Exercise 12.10

Question

12.10. Start-Up
Your friend the entrepreneur has just started a new business. Your advice is needed on the discount rate to be used to evaluate new opportunities. Looking through the financial records, you find that your friend could already

- insulate the building for $40,000, which would save 5600 gal/yr of fuel, currently valued at $1/gal.
- pay off $80,000 borrowed at a rate of 12% on the balance.
- pay $20,000 for an annuity paying $3200/yr for 30 years.
- lend to another entrepreneur who guarantees to double a $30,000 investment in 5 years.

Your friend has $60,000 in cash for investment. Estimating inflation at 4% a year, what is your friend's minimum discount rate for a $20,000 investment? a $60,000 investment?

Solution from Manual

12.10 Start-up

The opportunity costs for the projects are:

i) for insulation: perpetual savings of $5600/yr. on $40,000 mean a return of 14%, net of inflation, or 18% including inflation. This is because the price of fuel presumably increases with inflation.

ii) for mortgage: 12%, but with inflation.

iii) for annuity: The rate is approximately 3200/20,000 = 16%, with inflation. At that rate, lack of earnings beyond 30 years have no significant effect on present value.

iv) An investment that doubles in 5 years returns 14% (close enough), including inflation.

The priority for current investments is thus:

<table>
<thead>
<tr>
<th>Project</th>
<th>Size, $</th>
<th>Return, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>40,000</td>
<td>18</td>
</tr>
<tr>
<td>Annuity</td>
<td>20,000</td>
<td>16</td>
</tr>
<tr>
<td>Investment</td>
<td>30,000</td>
<td>14</td>
</tr>
<tr>
<td>Mortgage</td>
<td>80,000</td>
<td>12</td>
</tr>
</tbody>
</table>

For a $20,000 investment the minimum discount rate, including inflation, is 16%; for $60,000 it is \[
\frac{40(18) + 20(16)}{50} = 17.33%.
\]