

**Fin4713: Example: How much house can I afford? (Fixed amount for Property Tax and Insurance)**

You have a 50,000 annual income, and make car payments of 450 per month but have no other debt, and have \$30000 in the bank. How much house can you afford, given the following mortgage opportunity:

FRM conventional 30 year at 7.875%, requires 20% down with 28/36 qualifying ratio. Two discount points will be charges and closing cost and pro-rates = \$3000. Property taxes will be 3600 per year and insurance 360 per year.

**Step 1. How much of loan do I qualify for? This depends on the PITI I am allowed**

	<u>28%</u>	<u>36%</u>
Monthly income*ratio (50000/12*ratio)	1166.67	1500
Less other debts		<u>450</u>
Choose Min. as available for PITI	1166.67	1050

Available for PITI =	1050
Less property taxes	- 300
Less insurance	<u>- 30</u>
Available for debt service (PI)	720

Max amount of loan you can service (use financial calculator or formula) = \$99,300.84

**Step 2: Compute maximum size of loan you can afford to close on.**

Savings =	30000
Other closing	<u>3000</u>
Funds available for points and down payment.	27000

Define the following notation: HV = house value LV = loan value  
 For a 20% down payment loan note that  $0.8*HV=LV$  or we can rewrite as  
 $HV = 1.25*LV$   
 In general for a down payment percent of "d" we can write  $(1-d)*HV = LV$ , or  
 $HV = [1/(1-d)]*LV$

We will allocate our available cash to either the down payment or the points so we can write:  
 Cash = Down payment + loan point fee

We know the Down payment depends on the HV and loan point fee on fee on the LV so we write:  
 Cash =  $d*HV + p*LV$  where p = points, expressed as a fraction of loan

We know the amount of cash we have, d, & p. We also know that  $HV=[1/(1-d)*LV]$  so we can write

$$\text{Cash} = d*[1/(1-d)]*LV + p*LV$$

or, solving for what we want to know, the LV we have:

$$LV = \text{Cash}/[(d/(1-d) + p)]$$

For  $d=0.2$  (i.e. 20% down payment) and  $p=0.02$  (i.e. 2 points) and  $\text{cash}=27000$  we have:  
 $LV=27000/[.2/(1-.2) + .02] = 27000/.27 = 100000$   
 This is maximum size loan that we have funds to close on.

We need to choose the lower of the two possible loan amounts; thus, the maximum size loan we can afford is \$99,300. What is the maximum house we can afford? (Note that we don't need all of our cash to close this smaller loan, so we can use the extra money for a higher down payment (i.e. we are allowed more than 20% down, we are just not allow less) so we can apply that to buying the house. What remains is to compute the amount of house.

$$\begin{aligned} \text{Max house} &= \text{Loan amount} + \text{cash} - \text{prepays} - \text{points} = \\ &= 99300.84 + 30000 - 3000 - 1986.02 = \$124,314.82 \end{aligned}$$