Forward shooting grid method
for arithmetic average options

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Overview

1. Forward shooting grid for arithmetic average options

2. Numerical and financial remarks

3. Programming remarks

4. Numerical results

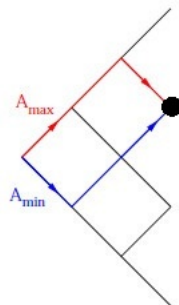# Forward shooting grid for arithmetic average options

Steps

1. Build tree for S

Forward shooting grid for arithmetic average options

▶▶▌Forward

Steps

1. Build tree for S
2. Shoot averages

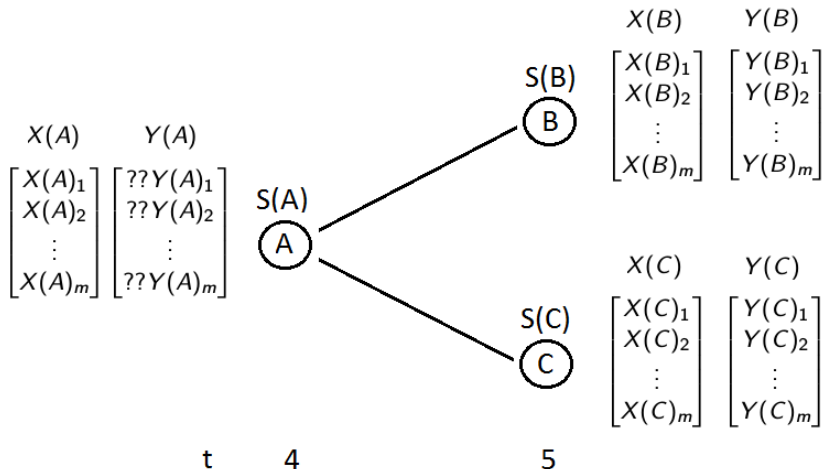# Forward shooting grid for arithmetic average options

Backward ⏮◀

Steps

1. Build tree for S
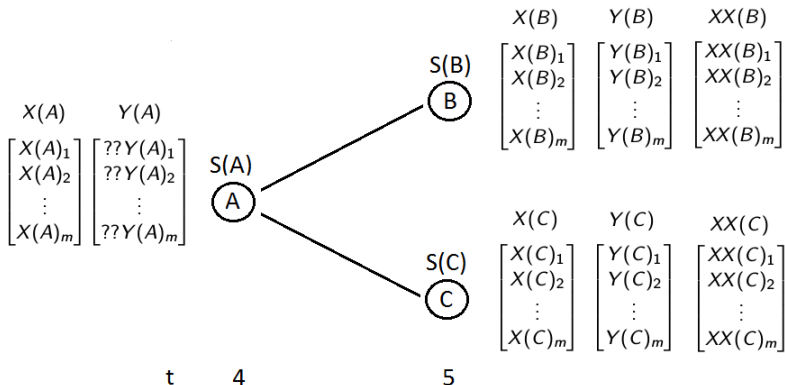2. Shoot averages
3. Backward recursion
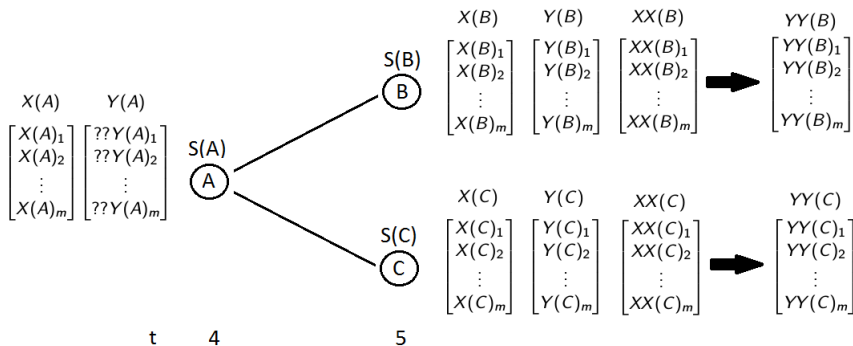
Backward recursion

Backward recursion

$$XX(B) = \frac{5 * X(A) + S(B)}{6}$$

X(A)

$$XX(C) = \frac{5 * X(A) + S(C)}{6}$$

Backward recursion

Backward recursion

$$X(A) \qquad Y(A)$$
$$\begin{bmatrix} X(A)_1 \\ X(A)_2 \\ \vdots \\ X(A)_m \end{bmatrix} \begin{bmatrix} ??Y(A)_1 \\ ??Y(A)_2 \\ \vdots \\ ??Y(A)_m \end{bmatrix}$$

S(A)
Ⓐ

S(B)
Ⓑ

$$X(B) \qquad Y(B) \qquad XX(B) \qquad\qquad YY(B)$$
$$\begin{bmatrix} X(B)_1 \\ X(B)_2 \\ \vdots \\ X(B)_m \end{bmatrix} \begin{bmatrix} Y(B)_1 \\ Y(B)_2 \\ \vdots \\ Y(B)_m \end{bmatrix} \begin{bmatrix} XX(B)_1 \\ XX(B)_2 \\ \vdots \\ XX(B)_m \end{bmatrix} \blacktriangleright \begin{bmatrix} YY(B)_1 \\ YY(B)_2 \\ \vdots \\ YY(B)_m \end{bmatrix}$$

S(C)
Ⓒ

$$X(C) \qquad Y(C) \qquad XX(C) \qquad\qquad YY(C)$$
$$\begin{bmatrix} X(C)_1 \\ X(C)_2 \\ \vdots \\ X(C)_m \end{bmatrix} \begin{bmatrix} Y(C)_1 \\ Y(C)_2 \\ \vdots \\ Y(C)_m \end{bmatrix} \begin{bmatrix} XX(C)_1 \\ XX(C)_2 \\ \vdots \\ XX(C)_m \end{bmatrix} \blacktriangleright \begin{bmatrix} YY(C)_1 \\ YY(C)_2 \\ \vdots \\ YY(C)_m \end{bmatrix}$$

t   4   5

Numerical and financial remarks

Numerical POV

1. How to space values in the average vector
2. How to choose values in YY
3. Number of time steps and dimension of the average vector

Financial POV

1. Discretely sampled average
2. Greeks

Programming remarks

Main issue

Data structure that will hold the lattices.

Bad version

1. Lattice for S held in a matrix
2. Averages and option prices held in a field (matrix of vectors)

Programming remarks

Main issue

Data structure that will hold the lattices.

Good version

1. Lattice for S held in a sparse matrix
2. Averages and option prices held in a C++ vector (STL dynamic container)

Numerical results

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table : Table caption

The end

Blocks of Highlighted Text

Block 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Integer lectus nisl, ultricies in feugiat rutrum, porttitor sit amet augue. Aliquam ut tortor mauris. Sed volutpat ante purus, quis accumsan dolor.

Block 2

Pellentesque sed tellus purus. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Vestibulum quis magna at risus dictum tempor eu vitae velit.

Block 3

Suspendisse tincidunt sagittis gravida. Curabitur condimentum, enim sed venenatis rutrum, ipsum neque consectetur orci, sed blandit justo nisi ac lacus.

Multiple Columns

Heading

1. Statement
2. Explanation
3. Example

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Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table : Table caption

Theorem

Theorem (Mass–energy equivalence)

$E = mc^2$

Verbatim

Example (Theorem Slide Code)

```
\begin{frame}
\frametitle{Theorem}
\begin{theorem}[Mass--energy equivalence]
$E = mc^2$
\end{theorem}
\end{frame}
```

Figure

Uncomment the code on this slide to include your own image from the same directory as the template .TeX file.

Citation

An example of the \cite command to cite within the presentation:

This statement requires citation [Smith, 2012].

References

John Smith (2012)

Title of the publication

Journal Name 12(3), 45 – 678.

The End