KING ABDULAZIZ UNIVERSITY
Faculty of Environmental Design
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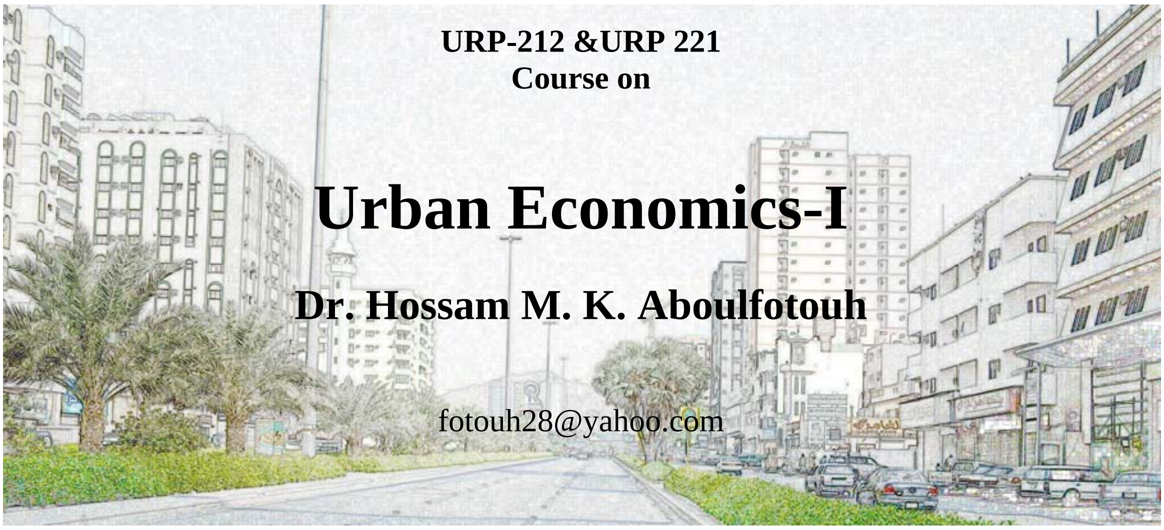

Lecture notes#10: Loans and Mortgage Finance

If one would like to buy a flat of 80 m^2 for 52,000 SR. Its monthly rent would be 433.3 SR for an annual interest rate of 10%. If one rented this flat for 10 years, the total sum of rents he might pay would be more than its market value at the date of delivery, while he still not its owner. Besides, its real market value at the end of the ten years will be more than twice its present value ten years earlier, i.e., for the same interest rate.

Why he did not buy it instead? There are many reasons. Most properly, it is either due to a fear from the mortgage finance in the light of uncertainty about their jobs and incomes, or they have not access to easy and secure mortgage finance system. In any case the flat will be subject to the mortgage contract until its buyer pays all its installments.

In case of buying it, if down payment equals 10%, one can reckon the yearly equal-installments for diverse refund periods (e.g., 10, 15 and 20 years), and based on the mortgage interest rate. For the low income groups, it might be 5% per year, or lower than this.

Reckoning:

1- Down payment = (10/100) * (52000) = **5200** SR
2- Remainder of the **loan** = 52000 – 5200 = **46800** SR
3- Yearly equal-installment without the interest rate= 46800/10 = **4680** SR

In case if refunding was without interest rate the buyer should pay 10 equal installments that each is **4680** SR (**390** SR a month).

But if we applied the interest rate, the 10 installments will differ. The value of each depends on the year of refund, forming a progressive series, where each installment S_n could be reckoned using the following equation:

$$S_n = X * [1 + R]^n$$

Where, ***n*** is the number of years
R is the interest rate, e.g., if ***R***=5%, it should be written as 5/100 or 0.05

Then, for **X** = 4680; ***n*** = 10; and **R** = 5/100, the progressive sequence of the ten installments, from S_1 to S_{10}, are shown here below.

For year-1, the installment S_1= 4680 * $[1 + (5/100)]^1$ = 4914.00 SR
For year-2, the installment S_2= 4680 * $[1 + (5/100)]^2$ = 5159.70SR
For year-3, the installment S_3= 4680 * $[1 + (5/100)]^3$ = 5417.68 SR
For year-4, the installment S_4= 4680 * $[1 + (5/100)]^4$ = 5688.57 SR
For year-5, the installment S_5= 4680 * $[1 + (5/100)]^5$ = 5972.99 SR
For year-6, the installment S_6= 4680 * $[1 + (5/100)]^6$ = 6271.64 SR
For year-7, the installment S_7= 4680 * $[1 + (5/100)]^7$ = 6585.22 SR
For year-8, the installment S_8= 4680 * $[1 + (5/100)]^8$ = 6914.49 SR
For year-9, the installment S_9= 4680 * $[1 + (5/100)]^9$ = 7260.21 SR
For year-10, the installment S_{10}= 4680 * $[1 + (5/100)]^{10}$ = 7623.22 SR

Total sum of ($S_1 + S_2 + S_3 +.......+ S_n$) = **61807.76** SR

The average annual installment S_{av}= 61807.72/10 = **6180.77** SR

Notice that the yearly increments are not equal, i.e., it is not a linear case and thus the installment of the year-5 is not the average, see fig-1. Besides, one can get the average monthly installment by dividing the yearly installment 6180.77 SR by 12 (months of year) and get **515.06 SR** per each month. If we compared what should the buyer pay (i.e., 515.06 SR) with what should the renter pay (i.e., 433.3 SR), for the same flat during the same period, the logic says one should add the difference of 81.6 SR to the rent, and buy the flat. In this case the installments will be the accumulated savings, and not the cost he/she pays for getting only an accommodation service for a period of time, in a free housing market.

The above calculations showed how to reckon the average yearly (and/or monthly) installment S_{av} through multiple steps. Using the equation of summing the geometric progression (see for example its Wiki page via this link: Geometric Progression), one can get the same final result in one step as follows, taking into consideration that the

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numerical reckoning steps that are shown hereunder are only for illustration, i.e., one can do it in one step, using any scientific calculator.

$$S_{av} = \{S_1 * [(1- (1+R)^n) / (1- (1+R))] \} / n$$

Where $S1 = X * [1 + R]^1$, X = 4680, R = 0.05 and n = 10

$$S_{av} = \{4914 * [(1- (1+0.05)^{10}) / (1- (1+0.05))] \} / 10$$

$$S_{av} = \{4914 * [(- 0.628894626) / (- 0.05)] \} / 10$$

$$S_{av} = \{4914 * [12.57789254] \} / 10$$

$$S_{av} = \{61807.76\} / 10$$

S_{av} = **6180.77** SR per year

And,

(The monthly average installment S_{avm} = 6180.77/12 = **515.06** SR per month)

Minimum monthly income of the target buyer = 515.06 * 4 = **2060.25** SR per month

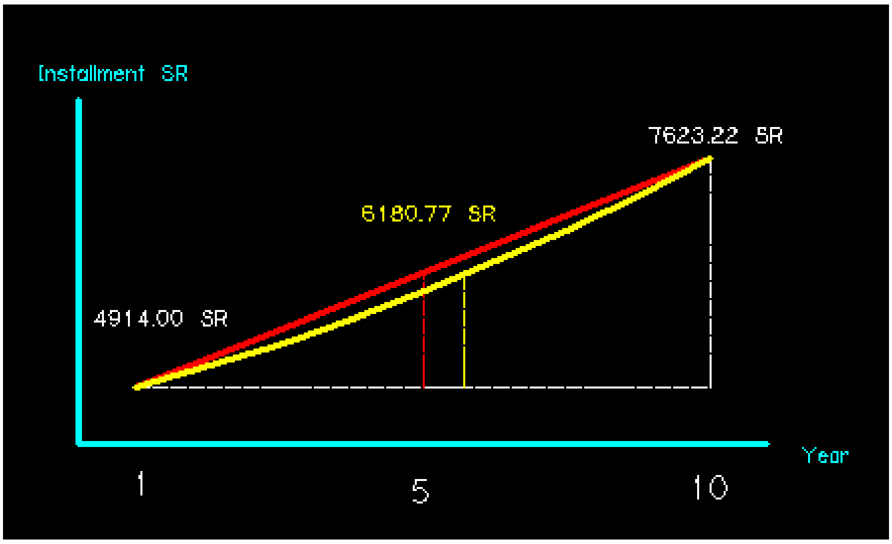

Figure-1: Profile of the Annual Installments

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