Lab 7: Parking Garage Case Study

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1 Load Packages

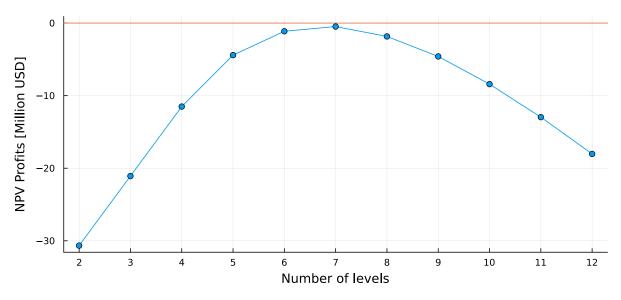
```
using Revise
using ParkingGarage

using Plots
Plots.default(; margin=5Plots.mm)
```

2 Static Deterministic Case

```
let
       sow = ParkingGarageSOW(; demand_growth_rate=80.0, n_years=20, discount_rate=0.12)
2
       n_{evels} = 2:12
3
       policies = [StaticPolicy(i) for i in n_levels]
4
       profits = [simulate(sow, policy) for policy in policies]
5
       plot(
6
           n_levels,
           profits;
           ylabel="NPV Profits [Million USD]",
           xlabel="Number of levels",
10
           legend=false,
11
           title="$(sow.n_years) Year Horizon, $(sow.discount_rate) Discount, $(sow.demand_growth
12
           size=(800, 400),
13
           marker=:circle,
14
           xticks=n_levels,
15
16
       hline!([0])
   end
```

20 Year Horizon, 0.12 Discount, 80.0 Demand Growth

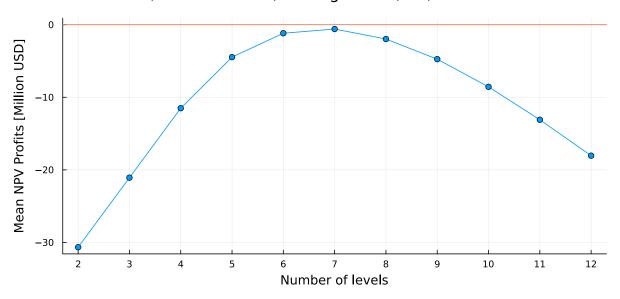


3 Static Stochastic Case

```
let
       n_years = 20
2
       discount_rate = 0.12
3
       sow1 = ParkingGarageSOW(; demand_growth_rate=70.0, n_years, discount_rate)
4
       n levels = 2:12
5
       policies = [StaticPolicy(i) for i in n_levels]
6
       profits1 = [simulate(sow1, policy) for policy in policies]
7
       sow2 = ParkingGarageSOW(; demand_growth_rate=80.0, n_years, discount_rate)
9
       profits2 = [simulate(sow2, policy) for policy in policies]
10
11
       sow3 = ParkingGarageSOW(; demand_growth_rate=90.0, n_years, discount_rate)
12
       profits3 = [simulate(sow3, policy) for policy in policies]
13
14
       15
       for i in 1:length(profits1)
16
           profits_mean[i] = (profits1[i] + profits2[i] +profits3[i]) / 3
17
       end
18
19
       profits_mean_plot = transpose(profits_mean)
20
        plot(
21
           n_levels,
22
           profits_mean_plot;
23
           ylabel="Mean NPV Profits [Million USD]",
24
           xlabel="Number of levels",
           legend=false,
26
```

```
title="20 Year Horizon, 12% Discount, Average of 70, 80, and 90% Demand Growth",
size=(800, 400),
marker=:circle,
xticks=n_levels,
}
hline!([0])
end
```

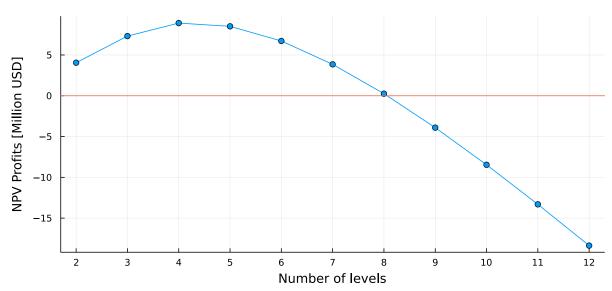
20 Year Horizon, 12% Discount, Average of 70, 80, and 90% Demand Grow



4 Adaptive Deterministic Case

```
let
1
       sow = ParkingGarageSOW(; demand_growth_rate=80.0, n_years=20, discount_rate=0.12)
2
       n_{evels} = 2:12
3
       policies = [AdaptivePolicy(i) for i in n_levels]
4
       profits = [simulate(sow, policy) for policy in policies]
       plot(
6
           n_levels,
           profits;
8
           ylabel="NPV Profits [Million USD]",
9
           xlabel="Number of levels",
10
            legend=false,
11
            title="$(sow.n_years) Year Horizon, $(sow.discount_rate) Discount, $(sow.demand_growth
^{12}
            size=(800, 400),
13
           marker=:circle,
14
           xticks=n_levels,
15
16
       hline!([0])
17
   end
```

20 Year Horizon, 0.12 Discount, 80.0 Demand Growth



5 Adaptive Stochastic Case