Mortgages

Ex. 100,000 annual payments for 4 years. 6%

$$100{,}000 = \frac{P}{(1.06)^1} + \frac{P}{(1.06)^2} + \frac{P}{(1.06)^3} + \frac{P}{(1.06)^4}$$

$$100{,}000 = P \sum_{n=1}^{4} \frac{1}{(1.06)^n} \rightarrow a_1\frac{(1-r^4)}{1-r}$$

$$100{,}000 = P\left(\frac{1}{1.06}\left(\frac{1-\frac{1}{1.06}^4}{1-\frac{1}{1.06}}\right)\right)$$

$$= P\left(0.943\left(\frac{0.20791}{0.0566}\right)\right)$$

$$100{,}000 = P(3.4651)$$

$$28{,}859.19 = P$$

Ex 10 years. 4% annual rate.
you are paying monthly. $300,000

$$300{,}000 = P \sum_{n=1}^{120} \frac{1}{\left(1+\frac{0.04}{12}\right)^{n}}$$

$$3{,}037.35 = P$$

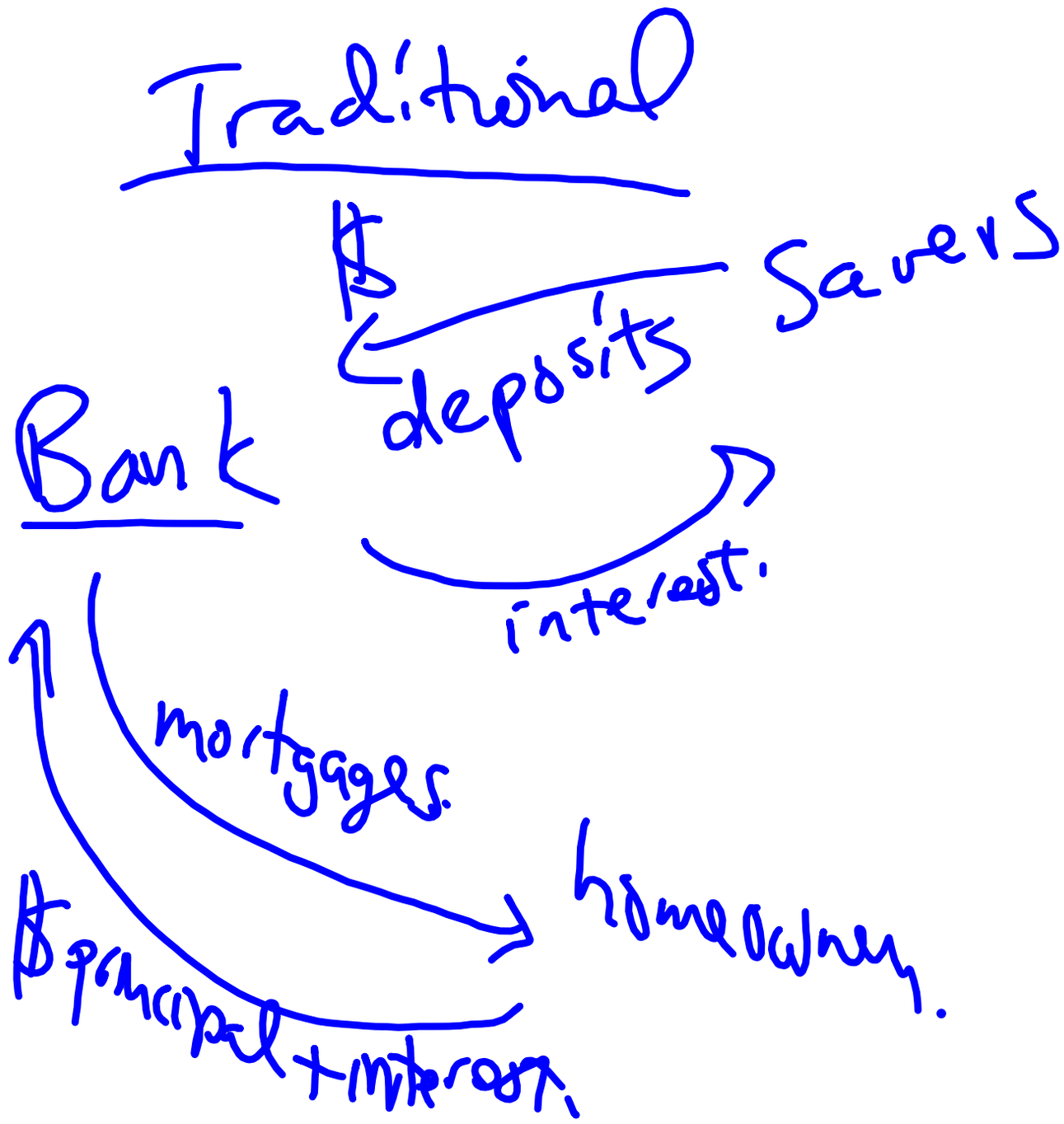
Value – what is the return on an investment?

Ex. you pay $1 MM and get guaranteed. 200,000 year 2
300,000 3
900,000 4

$$1{,}000{,}000 = \frac{200{,}000}{(1+r)^2} + \frac{300{,}000}{(1+r)^3} + \frac{900{,}000}{(1+r)^4}$$

$$1{,}000{,}000 = \frac{100{,}000}{(1+r)^2}\left[2 + \frac{3}{(1+r)} + \frac{9}{(1+r)^2}\right]$$

$$0 = -1{,}000{,}000 + \frac{100{,}000}{(1+r)^2}\left[2 + \frac{3}{(1+r)} + \frac{9}{(1+r)^2}\right]$$


Traditional
Bank
deposits
Savers
interest.
mortgages
homeowners.
principal + interest.

Mortgage backed securities