US income tax in pictures

Some visualizing and summarizing of Chris Peel's excellent deep dive into US income tax schedules and effective tax rates.

Load and organize data

In[74]:=
```
(* Replace with the correct file path! Data can be found at https://
 raw.githubusercontent.com/chrisvwx/taxFoo.jl/main/incomeTax/mfj.csv *)labeled = Import [
   "/Users/swaldman/Documents/BaseFolders/mchange-llc-fl/Interfluidity/income-tax-surface/mfj-with-std-
     deduction.csv"];
```

In[75]:=
```
data = labeled[[2 ;;, 2 ;;]];
```

In[76]:=
```
transposedLabeled = Transpose[labeled];
```

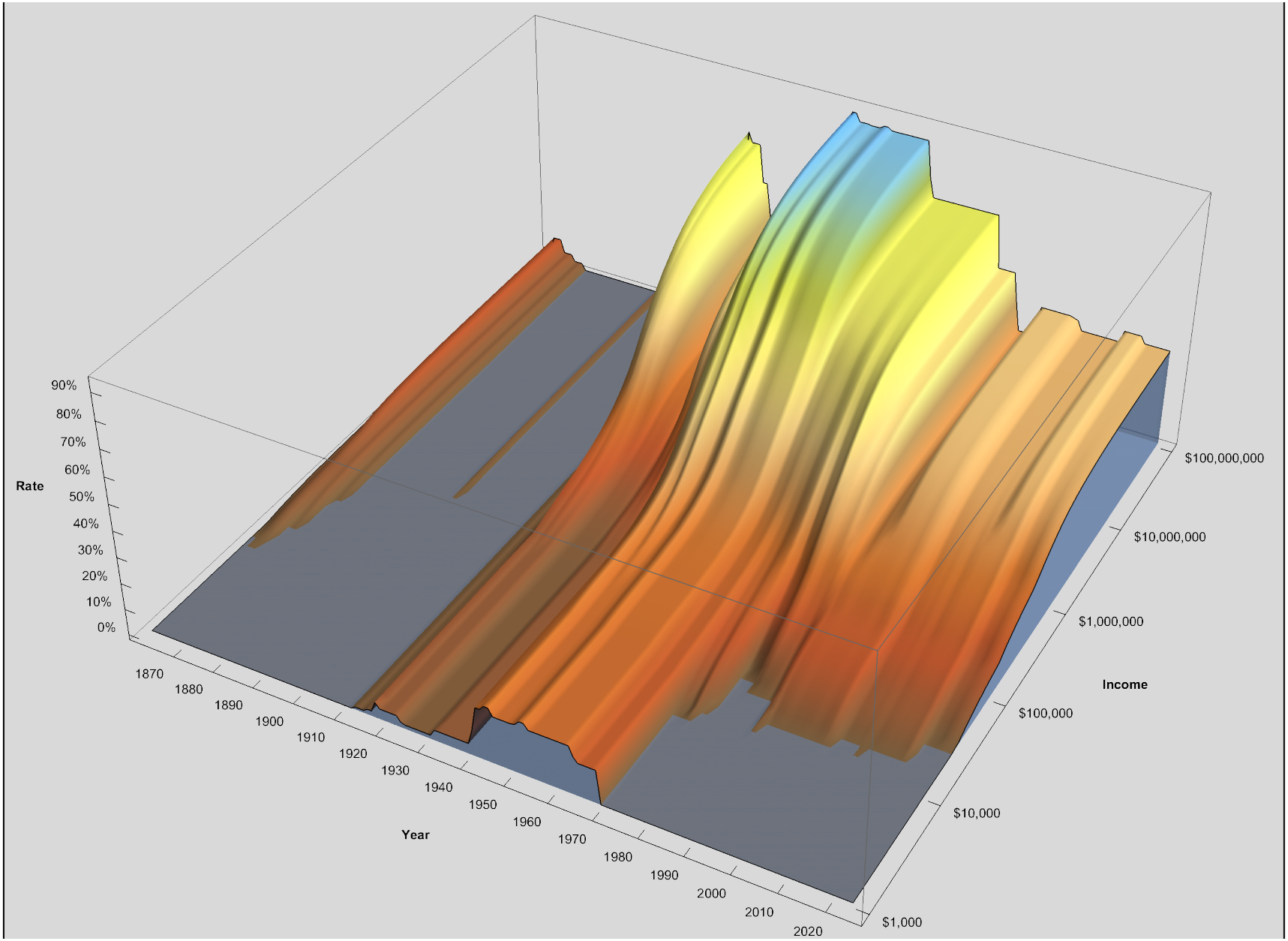
For surface graphs

In[77]:=
```
(* genSurface expects a CSV whose rows are years,
columns are income as 10^x where x begins at 3 and rises by ticks of 0.1,
whose first row and column are labels that are stripped *)
genSurface[data_] := Module[{dim, ticksYear, ticksIncome, ticksRate},
  dim = Dimensions[data];
  ticksYear = Select[Table[{Round[x], Round[1861 + x]}, {x, 1, dim[[1]]}], (Mod[#[[2]], 10] == 0) &];
  ticksIncome = Select[Table[{Round[x], "$" <> ToString[NumberForm[Round[10^((x+29)/10)], DigitBlock → 3]]},
     {x, 1, dim[[2]]}], (Mod[#[[1]], 10] == 1) &];
  ticksRate = Table[{x, TextString[x] <> "%"}, {x, 0, 100, 10}];
  DiscretePlot3D[data[[i, j]], {i, 1, dim[[1]]}, {j, 1, dim[[2]]}, Joined → True,
   AxesLabel → Map[Style[#, FontWeight → Bold] &, {"Year", "Income", "Rate"}], ColorFunction → "SouthwestColors",
   Ticks → {ticksYear, ticksIncome, ticksRate}, AxesEdge → {Automatic, {1, -1}, Automatic}, ImageSize -> Full]
 ]
```

Generate surface graph

In[78]:=
```
graph = genSurface[data] (* see genSurface.nb *)
```

Out[78]=


Rate
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Year
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Income
$1,000
$10,000
$100,000
$1,000,000
$10,000,000
$100,000,000

```
CloudDeploy[graph, Permissions → "Public"]
```

Generate variability table

In[79]:=
```
indexInTranposedLabeledForYear[year_] := year - 1860
```

In[80]:=
```
variabilityTableRow[i_, fromYear_] :=
 Module[{fromIndex = indexInTranposedLabeledForYear[fromYear], dataVec, min, max},
  dataVec = transposedLabeled[[i, fromIndex ;;]];
  min = Min[dataVec];
  max = Max[dataVec];
  {transposedLabeled[[i, 1]], min, max, max - min, StandardDeviation[dataVec]}
 ]
```

In[81]:=
```
variabilityTable[fromYear_] := Module[{len}, len = Length[transposedLabeled];
  Table[variabilityTableRow[i, fromYear], {i, 2, len}]
 ]
```

In[82]:=
```
variabilityTable[1945] // TableForm
```

Out[82]//TableForm=

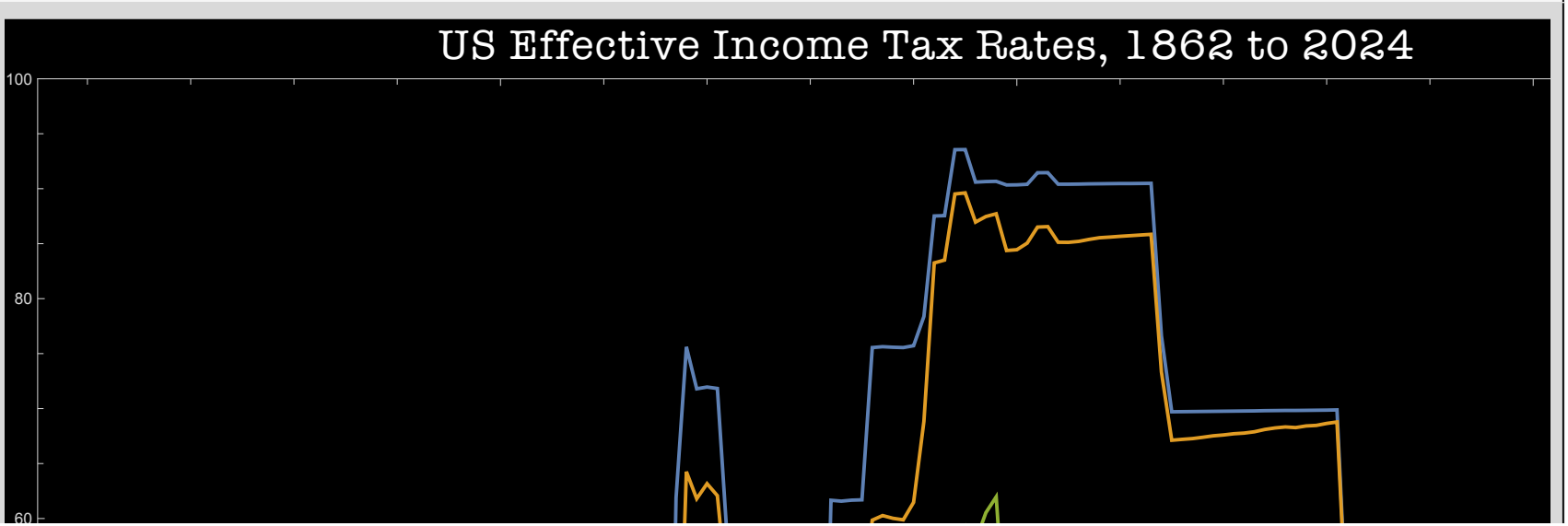
1000	0.	20.7	20.7	8.07576
1259	0.	20.7	20.7	8.07576
1585	0.	20.7	20.7	8.07576
1995	0.	20.7	20.7	8.07576
2512	0.	20.7	20.7	8.07576
3162	0.	20.7	20.7	8.07576
3981	0.	20.7	20.7	8.07576
5012	0.	20.7	20.7	8.07576
6310	0.	20.7	20.7	8.07576
7943	0.	20.7	20.7	8.07576
10 000	0.	20.7	20.7	8.01924
12 589	0.	21.17	21.17	8.12252
15 849	0.	21.55	21.55	7.95185

19 953	0.	21.85	21.85	7.55446
25 119	0.	22.08	22.08	7.17325
31 623	0.	22.27	22.27	6.72079
39 811	2.44	22.63	20.19	6.10329
50 119	4.03	23.12	19.09	5.50041
63 096	5.55	23.5	17.95	5.03806
79 433	6.88	24.27	17.39	4.7048
100 000	7.93	25.24	17.31	4.55021
125 893	8.77	26.67	17.9	4.37325
158 489	11.43	28.45	17.02	4.10808
199 526	13.61	31.65	18.04	4.36491
251 189	15.45	35.51	20.06	4.9365
316 228	17.21	39.91	22.7	5.80019
398 107	18.61	44.28	25.67	6.70949
501 187	20.95	48.48	27.53	7.65631
630 957	23.7	52.97	29.27	8.63148
794 328	26.06	57.48	31.42	9.6492
1 000 000	26.61	61.97	35.36	10.813
1 258 925	26.9	66.61	39.71	12.1316
1 584 893	27.12	71.16	44.04	13.5186
1 995 262	27.3	74.85	47.55	14.9384
2 511 886	27.45	77.97	50.52	16.3427
3 162 278	27.56	80.62	53.06	17.5732
3 981 072	27.65	83.	55.35	18.613
5 011 872	27.72	85.27	57.55	19.4935
6 309 573	27.78	87.06	59.28	20.2257
7 943 282	27.82	88.49	60.67	20.8141
10 000 000	27.86	89.62	61.76	21.2829
12 589 254	27.89	90.52	62.63	21.6572
15 848 932	27.91	91.24	63.33	21.9555
19 952 623	27.93	91.81	63.88	22.1933
25 118 864	27.94	92.26	64.32	22.3821
31 622 777	27.96	92.62	64.66	22.5321
39 810 717	27.97	92.9	64.93	22.6521
50 118 723	27.97	93.13	65.16	22.7471
63 095 734	27.98	93.31	65.33	22.8232
79 432 823	27.98	93.45	65.47	22.8836
100 000 000	27.99	93.56	65.57	22.9313

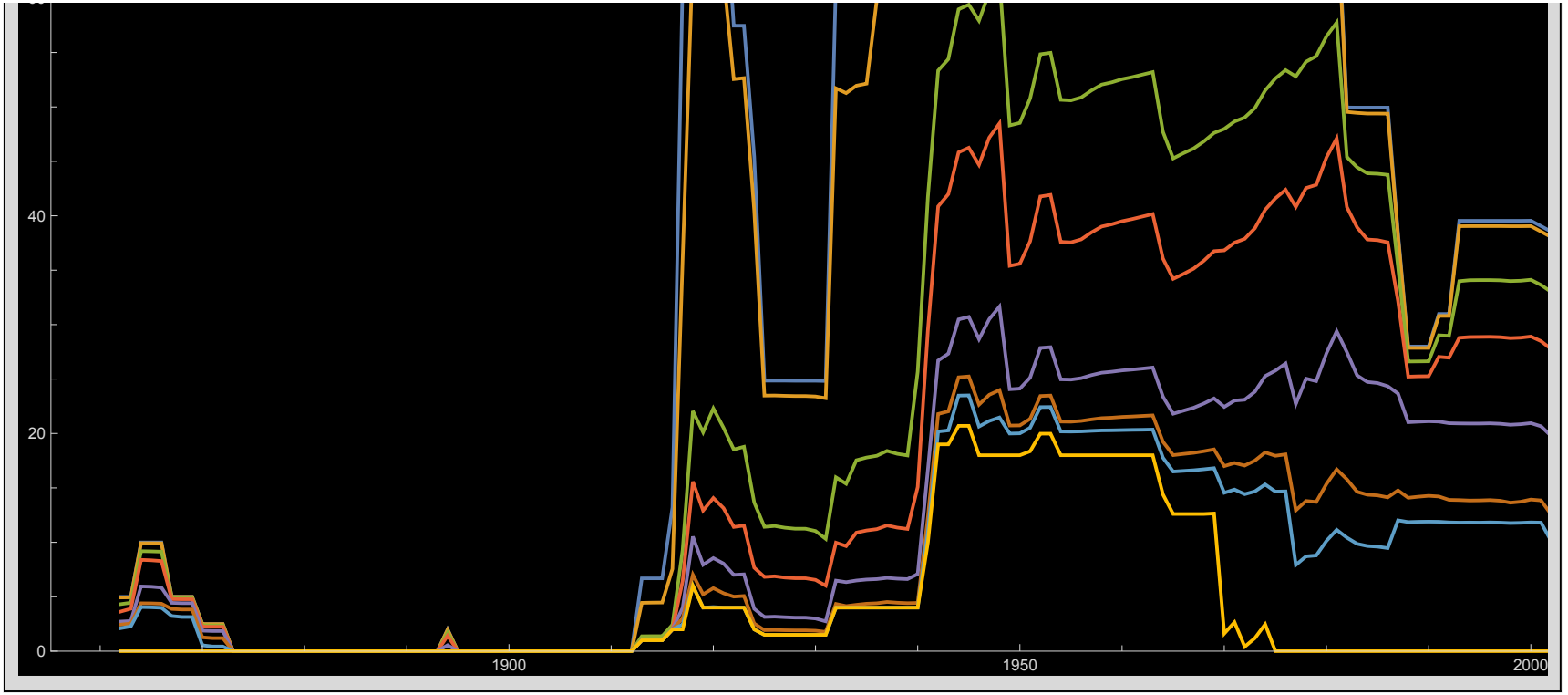
Generate cross-section graphs

In[83]:=
```
crossSectionGraph[startYear_, endYear_] := Module[{startIndex = startYear - 1860, endIndex = endYear - 1860},
  ListPlot[Reverse[Map[Style[#, Thick] &, {Legended[transposedLabeled[[12, startIndex ;; endIndex]], "$10K"],
      Legended[transposedLabeled[[20, startIndex ;; endIndex]], "$63K"],
      Legended[transposedLabeled[[22, startIndex ;; endIndex]], "$100K"],
      Legended[transposedLabeled[[25, startIndex ;; endIndex]], "$200K"],
      Legended[transposedLabeled[[29, startIndex ;; endIndex]], "$500K"],
      Legended[transposedLabeled[[32, startIndex ;; endIndex]], "$1M"],
      Legended[transposedLabeled[[42, startIndex ;; endIndex]], "$10M"],
      Legended[transposedLabeled[[52, startIndex ;; endIndex]], "$100M"]}]],
   Joined → True, PlotLegends → None, Frame → True, DataRange → {startYear, endYear},
   PlotRange → {0, 100}, Background → Black, FrameStyle → LightGray,
   PlotLabel → Style["US Effective Income Tax Rates, " <> TextString[startYear] <> " to " <> TextString[endYear],
     White, FontFamily → "American Typewriter", FontSize → 24, FontTracking → "Extended"], ImageSize → 1024]
 ]
```

In[84]:=
```
crossSectionGraph[1862, 2024]
```

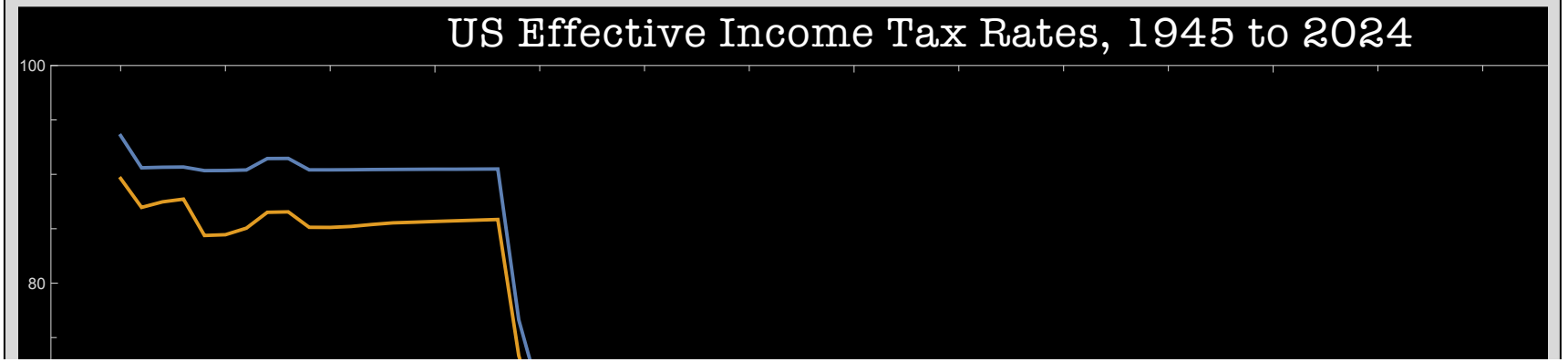


Out[84]=

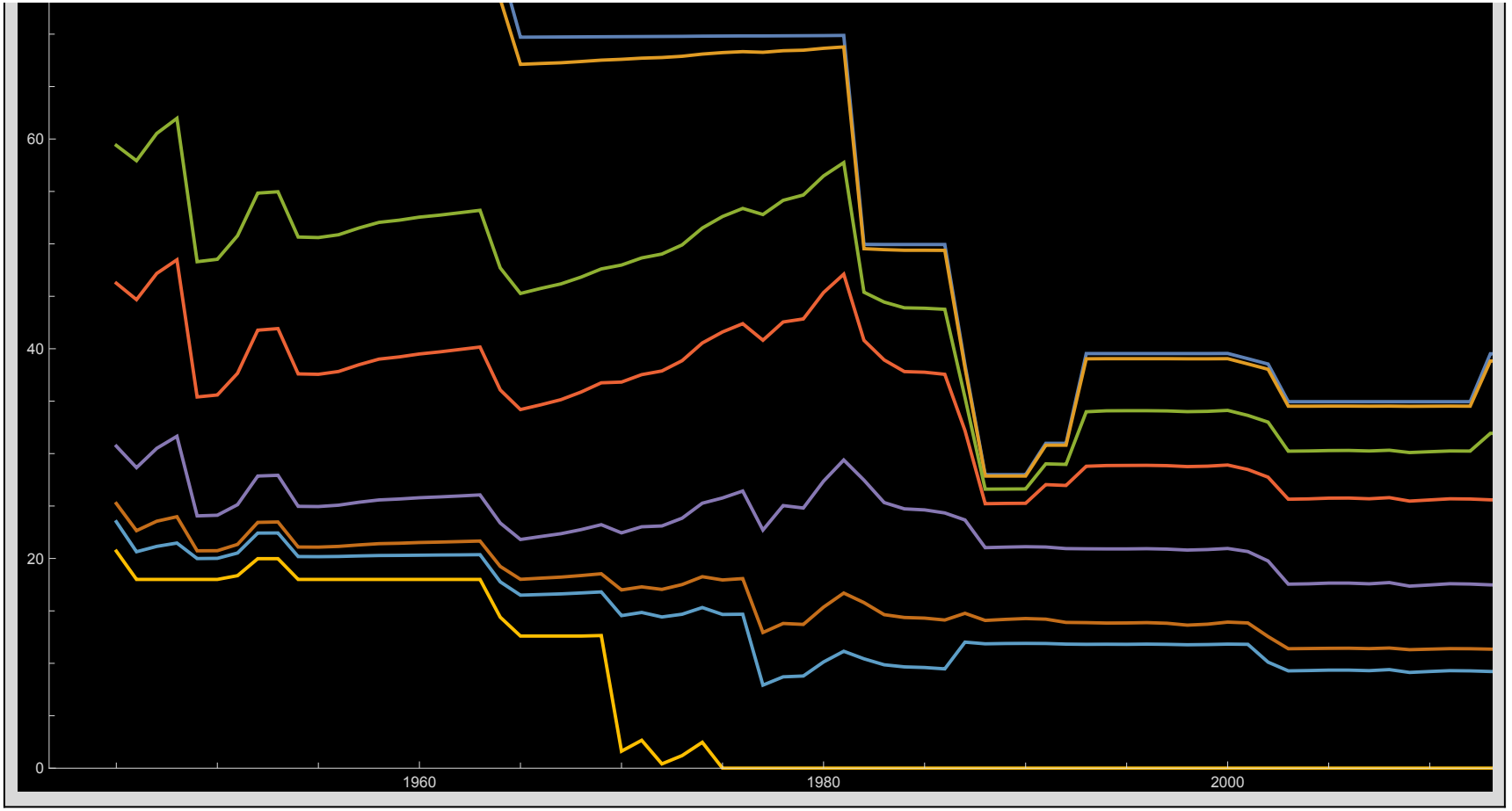


In[85]:=

```
crossSectionGraph[1945, 2024]
```

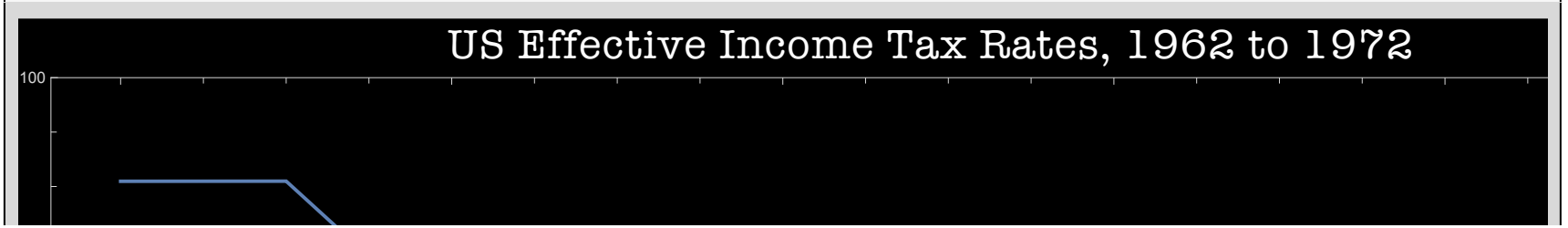


Out[85]=

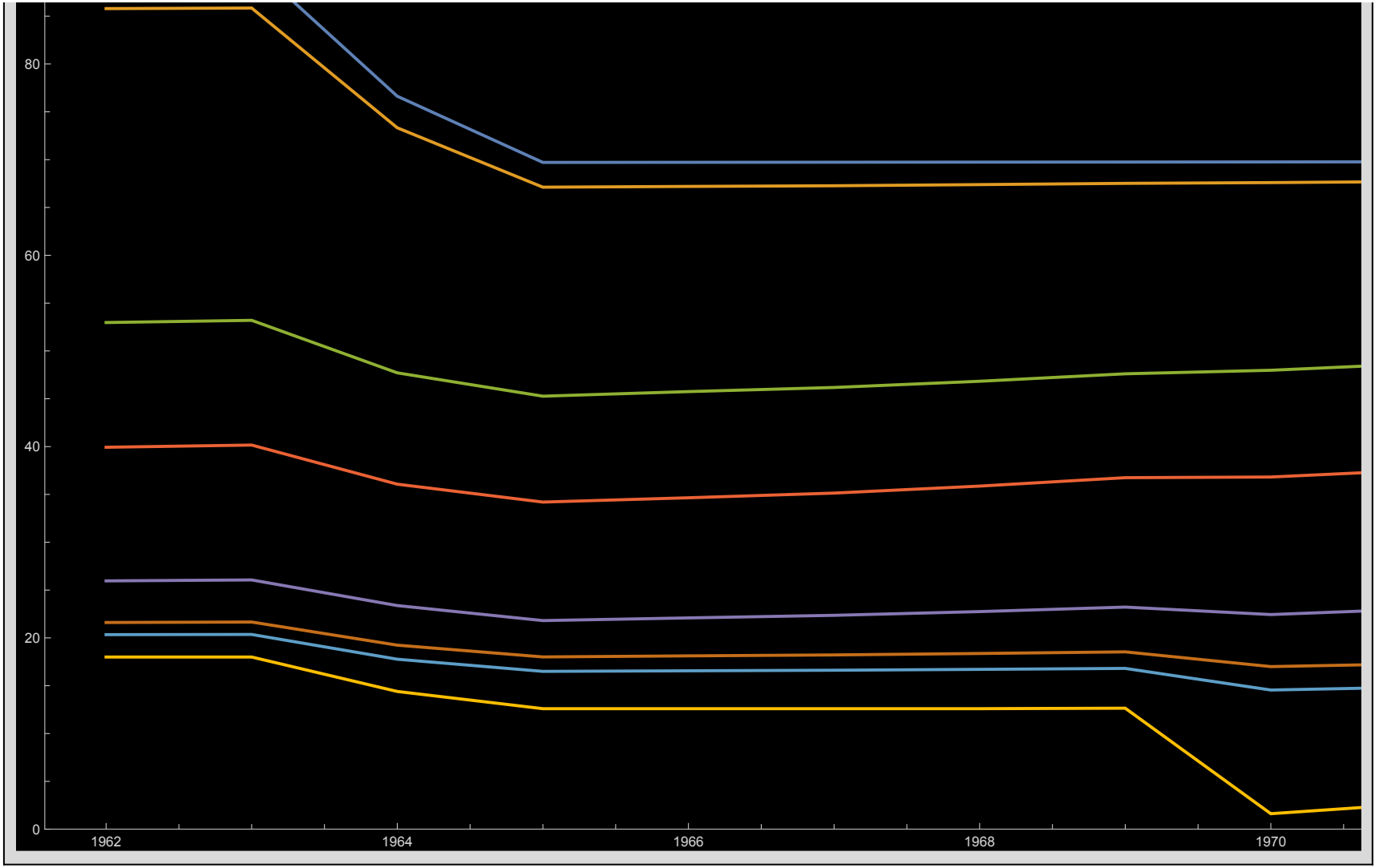


In[86]:=

```
crossSectionGraph[1962, 1972]
```



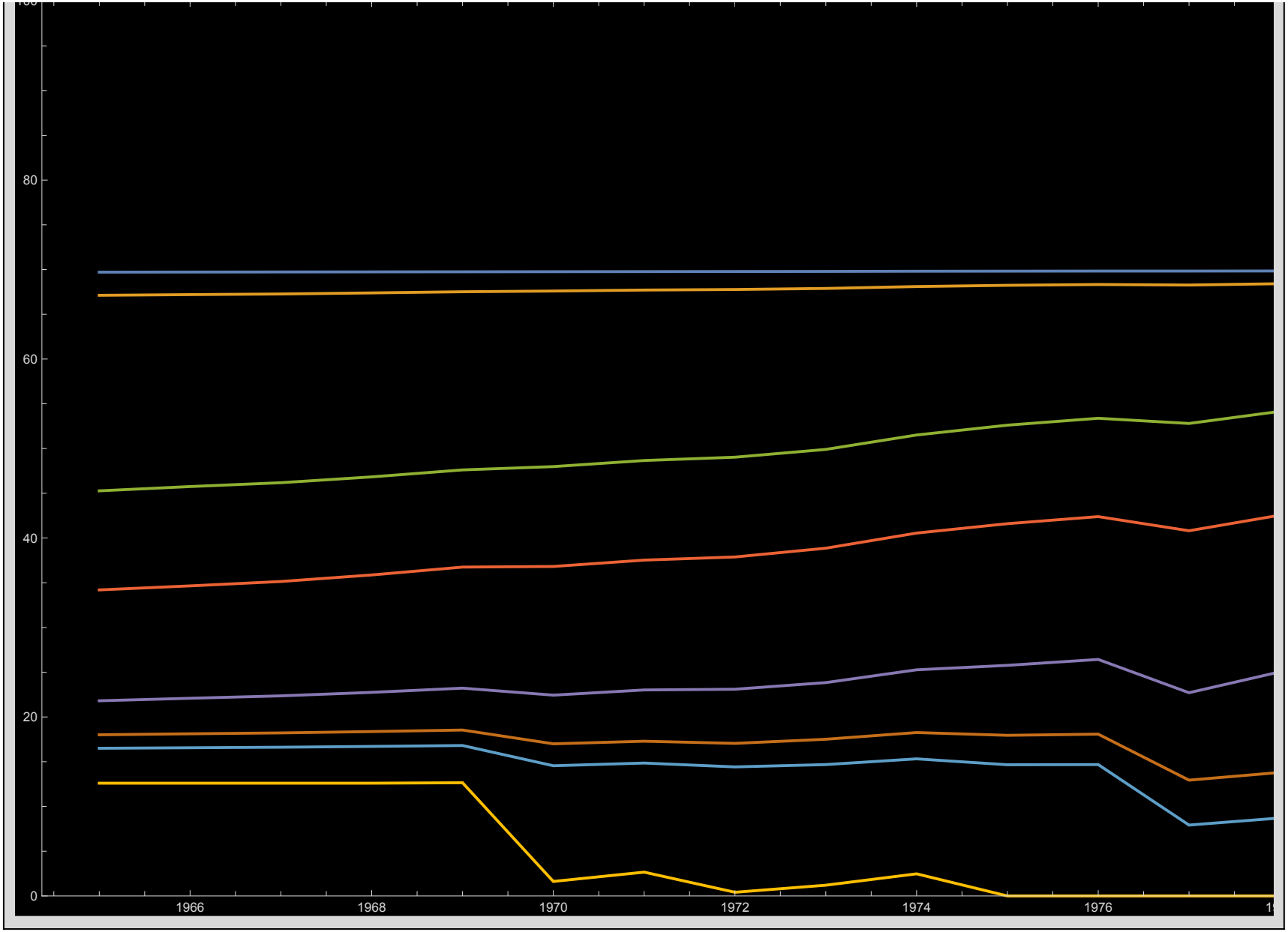
Out[86]=



In[87]:=

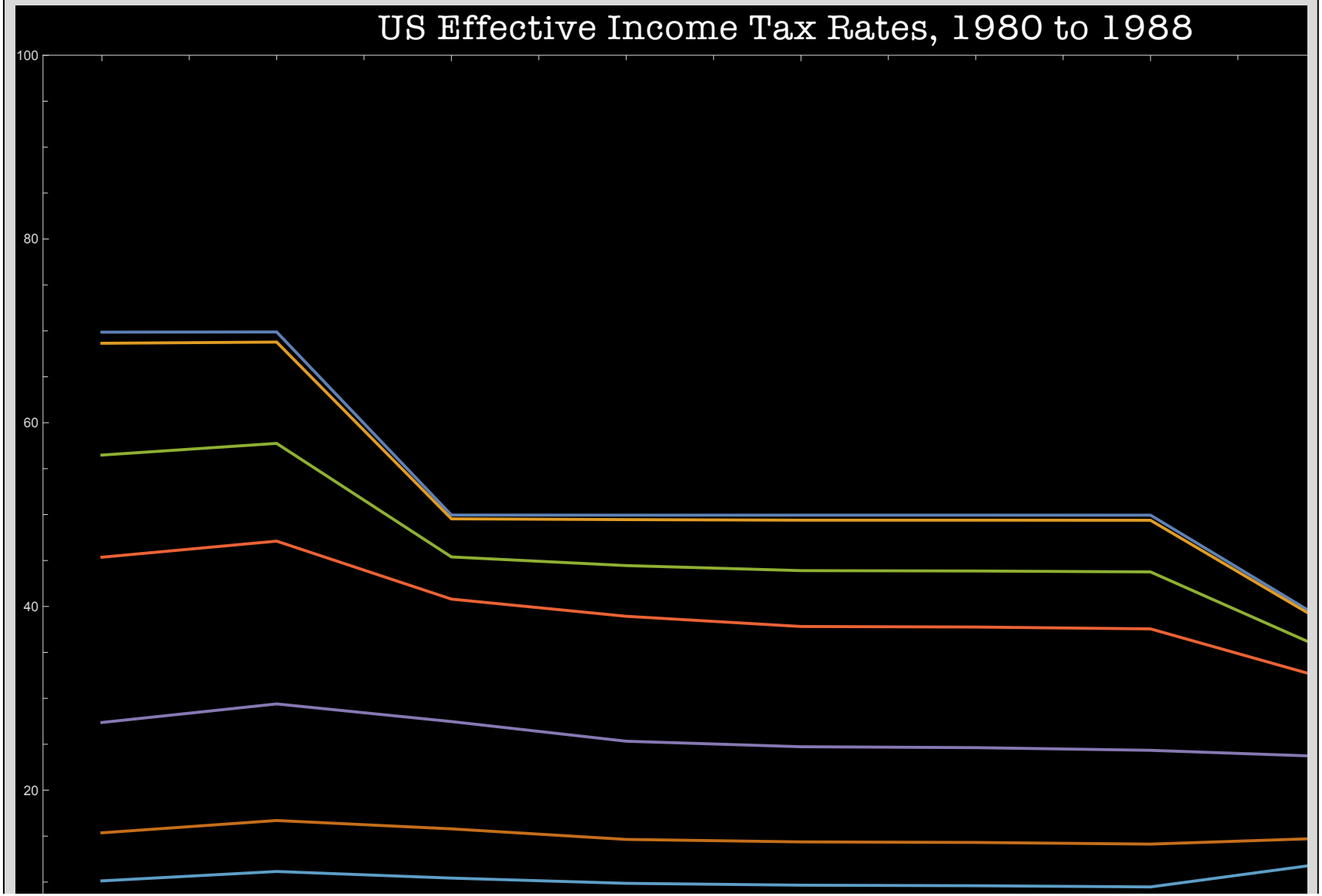
```
crossSectionGraph[1965, 1980]
```

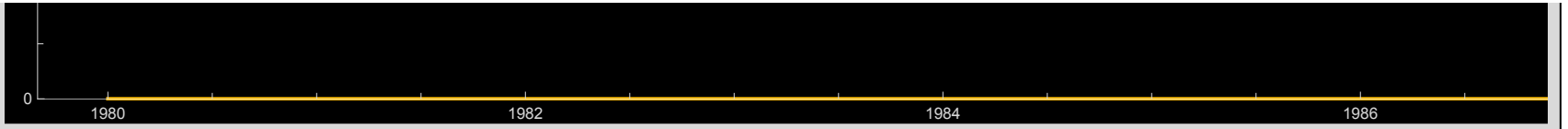
Out[87]=



In[88]:=
```
crossSectionGraph[1980, 1988]
```

Out[88]=

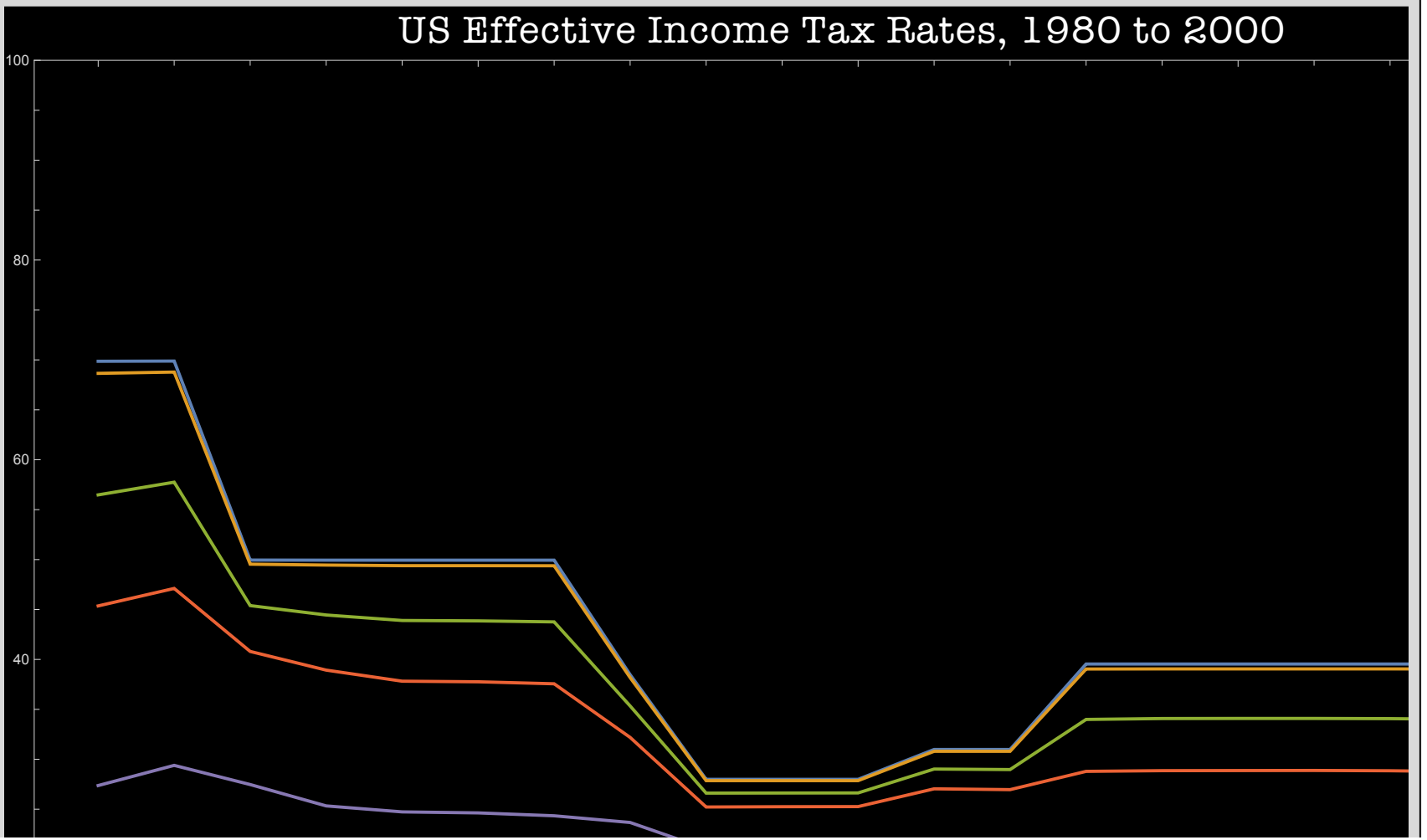


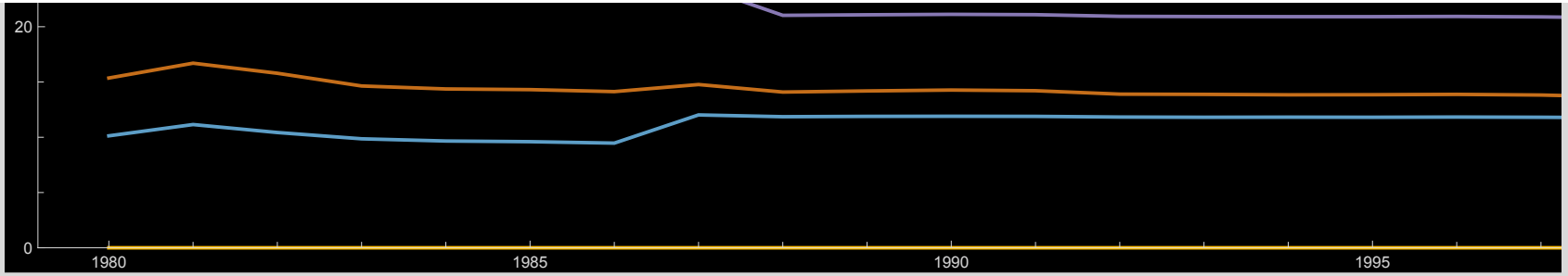


In[89]:=

```
crossSectionGraph[1980, 2000]
```

Out[89]=

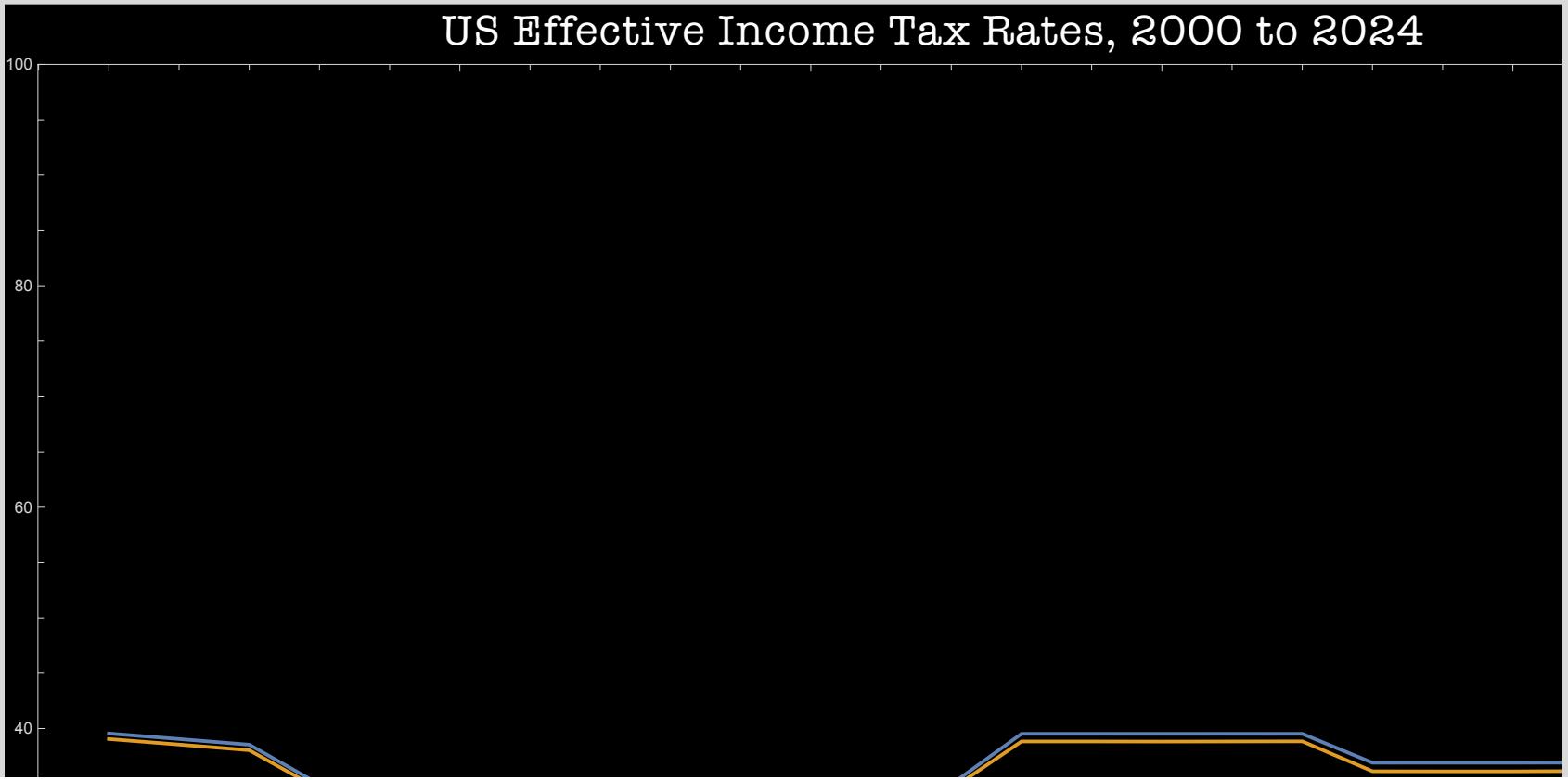


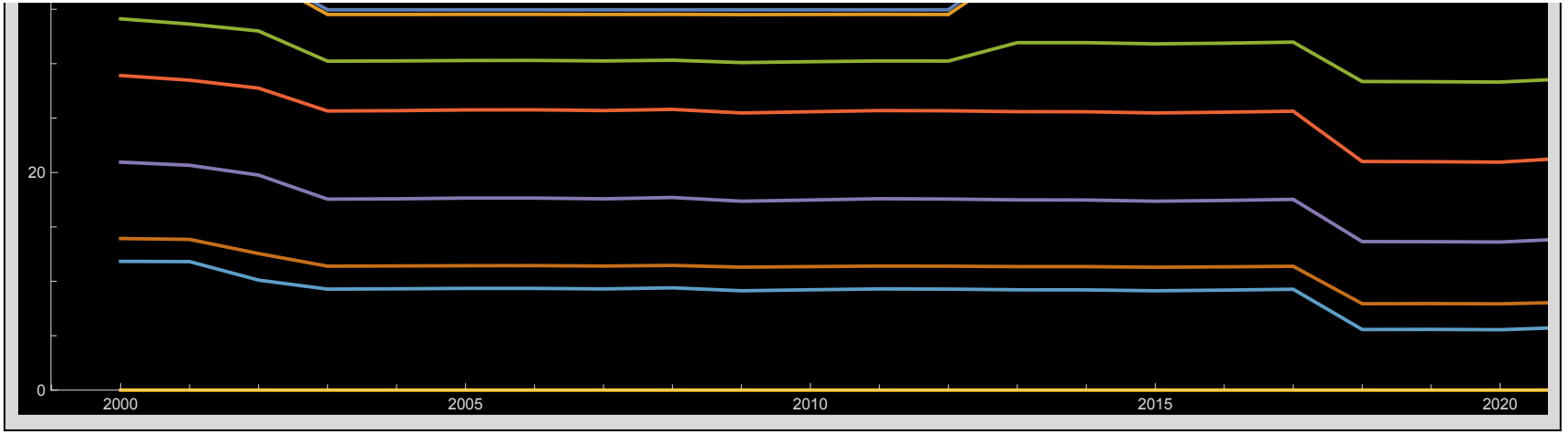


In[90]:=

```
crossSectionGraph[2000, 2024]
```

Out[90]=




20
0
2000
2005
2010
2015
2020