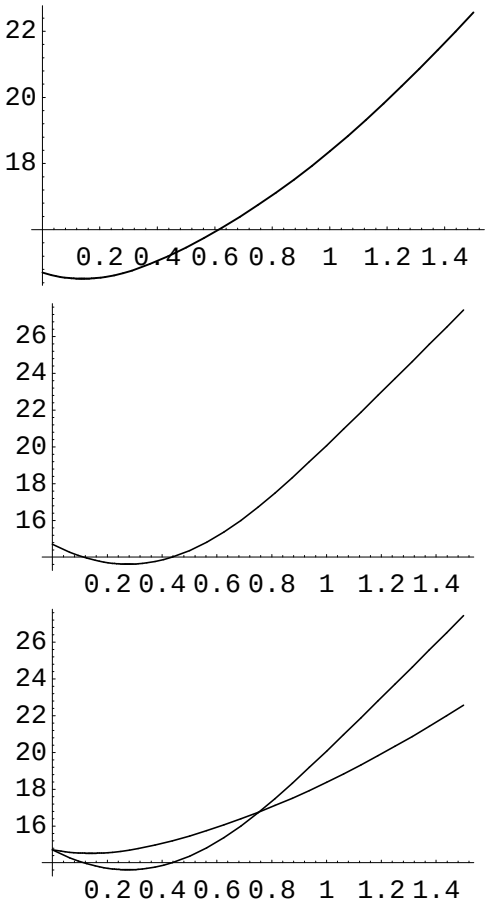
```
{12.4125, {alpha -> 0.193406}}
```

Out[168]=

```
{11.3525, {alpha -> 0.202234}}
```

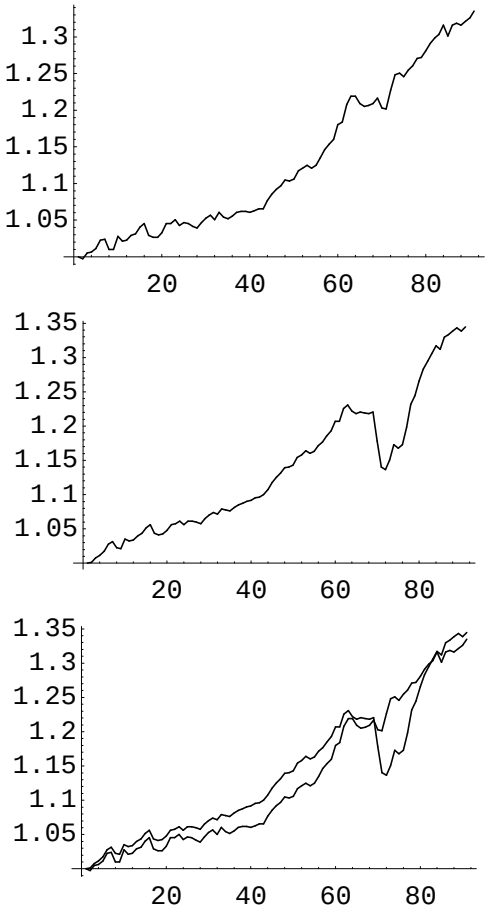
In[169]:=

```
Plot[AverageSquaredDeviation[
        MaleSeventy,ShortIndex,alpha]  ,{alpha,0,1.5}];
Plot[AverageSquaredDeviation[
        MaleSeventy,ShortCorp,alpha]  ,{alpha,0,1.5}];
Show[%,%%];
```



In[172]:=

```
ListPlot[ShortIndex/ShortIndex[[1]],PlotJoined->True];
ListPlot[ShortCorp/ShortCorp[[1]],PlotJoined->True];
Show[%,%%];
```



In[175]:=

```
(* I want to make a scatter diagram showing unhedged
"deviations from initial income" on the horizontal
axis and hedged "deviations from initial income" on
the vertical axis.  I'd hope that the latter would
be smaller than the former: so the scatter would
be closer to the horizontal axis (where hedged deviations
equal to zero) than a 45-degree line.

This scatter diagram will take many steps to develop.
Here are the steps. *)
```

In[176]:=

```
Take[
AllYears[MaleSeventy] ,3]
Take[
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[IntIndex,1/3]] ,3]
Transpose[{%%,%}]
```

Out[176]=

```
{{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698},
  {722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701},
  {716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701, 693}}
```

Out[177]=

```
{{720., 721.03, 720.812, 710.428, 711.57, 703.72, 694.624, 695.794,
   701.753, 708.389, 705.667, 708.633},
  {722., 721.782, 711.384, 712.528, 704.668, 695.559, 696.731,
   702.697, 709.343, 706.616, 709.586, 715.467},
  {716., 705.686, 706.82, 699.023, 689.987, 691.15, 697.068, 703.66,
   700.956, 703.902, 709.735, 704.411}}
```

Out[178]=

```
{{{720, 722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698},
   {720., 721.03, 720.812, 710.428, 711.57, 703.72, 694.624, 695.794,
    701.753, 708.389, 705.667, 708.633}},
  {{722, 716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701},
   {722., 721.782, 711.384, 712.528, 704.668, 695.559, 696.731,
    702.697, 709.343, 706.616, 709.586, 715.467}},
  {{716, 706, 704, 688, 680, 693, 698, 695, 696, 698, 701, 693},
   {716., 705.686, 706.82, 699.023, 689.987, 691.15, 697.068, 703.66,
    700.956, 703.902, 709.735, 704.411}}}
```

In[179]:=

```
Deviation[vector_] := vector - vector[[1]]
Take[
Map[Deviation,
     AllYears[MaleSeventy]
 ] ,3]
Take[
Map[Deviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[IntIndex,1/3]]
 ] ,3]
Transpose[{%%,%}]
```

Out[180]=

```
{{0, 2, -4, -14, -16, -32, -40, -27, -22, -25, -24, -22},
  {0, -6, -16, -18, -34, -42, -29, -24, -27, -26, -24, -21},
  {0, -10, -12, -28, -36, -23, -18, -21, -20, -18, -15, -23}}
```

Out[181]=

```
{{0., 1.02957, 0.811828, -9.57168, -8.43011, -16.2796, -25.3763,
   -24.2056, -18.2473, -11.6107, -14.3333, -11.3674},
  {0., -0.218035, -10.6155, -9.47241, -17.3324, -26.4415, -25.2692,
   -19.3028, -12.6572, -15.3836, -12.4136, -6.53342},
  {0., -10.3142, -9.18024, -16.9773, -26.0134, -24.8505, -18.9319,
   -12.3396, -15.0441, -12.0979, -6.2648, -11.5888}}
```

Out[182]=

```
{{{0, 2, -4, -14, -16, -32, -40, -27, -22, -25, -24, -22},
   {0., 1.02957, 0.811828, -9.57168, -8.43011, -16.2796, -25.3763,
    -24.2056, -18.2473, -11.6107, -14.3333, -11.3674}},
  {{0, -6, -16, -18, -34, -42, -29, -24, -27, -26, -24, -21},
   {0., -0.218035, -10.6155, -9.47241, -17.3324, -26.4415, -25.2692,
    -19.3028, -12.6572, -15.3836, -12.4136, -6.53342}},
  {{0, -10, -12, -28, -36, -23, -18, -21, -20, -18, -15, -23},
   {0., -10.3142, -9.18024, -16.9773, -26.0134, -24.8505, -18.9319,
    -12.3396, -15.0441, -12.0979, -6.2648, -11.5888}}}
```

In[183]:=

```
(* test this logic *)
Apply[        f[{##}]&,{{{a,b,c},{1,2,3}},
                    {{w,x,y},{5,6,7}}},{1}]
Apply[Transpose[{##}]&,{{{a,b,c},{1,2,3}},
                    {{w,x,y},{5,6,7}}},{1}]
```

Out[184]=

```
{f[{{a, b, c}, {1, 2, 3}}], f[{{w, x, y}, {5, 6, 7}}]}
```

Out[185]=

```
{{{a, 1}, {b, 2}, {c, 3}}, {{w, 5}, {x, 6}, {y, 7}}}
```

In[186]:=

```
(* still testing... *)
Apply[Transpose[{##}]&,
Transpose[{
Take[
Map[Deviation,
     AllYears[MaleSeventy]
 ] ,3]
,
Take[
Map[Deviation,
AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[IntIndex,1/3]]
 ] ,3]
}]
,{1}]
```

Out[187]=

```
{{{0, 0.}, {2, 1.02957}, {-4, 0.811828}, {-14, -9.57168},
   {-16, -8.43011}, {-32, -16.2796}, {-40, -25.3763},
   {-27, -24.2056}, {-22, -18.2473}, {-25, -11.6107},
   {-24, -14.3333}, {-22, -11.3674}},
  {{0, 0.}, {-6, -0.218035}, {-16, -10.6155}, {-18, -9.47241},
   {-34, -17.3324}, {-42, -26.4415}, {-29, -25.2692},
   {-24, -19.3028}, {-27, -12.6572}, {-26, -15.3836},
   {-24, -12.4136}, {-21, -6.53342}},
  {{0, 0.}, {-10, -10.3142}, {-12, -9.18024}, {-28, -16.9773},
   {-36, -26.0134}, {-23, -24.8505}, {-18, -18.9319},
   {-21, -12.3396}, {-20, -15.0441}, {-18, -12.0979}, {-15, -6.2648},
   {-23, -11.5888}}}
```

In[188]:=

```
(* OK; make a definition for all years, not just three *)
UnhedgedVsHedgedDeviations[person_,instrument_,alpha_]:=
Apply[Transpose[{##}]&,
Transpose[{Map[Deviation,
(*       AllYears[MaleSeventy] :not right because
                          presumably "not hedging" means
                          holding 100% Money Markets, not
                          100% cash under a mattress *)
        AllYearsHedgedIncome[person,BlendedInstrument[instrument,0]]
 ] ,       Map[Deviation,
        AllYearsHedgedIncome[person,BlendedInstrument[instrument,alpha]]
] }]   ,{1}]
(*and check the definition*)
Take[  UnhedgedVsHedgedDeviations[MaleSeventy,IntIndex,1/3] ,3]
```

Out[191]=

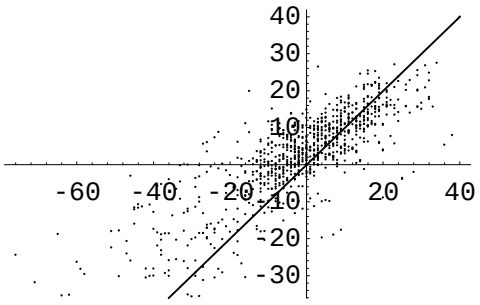
```
{{{0., 0.}, {2., 1.02957}, {-4., 0.811828}, {-14., -9.57168},
   {-16., -8.43011}, {-32., -16.2796}, {-40., -25.3763},
   {-27., -24.2056}, {-22., -18.2473}, {-25., -11.6107},
   {-24., -14.3333}, {-22., -11.3674}},
  {{0., 0.}, {-6., -0.218035}, {-16., -10.6155}, {-18., -9.47241},
   {-34., -17.3324}, {-42., -26.4415}, {-29., -25.2692},
   {-24., -19.3028}, {-27., -12.6572}, {-26., -15.3836},
   {-24., -12.4136}, {-21., -6.53342}},
  {{0., 0.}, {-10., -10.3142}, {-12., -9.18024}, {-28., -16.9773},
   {-36., -26.0134}, {-23., -24.8505}, {-18., -18.9319},
   {-21., -12.3396}, {-20., -15.0441}, {-18., -12.0979},
   {-15., -6.2648}, {-23., -11.5888}}}
```

In[192]:=

```
(* to finally make a scatter diagram *)
Take[Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,
                                        LongCorp,1/5],1],14]
ListPlot[
     Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,
                                          LongCorp,1/5],1]
      ,PlotStyle->PointSize[0.01],DisplayFunction->Identity];
ListPlot[{{-60,-60},{40,40}},
      PlotJoined->True,DisplayFunction->Identity];
Show[{%,%%},DisplayFunction->$DisplayFunction];
InputForm[%]>>b:\Scatter.txt
(* This is the scatter diagram for every month of
every one of the 80 years. *)
```

Out[193]=

```
{{0., 0.}, {2., 2.47736}, {-4., 0.733884}, {-14., -10.966},
  {-16., -9.48364}, {-32., -17.8988}, {-40., -28.086},
  {-27., -27.6873}, {-22., -20.154}, {-25., -16.0397},
  {-24., -17.5577}, {-22., -14.8469}, {0., 0.}, {-6., -1.74232}}
```

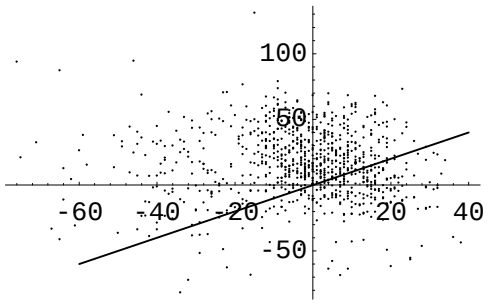


In[199]:=

```
(* The scatter diagram if you go too far, holding
90% of assets on the Long-term Index *)
Take[Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongIndex,.9],1],14]
ListPlot[
     Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongIndex,.9],1]
      ,PlotStyle->PointSize[0.01],DisplayFunction->Identity];
ListPlot[{{-60,-60},{40,40}},
      PlotJoined->True,DisplayFunction->Identity];
Show[{%,%%},DisplayFunction->$DisplayFunction];
```

Out[200]=

```
{{0., 0.}, {2., 0.331707}, {-4., 12.5443}, {-14., -4.21207},
  {-16., 7.58716}, {-32., 25.2303}, {-40., 7.13736},
  {-27., -37.4083}, {-22., -21.1936}, {-25., 9.52696},
  {-24., -4.70141}, {-22., 1.38614}, {0., 0.}, {-6., 12.2409}}
```



In[204]:=

```
(* That was the scatter diagram for every month of
every one of the 80 years.  What follows is scatter
diagrams of the criteria which summarize each of
the 80 years, namely the MaxDeviation criterion
and the SquaredDeviation criterion.
*)
Take[  Map[MaxDeviation,
     AllYears[MaleSeventy]] ,3]
Take[  Map[MaxDeviation,
     AllYearsHedgedIncome[
             MaleSeventy,BlendedInstrument[IntIndex,1/3]]],3]



Take[  Transpose[{Map[MaxDeviation,
     AllYears[MaleSeventy]] ,
  Map[MaxDeviation,
     AllYearsHedgedIncome[
             MaleSeventy,BlendedInstrument[IntIndex,1/3]]]}  ]
,3]
ListPlot[%,PlotStyle->PointSize[0.05]];
```

Out[205]=

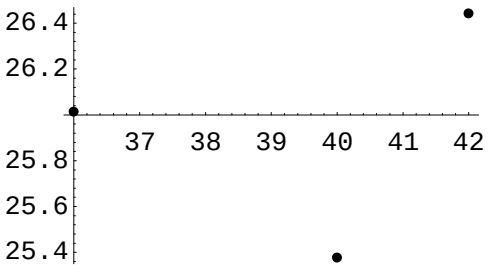
```
{40, 42, 36}
```

Out[206]=

```
{25.3763, 26.4415, 26.0134}
```

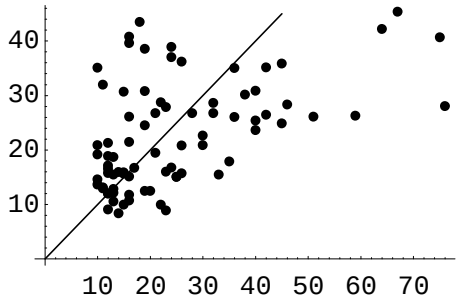
Out[207]=

```
{{40, 25.3763}, {42, 26.4415}, {36, 26.0134}}
```



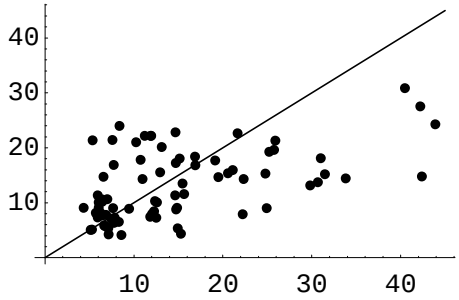
In[209]:=

```
ListPlot[
Transpose[{Map[MaxDeviation,
 AllYears[MaleSeventy]] ,
          Map[MaxDeviation,
 AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[IntIndex,1/3]]]}  ]
,PlotStyle->PointSize[0.05],DisplayFunction->Identity];
ListPlot[{{0,0},{45,45}},PlotJoined->True,DisplayFunction->Identity];
Show[{%,%%},DisplayFunction->$DisplayFunction];
```



In[212]:=

```
ListPlot[
Transpose[{Map[SquaredDeviation,
 AllYears[MaleSeventy]] ,
        Map[SquaredDeviation,
 AllYearsHedgedIncome[MaleSeventy,BlendedInstrument[IntIndex,1/3]]]}  ]
,PlotStyle->PointSize[0.05],DisplayFunction->Identity];
ListPlot[{{0,0},{45,45}},PlotJoined->True,DisplayFunction->Identity];
Show[{%,%%},DisplayFunction->$DisplayFunction];
```



In[215]:=

```
(* All Persons, Both Criteria, All Instruments *)
Max[Map[MaxDeviation,AllYears[MaleSixty]] ]
MaxMaxDeviation[         MaleSixty,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[MaleSixty,ShortIndex]
OptimalAlphaMaxCriterion[MaleSixty,ShortCorp]
OptimalAlphaMaxCriterion[MaleSixty,IntIndex]
OptimalAlphaMaxCriterion[MaleSixty,IntCorp]
OptimalAlphaMaxCriterion[MaleSixty,LongIndex]
OptimalAlphaMaxCriterion[MaleSixty,LongCorp]
```

Out[216]=

```
70
```

Out[217]=

```
70.
```

Out[218]=

```
{51.6238, {alpha -> 0.451695}}
```

Out[219]=

```
{47.0506, {alpha -> 0.27773}}
```

Out[220]=

```
{44.4919, {alpha -> 0.283818}}
```

Out[221]=

```
{47.7625, {alpha -> 0.151326}}
```

Out[222]=

```
{47.3564, {alpha -> 0.366534}}
```

Out[223]=

```
{46.437, {alpha -> 0.146192}}
```

In[224]:=

```
Average[Map[SquaredDeviation,AllYears[MaleSixty]] ]
AverageSquaredDeviation[
                              MaleSixty,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[MaleSixty,ShortIndex]
OptimalAlphaSquaredCriterion[MaleSixty,ShortCorp]
OptimalAlphaSquaredCriterion[MaleSixty,IntIndex]
OptimalAlphaSquaredCriterion[MaleSixty,IntCorp]
OptimalAlphaSquaredCriterion[MaleSixty,LongIndex]
OptimalAlphaSquaredCriterion[MaleSixty,LongCorp]
```

Out[224]=

```
14.6454
```

Out[225]=

```
14.6454
```

Out[226]=

```
{14.4266, {alpha -> 0.214038}}
```

Out[227]=

```
{13.807, {alpha -> 0.298447}}
```

Out[228]=

```
{12.828, {alpha -> 0.324588}}
```

Out[229]=

```
{12.7208, {alpha -> 0.257273}}
```

Out[230]=

```
{12.3178, {alpha -> 0.234217}}
```

Out[231]=

```
{11.4933, {alpha -> 0.230765}}
```

In[232]:=

```
Max[Map[MaxDeviation,AllYears[FemaleSixty]] ]
MaxMaxDeviation[         FemaleSixty,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[FemaleSixty,ShortIndex]
OptimalAlphaMaxCriterion[FemaleSixty,ShortCorp]
OptimalAlphaMaxCriterion[FemaleSixty,IntIndex]
OptimalAlphaMaxCriterion[FemaleSixty,IntCorp]
OptimalAlphaMaxCriterion[FemaleSixty,LongIndex]
OptimalAlphaMaxCriterion[FemaleSixty,LongCorp]
```

Out[232]=

```
70
```

Out[233]=

```
70.
```

Out[234]=

```
{51.9145, {alpha -> 0.442155}}
```

Out[235]=

```
{47.0588, {alpha -> 0.294665}}
```

Out[236]=

```
{45.287, {alpha -> 0.278308}}
```

Out[237]=

```
{47.7714, {alpha -> 0.160293}}
```

Out[238]=

```
{45.4307, {alpha -> 0.388503}}
```

Out[239]=

```
{46.3193, {alpha -> 0.146725}}
```

In[240]:=

```
Average[Map[SquaredDeviation,AllYears[FemaleSixty]] ]
AverageSquaredDeviation[
                              FemaleSixty,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[FemaleSixty,ShortIndex]
OptimalAlphaSquaredCriterion[FemaleSixty,ShortCorp]
OptimalAlphaSquaredCriterion[FemaleSixty,IntIndex]
OptimalAlphaSquaredCriterion[FemaleSixty,IntCorp]
OptimalAlphaSquaredCriterion[FemaleSixty,LongIndex]
OptimalAlphaSquaredCriterion[FemaleSixty,LongCorp]
```

Out[240]=

```
14.7309
```

Out[241]=

```
14.7309
```

Out[242]=

```
{14.5064, {alpha -> 0.232672}}
```

Out[243]=

```
{14.0335, {alpha -> 0.287805}}
```

Out[244]=

```
{12.9784, {alpha -> 0.335281}}
```

Out[245]=

```
{13.0189, {alpha -> 0.257194}}
```

Out[246]=

```
{12.4377, {alpha -> 0.24556}}
```

Out[247]=

```
{11.7394, {alpha -> 0.236417}}
```

In[248]:=

```
Max[Map[MaxDeviation,AllYears[MaleSixtyFive]] ]
MaxMaxDeviation[         MaleSixtyFive,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[MaleSixtyFive,ShortIndex]
OptimalAlphaMaxCriterion[MaleSixtyFive,ShortCorp]
OptimalAlphaMaxCriterion[MaleSixtyFive,IntIndex]
OptimalAlphaMaxCriterion[MaleSixtyFive,IntCorp]
OptimalAlphaMaxCriterion[MaleSixtyFive,LongIndex]
OptimalAlphaMaxCriterion[MaleSixtyFive,LongCorp]
```

Out[248]=

```
71
```

Out[249]=

```
71.
```

Out[250]=

```
{56.4831, {alpha -> 0.311337}}
```

Out[251]=

```
{48.4784, {alpha -> 0.248288}}
```

Out[252]=

```
{51.0706, {alpha -> 0.195733}}
```

Out[253]=

```
{48.7563, {alpha -> 0.13822}}
```

Out[254]=

```
{51.6627, {alpha -> 0.279783}}
```

Out[255]=

```
{47.7996, {alpha -> 0.154461}}
```

In[256]:=

```
Average[Map[SquaredDeviation,AllYears[MaleSixtyFive]] ]
AverageSquaredDeviation[
                              MaleSixtyFive,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[MaleSixtyFive,ShortIndex]
OptimalAlphaSquaredCriterion[MaleSixtyFive,ShortCorp]
OptimalAlphaSquaredCriterion[MaleSixtyFive,IntIndex]
OptimalAlphaSquaredCriterion[MaleSixtyFive,IntCorp]
OptimalAlphaSquaredCriterion[MaleSixtyFive,LongIndex]
OptimalAlphaSquaredCriterion[MaleSixtyFive,LongCorp]
```

Out[256]=

```
14.7083
```

Out[257]=

```
14.7083
```

Out[258]=

```
{14.5988, {alpha -> 0.135159}}
```

Out[259]=

```
{13.9343, {alpha -> 0.267826}}
```

Out[260]=

```
{13.051, {alpha -> 0.289957}}
```

Out[261]=

```
{12.8277, {alpha -> 0.233179}}
```

Out[262]=

```
{12.5336, {alpha -> 0.209704}}
```

Out[263]=

```
{11.6554, {alpha -> 0.210078}}
```

In[264]:=

```
Max[Map[MaxDeviation,AllYears[FemaleSixtyFive]] ]
MaxMaxDeviation[         FemaleSixtyFive,ShortIndex,0]
                                                (*no hedging*)
OptimalAlphaMaxCriterion[FemaleSixtyFive,ShortIndex]
OptimalAlphaMaxCriterion[FemaleSixtyFive,ShortCorp]
OptimalAlphaMaxCriterion[FemaleSixtyFive,IntIndex]
OptimalAlphaMaxCriterion[FemaleSixtyFive,IntCorp]
OptimalAlphaMaxCriterion[FemaleSixtyFive,LongIndex]
OptimalAlphaMaxCriterion[FemaleSixtyFive,LongCorp]
```

Out[264]=

```
71
```

Out[265]=

```
71.
```

Out[267]=

```
{51.3826, {alpha -> 0.471404}}
```

Out[268]=

```
{47.5072, {alpha -> 0.276315}}
```

Out[269]=

```
{43.7404, {alpha -> 0.295881}}
```

Out[270]=

```
{48.1215, {alpha -> 0.151305}}
```

Out[271]=

```
{47.6692, {alpha -> 0.340743}}
```

Out[272]=

```
{47.6791, {alpha -> 0.138112}}
```

In[273]:=

```
Average[Map[SquaredDeviation,AllYears[FemaleSixtyFive]] ]
AverageSquaredDeviation[
                              FemaleSixtyFive,ShortIndex,0]
                                                  (*no hedging*)
OptimalAlphaSquaredCriterion[FemaleSixtyFive,ShortIndex]
OptimalAlphaSquaredCriterion[FemaleSixtyFive,ShortCorp]
OptimalAlphaSquaredCriterion[FemaleSixtyFive,IntIndex]
OptimalAlphaSquaredCriterion[FemaleSixtyFive,IntCorp]
OptimalAlphaSquaredCriterion[FemaleSixtyFive,LongIndex]
OptimalAlphaSquaredCriterion[FemaleSixtyFive,LongCorp]
```

Out[273]=

```
14.1692
```

Out[274]=

```
14.1692
```

Out[276]=

```
{14.1175, {alpha -> 0.0824698}}
```

Out[277]=

```
{13.6275, {alpha -> 0.225885}}
```

Out[278]=

```
{12.8713, {alpha -> 0.280595}}
```

Out[279]=

```
{12.6117, {alpha -> 0.226233}}
```

Out[280]=

```
{12.3102, {alpha -> 0.21284}}
```

Out[281]=

```
{11.4514, {alpha -> 0.216225}}
```

In[282]:=

```
Max[Map[MaxDeviation,AllYears[MaleSeventy]] ]
MaxMaxDeviation[         MaleSeventy,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[MaleSeventy,ShortIndex]
OptimalAlphaMaxCriterion[MaleSeventy,ShortCorp]
OptimalAlphaMaxCriterion[MaleSeventy,IntIndex]
OptimalAlphaMaxCriterion[MaleSeventy,IntCorp]
OptimalAlphaMaxCriterion[MaleSeventy,LongIndex]
OptimalAlphaMaxCriterion[MaleSeventy,LongCorp]
```

Out[282]=

```
76
```

Out[283]=

```
76.
```

Out[284]=

```
{51.7737, {alpha -> 0.50601}}
```

Out[285]=

```
{48.6292, {alpha -> 0.275281}}
```

Out[286]=

```
{44.5734, {alpha -> 0.34862}}
```

Out[287]=

```
{49.4935, {alpha -> 0.150622}}
```

Out[288]=

```
{54.652, {alpha -> 0.320381}}
```

Out[289]=

```
{48.7916, {alpha -> 0.191705}}
```

In[290]:=

```
Average[Map[SquaredDeviation,AllYears[MaleSeventy]] ]
AverageSquaredDeviation[
                              MaleSeventy,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[MaleSeventy,ShortIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,ShortCorp]
OptimalAlphaSquaredCriterion[MaleSeventy,IntIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,IntCorp]
OptimalAlphaSquaredCriterion[MaleSeventy,LongIndex]
OptimalAlphaSquaredCriterion[MaleSeventy,LongCorp]
```

Out[290]=

```
14.7042
```

Out[291]=

```
14.7042
```

Out[292]=

```
{14.518, {alpha -> 0.140808}}
```

Out[293]=

```
{13.6208, {alpha -> 0.274623}}
```

Out[294]=

```
{12.8982, {alpha -> 0.26922}}
```

Out[295]=

```
{12.359, {alpha -> 0.233366}}
```

Out[296]=

```
{12.4125, {alpha -> 0.193406}}
```

Out[297]=

```
{11.3525, {alpha -> 0.202234}}
```

In[298]:=

```
Max[Map[MaxDeviation,AllYears[FemaleSeventy]] ]
MaxMaxDeviation[         FemaleSeventy,ShortIndex,0](*no hedging*)
OptimalAlphaMaxCriterion[FemaleSeventy,ShortIndex]
OptimalAlphaMaxCriterion[FemaleSeventy,ShortCorp]
OptimalAlphaMaxCriterion[FemaleSeventy,IntIndex]
OptimalAlphaMaxCriterion[FemaleSeventy,IntCorp]
OptimalAlphaMaxCriterion[FemaleSeventy,LongIndex]
OptimalAlphaMaxCriterion[FemaleSeventy,LongCorp]
```

Out[298]=

```
75
```

Out[299]=

```
75.
```

Out[300]=

```
{52.6902, {alpha -> 0.519331}}
```

Out[301]=

```
{48.5132, {alpha -> 0.283623}}
```

Out[302]=

```
{44.9442, {alpha -> 0.346323}}
```

Out[303]=

```
{49.5001, {alpha -> 0.160667}}
```

Out[304]=

```
{53.6721, {alpha -> 0.343754}}
```

Out[305]=

```
{48.5627, {alpha -> 0.191373}}
```

In[306]:=

```
Average[Map[SquaredDeviation,AllYears[FemaleSeventy]] ]
AverageSquaredDeviation[
                              FemaleSeventy,ShortIndex,0]  (*no hedging*)
OptimalAlphaSquaredCriterion[FemaleSeventy,ShortIndex]
OptimalAlphaSquaredCriterion[FemaleSeventy,ShortCorp]
OptimalAlphaSquaredCriterion[FemaleSeventy,IntIndex]
OptimalAlphaSquaredCriterion[FemaleSeventy,IntCorp]
OptimalAlphaSquaredCriterion[FemaleSeventy,LongIndex]
OptimalAlphaSquaredCriterion[FemaleSeventy,LongCorp]
```

Out[306]=

```
14.2693
```

Out[307]=

```
14.2693
```

Out[308]=

```
{14.2331, {alpha -> 0.0571128}}
```

Out[309]=

```
{13.6754, {alpha -> 0.223112}}
```

Out[310]=

```
{13.0229, {alpha -> 0.258295}}
```

Out[311]=

```
{12.557, {alpha -> 0.223656}}
```

Out[312]=

```
{12.4788, {alpha -> 0.193397}}
```

Out[313]=

```
{11.4887, {alpha -> 0.205485}}
```

In[314]:=

```
Max[Map[MaxDeviation,AllYears[MaleSeventyFive]] ]
MaxMaxDeviation[       MaleSeventyFive,ShortIndex,0]
                                                  (*no hedging*)
OptimalAlphaMaxCriterion[MaleSeventyFive,ShortIndex]
OptimalAlphaMaxCriterion[MaleSeventyFive,ShortCorp]
OptimalAlphaMaxCriterion[MaleSeventyFive,IntIndex]
OptimalAlphaMaxCriterion[MaleSeventyFive,IntCorp]
OptimalAlphaMaxCriterion[MaleSeventyFive,LongIndex]
OptimalAlphaMaxCriterion[MaleSeventyFive,LongCorp]
```

Out[314]=

```
77
```

Out[315]=

```
77.
```

Out[317]=

```
{58.9353, {alpha -> 0.343419}}
```

Out[318]=

```
{51.1683, {alpha -> 0.51587}}
```

Out[319]=

```
{52.116, {alpha -> 0.252649}}
```

Out[320]=

```
{49.7601, {alpha -> 0.175615}}
```

Out[321]=

```
{61.3213, {alpha -> 0.205176}}
```

Out[322]=

```
{50.754, {alpha -> 0.192341}}
```

In[323]:=

```
Average[Map[SquaredDeviation,AllYears[MaleSeventyFive]] ]
AverageSquaredDeviation[
                              MaleSeventyFive,ShortIndex,0]
                                                  (*no hedging*)
OptimalAlphaSquaredCriterion[MaleSeventyFive,ShortIndex]
OptimalAlphaSquaredCriterion[MaleSeventyFive,ShortCorp]
OptimalAlphaSquaredCriterion[MaleSeventyFive,IntIndex]
OptimalAlphaSquaredCriterion[MaleSeventyFive,IntCorp]
OptimalAlphaSquaredCriterion[MaleSeventyFive,LongIndex]
OptimalAlphaSquaredCriterion[MaleSeventyFive,LongCorp]
```

Out[323]=

```
14.9754
```

Out[324]=

```
14.9754
```

Out[326]=

```
{14.5585, {alpha -> 0.162098}}
```

Out[327]=

```
{13.5349, {alpha -> 0.28398}}
```

Out[328]=

```
{12.8434, {alpha -> 0.252556}}
```

Out[329]=

```
{12.1603, {alpha -> 0.23152}}
```

Out[330]=

```
{12.6432, {alpha -> 0.168293}}
```

Out[331]=

```
{11.6843, {alpha -> 0.181183}}
```

In[332]:=

```
Max[Map[MaxDeviation,AllYears[FemaleSeventyFive]] ]
MaxMaxDeviation[     FemaleSeventyFive,ShortIndex,0]
                                                  (*no hedging*)
OptimalAlphaMaxCriterion[FemaleSeventyFive,ShortIndex]
OptimalAlphaMaxCriterion[FemaleSeventyFive,ShortCorp]
OptimalAlphaMaxCriterion[FemaleSeventyFive,IntIndex]
OptimalAlphaMaxCriterion[FemaleSeventyFive,IntCorp]
OptimalAlphaMaxCriterion[FemaleSeventyFive,LongIndex]
OptimalAlphaMaxCriterion[FemaleSeventyFive,LongCorp]
```

Out[332]=

```
77
```

Out[333]=

```
77.
```

Out[335]=

```
{51.7272, {alpha -> 0.525979}}
```

Out[336]=

```
{47.8654, {alpha -> 0.27901}}
```

Out[337]=

```
{44.3997, {alpha -> 0.369226}}
```

Out[338]=

```
{48.9417, {alpha -> 0.157789}}
```

Out[339]=

```
{55.9886, {alpha -> 0.32492}}
```

Out[340]=

```
{48.775, {alpha -> 0.203287}}
```

In[341]:=

```
Average[Map[SquaredDeviation,AllYears[FemaleSeventyFive]] ]
AverageSquaredDeviation[
                              FemaleSeventyFive,ShortIndex,0]
                                                  (*no hedging*)
OptimalAlphaSquaredCriterion[FemaleSeventyFive,ShortIndex]
OptimalAlphaSquaredCriterion[FemaleSeventyFive,ShortCorp]
OptimalAlphaSquaredCriterion[FemaleSeventyFive,IntIndex]
OptimalAlphaSquaredCriterion[FemaleSeventyFive,IntCorp]
OptimalAlphaSquaredCriterion[FemaleSeventyFive,LongIndex]
OptimalAlphaSquaredCriterion[FemaleSeventyFive,LongCorp]
```

Out[341]=

```
14.2886
```

Out[342]=

```
14.2886
```

Out[344]=

```
{14.194, {alpha -> 0.0750452}}
```

Out[345]=

```
{13.4567, {alpha -> 0.243983}}
```

Out[346]=

```
{12.8094, {alpha -> 0.247991}}
```

Out[347]=

```
{12.1354, {alpha -> 0.228631}}
```

Out[348]=

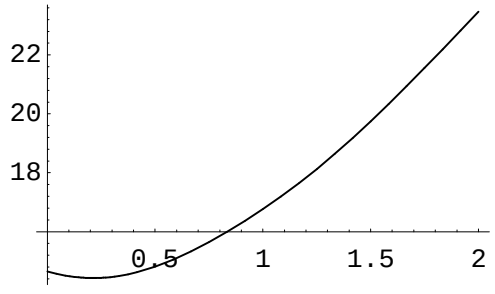
```
{12.3363, {alpha -> 0.175953}}
```

Out[349]=

```
{11.2229, {alpha -> 0.195217}}
```

In[350]:=

```
Plot[AverageSquaredDeviation[
          MaleSixty,ShortIndex,alpha]  ,{alpha,0,2}];
AverageSquaredDeviation[MaleSixty,ShortIndex,1]
```

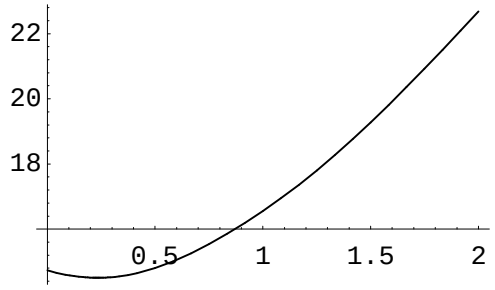


Out[351]=

```
16.7611
```

In[352]:=

```
Plot[AverageSquaredDeviation[
          FemaleSixty,ShortIndex,alpha]  ,{alpha,0,2}];
AverageSquaredDeviation[FemaleSixty,ShortIndex,1]
```

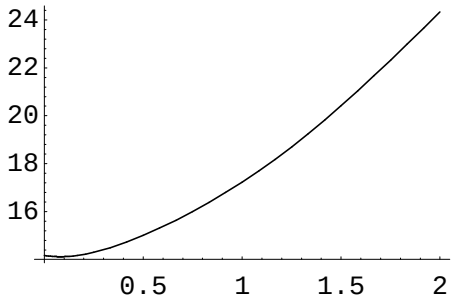


Out[353]=

```
16.5552
```

In[354]:=

```
Plot[AverageSquaredDeviation[
          FemaleSixtyFive,ShortIndex,alpha]  ,{alpha,0,2}];
AverageSquaredDeviation[FemaleSixtyFive,ShortIndex,1]
```



Out[355]=

```
17.2279
```

In[356]:=

```
dummy = { {a,b}, {c,d}, {e,f} }
Covariance[x_] :=
Apply[Plus,Map[#[[1]]*#[[2]]&,x]]/Length[x] -
Apply[Plus,Map[#[[1]]&,x]]/Length[x] *
Apply[Plus,Map[#[[2]]&,x]]/Length[x]
Covariance[dummy]
```

Out[356]=

```
{{a, b}, {c, d}, {e, f}}
```

Out[358]=

$$-\frac{(a + c + e)\,(b + d + f)}{9} + \frac{a\,b + c\,d + e\,f}{3}$$

In[359]:=

```
StandardDeviationUnsimplified[vector_] := Sqrt[  Apply[Plus,
(vector - (Apply[Plus,vector]/Length[vector]) )^2
                                        ]/Length[vector]  ]
(* Check Definition *)
StandardDeviationUnsimplified[{a,b,c}]
StandardDeviation[vector_]:=N[StandardDeviationUnsimplified[vector]]
```

Out[361]=

$$\frac{\sqrt{\left(a+\frac{-a-b-c}{3}\right)^2+\left(b+\frac{-a-b-c}{3}\right)^2+\left(\frac{-a-b-c}{3}+c\right)^2}}{\sqrt{3}}$$

In[363]:=

```
CorrelationCoefficient[x_]:=
     Covariance[x]/(
     StandardDeviation[Map[#[[1]]&,x]]*
     StandardDeviation[Map[#[[2]]&,x]])
(* Check *)
Map[#[[1]]&,{{aone,bone},{atwo,btwo},{athree,bthree}}]
CorrelationCoefficient[{{-1,-1},{0,0},{1,1}}]
CorrelationCoefficient[{{-1,1},{0,0},{1,-1}}]
Covariance[{{-1,0},{0,0},{1,0}}]
```

```
General::spell1:
   Possible spelling error: new symbol name "bone"
     is similar to existing symbol "aone".
General::spell1:
   Possible spelling error: new symbol name "btwo"
     is similar to existing symbol "atwo".
General::spell1:
   Possible spelling error: new symbol name "bthree"
     is similar to existing symbol "athree".
General::stop:
   Further output of General::spell1
     will be suppressed during this calculation.
```

Out[365]=

```
{aone, atwo, athree}
```

Out[366]=

```
1.
```

Out[367]=

```
-1.
```

Out[368]=

```
0
```

In[369]:=

```
Length[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,1/5],1]
]
CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,1/5],1]
]
```

Out[369]=

```
960
```

Out[370]=

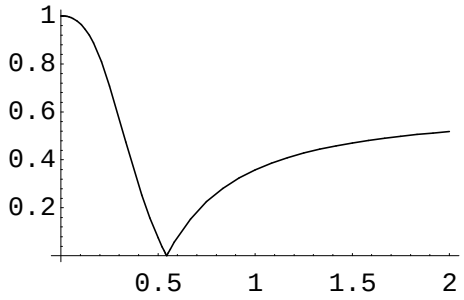
```
0.825918
```

In[371]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}]
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,2}];
```

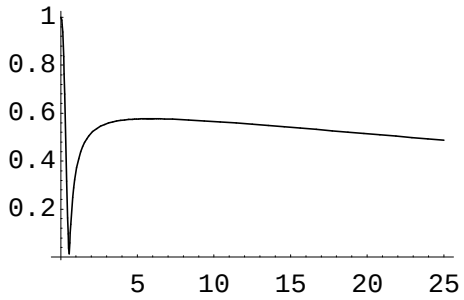
Out[371]=

```
                -8
{2.39652 10   , {alpha -> 0.54456}}
```



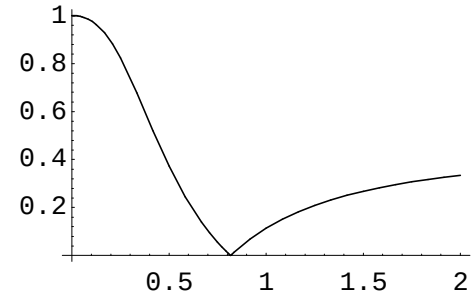
In[373]:=

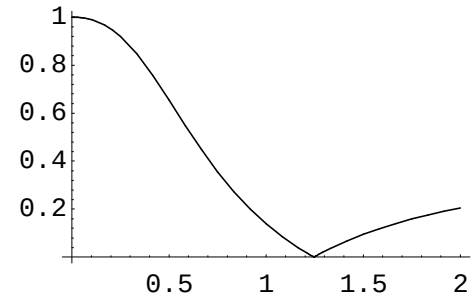
```
Plot[    Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]]
]              ,{alpha,0,25},PlotRange->All];
```

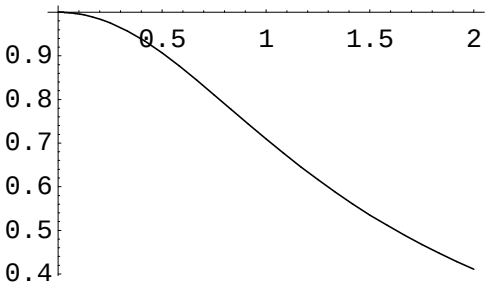


In[374]:=

```
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongIndex,alpha],1]
]              ],{alpha,0,2}];
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,IntIndex,alpha],1]
]              ],{alpha,0,2}];
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,ShortIndex,alpha],1]
]              ],{alpha,0,2}];
```

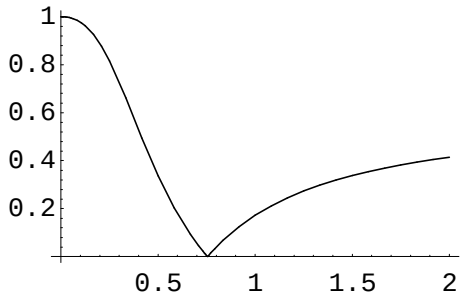






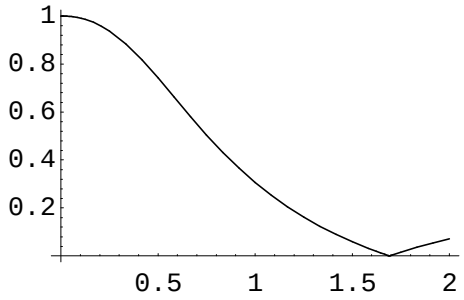
In[377]:=

```
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,IntCorp,alpha],1]
]              ],{alpha,0,2}];
```



In[378]:=

```
Plot[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,ShortCorp,alpha],1]
]              ],{alpha,0,2}];
```

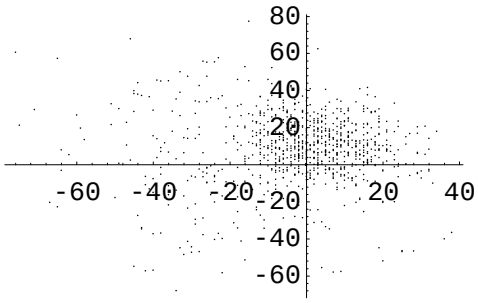


In[379]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}]
ListPlot[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],
1]/.%[[2]]
,PlotStyle->PointSize[0.01]];
InputForm[%]>>b:\Scatter2.txt
```

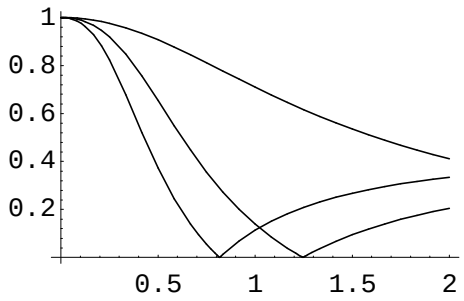
Out[379]=

```
                -8
{2.39652 10   , {alpha -> 0.54456}}
```



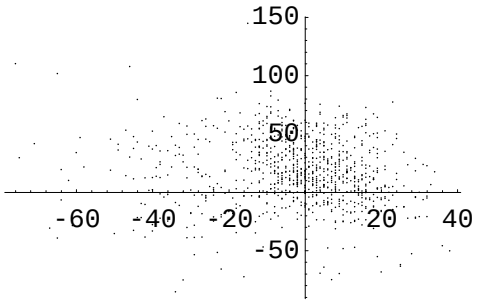
In[382]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongIndex,alpha],1]
]              ]}
,{alpha,0,2}];
```



In[383]:=

```
ListPlot[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongIndex,alpha],
1]/.{alpha->1}
,PlotStyle->PointSize[0.01]];
```



In[384]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSixty,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```

Out[384]=

```
                -7
{1.62657 10   , {alpha -> 0.674618}}
```

In[385]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixty,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[385]=
```
                -8
{2.01938 10   , {alpha -> 0.743969}}
```
In[386]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSixtyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[386]=
```
                -7
{1.76446 10   , {alpha -> 0.624195}}
```
In[387]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixtyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[387]=
```
                -7
{1.24383 10   , {alpha -> 0.652534}}
```
In[388]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[388]=
```
                -8
{2.39652 10   , {alpha -> 0.54456}}
```
In[389]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[389]=
```
                -8
{3.30569 10   , {alpha -> 0.58816}}
```
In[390]:=
```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```
Out[390]=
```
                -7
{1.71716 10   , {alpha -> 0.515835}}
```

In[391]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSeventyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}]
```

Out[391]=

```
                -7
{7.34093 10   , {alpha -> 0.508054}}
```

In[392]:=

```
AverageAnnualMaxDevFromInitial[person_,instrument_,alpha_]:=
Average[Map[MaxDeviation,
AllYearsHedgedIncome[person,BlendedInstrument[
                                instrument,alpha]]  ]]

AverageAnnualMaxDevFromInitial[MaleSixty,LongCorp,0]
AverageAnnualMaxDevFromInitial[FemaleSixty,LongCorp,0]
AverageAnnualMaxDevFromInitial[MaleSixtyFive,LongCorp,0]
AverageAnnualMaxDevFromInitial[FemaleSixtyFive,LongCorp,0]
AverageAnnualMaxDevFromInitial[MaleSeventy,LongCorp,0]
AverageAnnualMaxDevFromInitial[FemaleSeventy,LongCorp,0]
AverageAnnualMaxDevFromInitial[MaleSeventyFive,LongCorp,0]
AverageAnnualMaxDevFromInitial[FemaleSeventyFive,LongCorp,0]
```

Out[393]=

```
25.075
```

Out[394]=

```
25.125
```

Out[395]=

```
25.3
```

Out[396]=

```
23.75
```

Out[397]=

```
24.9
```

Out[398]=

```
24.3125
```

Out[399]=

```
25.625
```

Out[400]=

```
24.35
```

In[401]:=

```
AverageAnnualMaxDevFromInitial[MaleSixty,LongCorp,.23]
AverageAnnualMaxDevFromInitial[FemaleSixty,LongCorp,.24]
AverageAnnualMaxDevFromInitial[MaleSixtyFive,LongCorp,.21]
AverageAnnualMaxDevFromInitial[FemaleSixtyFive,LongCorp,.22]
AverageAnnualMaxDevFromInitial[MaleSeventy,LongCorp,.20]
AverageAnnualMaxDevFromInitial[FemaleSeventy,LongCorp,.21]
AverageAnnualMaxDevFromInitial[MaleSeventyFive,LongCorp,.18]
AverageAnnualMaxDevFromInitial[FemaleSeventyFive,LongCorp,.20]
```

Out[401]=

```
20.5475
```

Out[402]=

```
20.9516
```

Out[403]=

```
20.683
```

Out[404]=

```
20.3671
```

Out[405]=

```
20.1435
```

Out[406]=

```
20.2617
```

Out[407]=

```
20.7529
```

Out[408]=

```
19.8876
```

In[409]:=

```
averageannualaverage[person_,instrument_,alpha_]:=
Average[Map[Average,AllYearsHedgedIncome[person,
                BlendedInstrument[instrument,alpha]]  ]]
averageannualaverage[MaleSixty,LongCorp,0]
averageannualaverage[FemaleSixty,LongCorp,0]
averageannualaverage[MaleSixtyFive,LongCorp,0]
averageannualaverage[FemaleSixtyFive,LongCorp,0]
averageannualaverage[MaleSeventy,LongCorp,0]
averageannualaverage[FemaleSeventy,LongCorp,0]
averageannualaverage[MaleSeventyFive,LongCorp,0]
averageannualaverage[FemaleSeventyFive,LongCorp,0]
(* This will not be exactly equal to the average calculated
a long time ago (near where the range was calculated) because
this oversamples years in the middle of the data set.  It is
close, though. *)
```

Out[410]=

587.295

Out[411]=

557.277

Out[412]=

637.976

Out[413]=

601.893

Out[414]=

704.114

Out[415]=

661.127

Out[416]=

778.641

Out[417]=

739.722

In[419]:=

```
averageannualaverage[MaleSixty,LongCorp,.23]
averageannualaverage[FemaleSixty,LongCorp,.24]
averageannualaverage[MaleSixtyFive,LongCorp,.21]
averageannualaverage[FemaleSixtyFive,LongCorp,.22]
averageannualaverage[MaleSeventy,LongCorp,.20]
averageannualaverage[FemaleSeventy,LongCorp,.21]
averageannualaverage[MaleSeventyFive,LongCorp,.18]
averageannualaverage[FemaleSeventyFive,LongCorp,.20]
```

Out[419]=

591.06

Out[420]=

560.994

Out[421]=

641.734

Out[422]=

605.596

Out[423]=

708.072

Out[424]=

665.023

Out[425]=

782.6

Out[426]=

743.885

In[427]:=

```
(* Now do all dates at once; no overlapping 12-mo periods*)
AllYears[vector_] := {vector}
```

In[429]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSixty,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixty,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixty,LongCorp,1(**)],1]
]               (*all dates at once*)
```

Out[429]=

```
                -6
{1.12203 10   , {alpha -> 0.926438}}
```

Out[430]=

```
                -7
{1.45346 10   , {alpha -> 1.02498}}
```

Out[431]=

```
0.00653153
```

In[432]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSixtyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixtyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSixtyFive,LongCorp,1(**)],1]
]               (*all dates at once*)
CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSixtyFive,LongCorp,1(**)],1]
]               (*all dates at once*)
```

Out[432]=

```
                -8
{2.10955 10   , {alpha -> 1.20646}}
```

Out[433]=

```
                -7
{2.75549 10   , {alpha -> 1.29163}}
```

Out[434]=

```
0.0408229
```

Out[435]=

```
0.056393
```

In[436]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSeventy,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSeventy,LongCorp,1(**)],1]
]               (*all dates at once*)
```

Out[436]=

```
                -8
{7.37103 10   , {alpha -> 0.670437}}
```

Out[437]=

```
                -8
{7.00746 10   , {alpha -> 1.02924}}
```

Out[438]=

```
0.00665107
```

In[439]:=

```
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[MaleSeventyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
FindMinimum[Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[FemaleSeventyFive,LongCorp,alpha],1]
]              ],{alpha,0,1}] (*all dates at once*)
```

Out[439]=

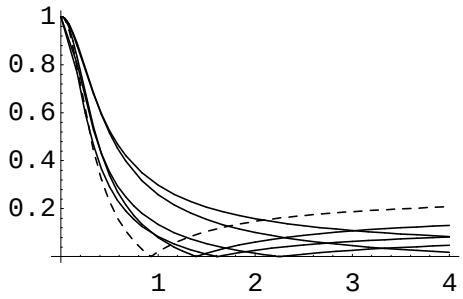
```
                -7
{2.63473 10   , {alpha -> 0.52287}}
```

Out[440]=

```
               -7
{2.6689 10   , {alpha -> 0.649821}}
```

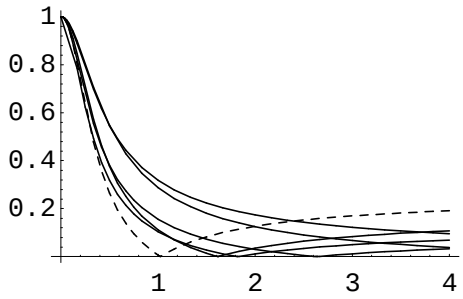
In[441]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixty,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixty,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixty,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixty,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         MaleSixty,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixty,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



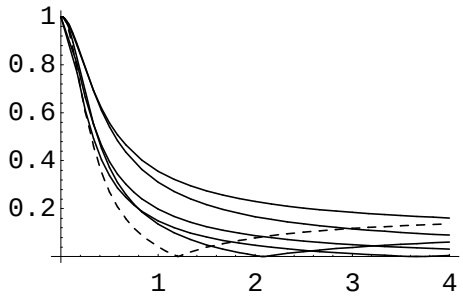
In[442]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixty,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixty,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixty,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixty,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         FemaleSixty,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixty,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



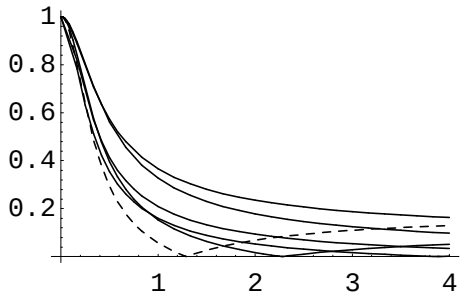
In[443]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSixtyFive,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



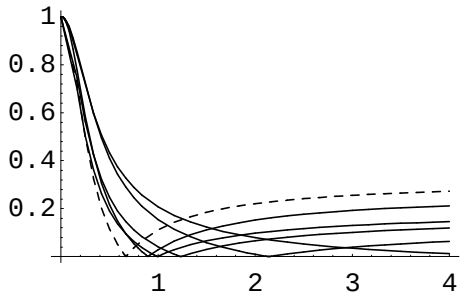
In[444]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSixtyFive,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



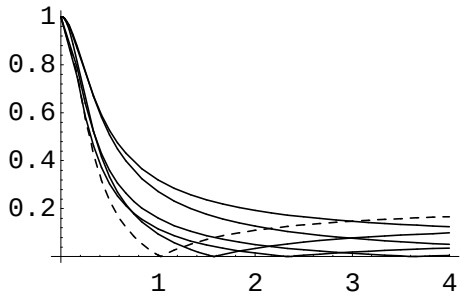
In[445]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventy,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventy,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventy,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventy,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         MaleSeventy,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventy,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



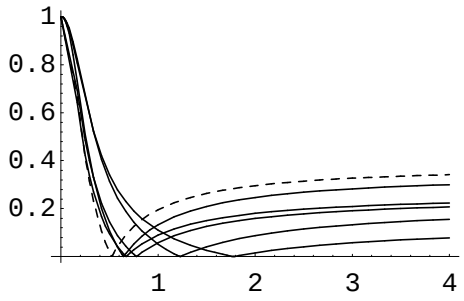
In[446]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventy,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventy,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventy,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventy,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         FemaleSeventy,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventy,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



In[447]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventyFive,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventyFive,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventyFive,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventyFive,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         MaleSeventyFive,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          MaleSeventyFive,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```



In[448]:=

```
Plot[{
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventyFive,ShortIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventyFive,ShortCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventyFive,IntIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventyFive,IntCorp,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                         FemaleSeventyFive,LongIndex,alpha],1]
]              ],
Abs[CorrelationCoefficient[
Flatten[UnhedgedVsHedgedDeviations[
                          FemaleSeventyFive,LongCorp,alpha],1]
]              ]}
,{alpha,0,4},PlotStyle->{{},{},{},{},{},
                         {Dashing[{0.02,0.02}]}}
];
```