

Problem Set 2: *Housing Affordability*

Objective: The objective of this assignment is to introduce students to the process of purchasing a home from a lender's perspective. This includes but is not limited to preparing amortization tables and qualifying the buyer.

Assignment: Please download the spreadsheet *Affordability_Fall2004.xls* from my website and answer the following questions. Please highlight your answers in **yellow** and turn in a hard copy of your results together with your spreadsheet on a disk. Please print your name clearly on the disk and scan the disk for viruses. ***This is an individual assignment.***

Description of the Neighborhood: Located in Bergen County, NJ, the distinction of Allendale is its likeness to a New England "small town" in the traditional character of its homes and the pride of ownership evident on every street. There is a versatility in its architectural variety and among its residents



that is expressed in a wide range of housing and social organizations for all ages, recreation and school activities.



This picturesque

community boasts 70-acre Crestwood Park, a recreational area with a 9-acre sand bottom swimming lake, sandy beaches, pine grove, ball field and a wooded wonderland for nature lovers. Another unusual recreational facility is

the 100+ acre "celery farm" which is a protected nature preserve with a glacial lake and wonderful walking paths. Its highly rated schools are centrally located and within easy reach of all in this compact 2.8 square mile community. Northern Highland Regional High School, with its 50-acre campus adjacent to Crestwood Park, serves as an active cultural and community center.

Allendale offers a charming center of town shopping area as well as a train station for easy commute to New York City. Bus lines are also available. For more information about this borough, please refer to the "Community Facts (Allendale)" worksheet.



Loan Information: Loan rates are found in the worksheet labeled "Loan Rates". These rates are current (as of May 28, 2004 when this case was constructed) and are the rates that you will use in this assignment. The current and historical loan limit on the size of single-family home mortgages that Fannie Mae and Freddie Mac buys from banks is located in the worksheet named "FNMA Conforming Loan Limits". Mortgages

that fall within these government sponsored enterprises (GSE) purchase limits are called **conforming loans** and are cheaper for consumers¹ because banks and thrifts can readily sell them to Fannie Mae and Freddie Mac or swap them for mortgage-backed securities. The GSEs are able to provide a lower cost largely because their government affiliation allows them to borrow at a lower rate than other finance companies. Fannie Mae and Freddie Mac sell large amounts of bonds and other debt securities and use the proceeds to finance their purchases of home mortgages. Loans that exceed the Fannie Mae/Freddie Mac loan limits are known as non-conforming or **Jumbo loans**.

Other Loan Criteria of the Lender: Like other lenders, your financial institution requires that buyers must purchase private mortgage insurance (PMI)² if they put down less than 20% of the purchase price of the home. Currently PMI is .0050 or ½ of 1% of the outstanding loan balance. The buyers are required to maintain their PMI until their loan balance is less than 80% of the contract sales price of the home. (Note: Unless the borrower terminates PMI when the 80% balance is reached, the borrower continues to pay PMI). Any loan whose contract loan amount exceeds the Fannie Mae/Freddie Mac loan limits is considered a Jumbo loan. Borrowers are required to set up an escrow account, which includes principal, interest, property taxes, and insurance, for 3 months.³ This escrow amount is included in the total closing costs, which is discussed below. The bank requires that all points and fees be paid in cash (this is part of the total closing costs) rather than rolled into the mortgage e.g., the bank will not finance the points and fees by increasing the mortgage amount. The bank uses the following ratios in qualifying the homebuyer:

Housing Expense-to-Gross Income Ratio: 28%
Long Term Debt-to-Gross Income Ratio⁴: 36%

where

Monthly housing expenses (PITI): The sum of monthly payments for **principal, interest, property taxes, homeowner's insurance**⁵, hazard insurance (if required), private mortgage insurance (if required), and condo or homeowner's fees (if required).

Monthly Debt Payments: The sum of monthly payments on long-term debt, including the debt service payments on your potential home (including private mortgage insurance), car

¹Mortgages bought by Fannie Mae and Freddie Mac typically have a rate about 0.30 percentage points lower than loans they are not eligible to buy.

²For more information on private mortgage insurance, please visit the industry's website at <http://www.privatemi.com/>

³The rationale for this escrow account is in the event that a homebuyer loses his or her job. Time is required to find a new job.

⁴Lenders are sometimes flexible in these ratios. For example, if the LT Debt to Gross Income Ratio is say 36.4% they might round to 36%.

⁵Like your car insurance the cost of your homeowner's insurance will be dependent on the age, location, and type of home you have. Typically the insurance shouldn't cost more than .5% of the appraised value of your home. In cases of total loss, the insurance would cover the replacement value of the home, excluding the value of the land. **For this case, assume that homeowner's insurance per year is .5%*Purchase Price of House.**

payments, student loan payments, and other personal loans requiring a periodic payment. Include your minimum monthly payment required on credit card balances carried over from month-to-month; but do not include credit card balances that you pay off entirely each month. Also, do not include your current mortgage payment if you are selling that property.

Gross Income: household's total monthly income before taxes. Alimony and child support payments, whether incoming or outgoing, should be reflected in the estimate.

In evaluating the income/salary of the borrower(s), the **bank you go to WILL NOT count any bonus money** due to its uncertain nature and frequency of payment (usually a lump sum payment rather than monthly payments).⁶ In terms of necessary documentation, the bank requires 3 years of income tax returns, together with one year of receipts for the payment of utilities (phone, water, and electric/gas).

Closing costs: Closing costs are one-time fees paid at closing for the loan and expressed as a percentage of the mortgage amount. This *includes* points and origination fees paid to the lender and transfer fees required to complete the **transaction**. Assume that the total closing costs (including points and origination fees) are 3% of the contract loan amount⁷. Note: You should ask your lender for a copy of the "Good Faith Estimate of Closing Costs" which itemizes fees commonly charged in your area. These fees include but are not limited to appraisal fees (\$305 average), credit report (\$37), application fee (\$288), document preparation fee (\$186), and flood certification (\$18) among others. Closing costs to the buyer typically do not include the realtor's commission, which is paid by the seller, in general.

The Homebuyers: Frank DeLima and his wife, Francine, are recent graduates of the Stern School of Business at New York University. Both have an undergraduate degree in Finance. Frank has worked full-time for Club Jubilee as its vice president for the past 3 years and earns \$120,000 per year. Francine works for KOHO radio and earns \$47,000 a year as a radio announcer. They have \$80,000 in savings of which they wish to spend no more than \$70,000 for a downpayment + closing costs on a house. The couple has one car, a Lexis SUV, which they just purchased on a 4-year lease. Lease payments are \$500 per month. They also have on average a \$50,000 balance on their credit card which charges a 21% annual percentage rate (apr) that they carry over from month to month and for which they typically make payments of \$1,000 per month⁸. In

⁶Lenders typically include the bonus in the household income if: 1) The bonus is part of a collective bargaining agreement and must be paid; or 2) The bonus is included in the computation of income by the employer or if there is a history of bonuses. If there is a history of bonuses but the applicant does not know if a bonus is planned, nor does the employer divulge its plans for a bonus nor the projected bonus amount, the lender typically uses an average of past two years' bonuses to calculate income. A bonus history for compliance purposes is to be considered one year or more. However, the bonus is NOT included in household income if the bonus is totally discretionary by the employer, there is no previous bonus history, and the wages of the applicant are the basic source of income.

⁷In a typical real estate deal, closing costs total 2% to 5%. Exact fees vary by property cost and location.

⁸There are many credit card calculators available on the Internet. One such java applet is <http://www.dinkytown.net/java/DebtRolldown.html> . Note that credit card companies calculate interest based on the annual percentage rate (apr) stated on the card. Caveat: Do not be fooled by basing your monthly payments on the low promotional interest rate that is only good for a short period of time. Your

addition to this, they both have student loans outstanding. Payment on the student loans is \$1,000 per month of which Frank and Francine each pay \$500. The outstanding balance on their student loans combined is \$5,000. Each has an outstanding balance of \$2,500 on their student loan. This is the first marriage for both of them. They have no other debts outstanding.



The DeLimas have already seen several houses in Allendale. The description of each house is given in the “Listings” worksheet. Since they want to start a family and want a home office, they are looking for a house that has at least 4 bedrooms and two baths. Their first choice is a house located at 533 Franklin Turnpike in Allendale, NJ. They have come to your firm for financing and would like you to help them in getting the deal done.

1. Home Prices in the Neighborhood (20 points): Homes that have sold recently in Allendale are found in the worksheet labeled “Home Prices Allendale,NJ”.
 - a. Constructing New Variables from the Data: Since Frank has taken a course in statistics, he would like to use a regression model in helping him to price the house. Prior to doing a regression, he first transforms the data of sold properties by constructing the following new variables:

Days from Present variable: using the DAYS360 function in Excel (=DAYS360(C4,E4)+1). This variable provides an indication of recent market activity since house prices might not remain constant over time. Using this variable allows us to see whether Allendale’s housing market has experienced either a surge or slowdown in recent months.

Dum Summer: Is a dummy or indicator variable. The variable is equal to 1 if the house that sold between the months of May through July otherwise the variable is set equal to zero. According to historic data from the U.S. National Association of Realtors, this time period outpaces the balance of the year in sales since there is more home inventory and variety. It also corresponds to the ending of school, vacation time and nicer weather.

Dum Cape: Is a dummy or indicator variable⁹. The variable is equal to 1 if the house that sold is a Cape Code otherwise the variable is set equal to zero (i.e., =IF(Q3="Cape",1,0). This variable indicates whether buyers tend to put a premium on this style of house.

minimum monthly payment is typically calculated as 2% of your current outstanding balance. This is one of the most common methods used by credit card companies to calculate minimum payments.

⁹Recall from statistics that you cannot have as many dummy variables for styles of houses as the number of housing styles that exist in your data set. You must have n-1 dummy variables if you have n housing styles so that the matrix is of full rank.

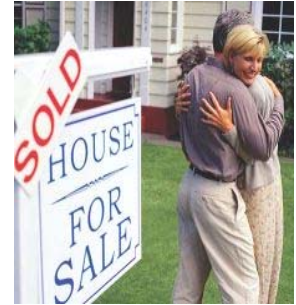
Dum Colonial: Is a dummy or indicator variable. The variable is equal to 1 if the house that sold is a Colonial otherwise the variable is set equal to zero This variable indicates whether buyers tend to put a premium on Colonial houses.

Dum Ranch: Is a dummy or indicator variable. The variable is equal to 1 if the house that sold is a Ranch otherwise the variable is set equal to zero This variable indicates whether buyers tend to put a premium on Ranch style houses.

Dum Basement: Is a dummy or indicator variable. The variable is equal to 1 if the house that sold has a basement otherwise the variable is set equal to zero This variables indicates whether buyers put a premium on houses that have a basement.

- b. Discount/Premium over List Price: Calculate the Premium/Discount using the formula $(\text{Sold Price}/\text{List Price})-1$. What is premium or discount from the list price on average (mean and median)? Is it always the case that the sale price is lower than the list price? What was the highest premium paid (if any)? What was the highest discount paid (if any)? Before answering this question, calculate the MAX and MIN of the premium/discount. On average, how good a job do realtors in this market do at pricing a seller's house for sale assuming a 5% margin for error? Please discuss.
- c. Relationship between Property Taxes and Sold Prices: First, graph the relationship between property taxes and sold prices using an XY(Scatter) graph option. Add a trendline to this scatterplot by first clicking on the dots to highlight them, right clicking on the mouse and then selecting the add Trendline option (linear). Discuss why a relationship should exist. Next, regress sold prices (y dependent variable) against property taxes (x independent variable) and use the regression to predict the justified price for the house that the DeLimas are interested in (533 Franklin Turnpike). To do a regression in Excel, pull down the Tools submenu then select Data Analysis and choose the Regression option (Tools → Data Analysis... → Regression). If the Data Analysis option is not shown, go to Tools → Add Ins... → check the box corresponding to Analysis ToolPak). What is the justified price for the house located at 533 Franklin Turnpike?
- d. Relationship between Square Feet and Sold Prices: Using only houses for which the square feet and sold prices are reported, graph the relationship between square feet and sold prices using an XY(Scatter) graph option and adding a linear trendline to the scatterplots then discuss why there should be a positive linear relationship between these two variables. Next, regress sold prices (y dependent variable) against square feet (x independent variable) and use the regression to predict the justified price for the house located at 533 Franklin Turnpike.

- e. Estimating the Sales Price vis-à-vis Regression: Perform a regression of Sales Price (dependent Y-variable) on the following X independent variables: DOM (days on the market), Days from Present, Interest Rate, Total Rooms, Bedrooms, Baths, Property Taxes, Lot Square Feet, Dum_Summer, Dum_Cape, Dum_Colonial, Dum_Ranch, and Dum_Basement. What is the estimated sales price of 533 Franklin Turnpike (set days on market, days from present, and Dum_Summer all equal to zero)? How good a job does our regression model do in predicting the cross-sectional variation in sold prices to the cross-sectional variation in the independent variables? Should we include all of the variables in our regression estimate even if their T-statistic is not statistically significant at the 5% level (Hint: look at the F-statistic)? Which of our independent variables is statistically significant using the T-test? What is the lower bound of the predicted sale price using one standard error of the estimate? Note: This is the lower bound of the confidence interval of the predicted price that you learned in statistics. Should a homeowner "overprice" his or her house or list the house at the going market price? (Hint: look at the coefficient associated with the Days on the Market variable)



2. Amortization Table (Base Case) (15 points): If the DeLimas put down 10% of the purchase price (1 - Loan to Value Ratio) and want a 30 year fixed rate mortgage, what will their monthly payments be if they were to purchase the house at 533 Franklin Turnpike assuming that they agree to the full list price of \$559,900?
- Using Excel, construct a 360-month amortization table showing the beginning balance, debt service payment, interest payment, principal payment, and ending balance. Also show what their total monthly payment to the lender will be if this amount differs from their monthly debt service payment. Given these flows¹⁰, calculate the annual percentage rate (APR), which is the true borrowing cost. Recall that the lender's IRR is equal to the true borrowing cost. Hint: you might have to put in a guess value such as .001 in order to calculate the IRR. Remember that this IRR is a monthly IRR and as such, you will need to multiply it by 12 in order to obtain the APR. Since there are points and loan origination fees, your APR should exceed the contract interest rate.
 - Next, graph the interest payments and principal payments using the charting function in Excel. Explain why interest is declining and principal is increasing over time.
 - On another graph, plot the outstanding mortgage balance over time. Explain why the outstanding mortgage balance is declining over time. Discuss how a mortgage, which is a type of corporate bond, differs from the traditional corporate bond in terms of its principal amount?

¹⁰Even though the lender collects PMI, he passes this payment on to the insurer.

3. Amount of Money Required by Borrowers (Base Case) (5 points): What is the total amount of money including closing costs that the DeLimas must come up with (i.e., the amount of equity) assuming that their offer price equals the list price of \$559,900?
4. Qualification of Buyers (5 points): What are the total long-term debt payments per month for the DeLimas given the facts in question #2 above? What is the monthly housing expense e.g., principal, interest, property taxes, and property & casualty insurance per month? Assume that total assessed value will initially equal the purchase price of the property. Based on your bank's housing expense-to-total gross income ratio and the long-term debt-to-total gross income ratio, do Frank and Francine qualify for the mortgage?
5. Some Deal Structuring Alternatives (10 points): Glenn Miyashiro, a friend of the DeLimas, suggests that Frank and Francine consider the following alternatives:
 - Alternative #1: Reduce the offer price by 3% (97% of List Price) with no paying down of any credit card debt or debt on student loans.
 - Alternative #2: Reduce the offer price by approximately 1 standard error of the regression estimate to \$530,000 (this is rounded to the nearest \$5,000).
 - Alternative #3: Reduce the offer price by 3% (97% of List Price) and have either Frank or Francine pay off his or her student loan.
 - Alternative #4: Reduce the offer price by approximately 1 standard error of the regression estimate to \$530,000, have either Frank or Francine pay off his or her student loan, and cut VISA payments by 10% to \$900 per month by paying \$5,000 to VISA lower their principal balance outstanding on credit card debt to \$45,000¹¹.

Do the DeLimas qualify for based on any of these four alternatives? Can they qualify without reducing either their credit card debt or debt on student loans? Please discuss.

6. Creative Financing using a 3/1 Hybrid Arm: Frank's aunt, Mary Tunta, a realtor with Pochoman Realty suggests that they should consider taking out a 3/1 hybrid loan since the monthly payments are lower (at least initially). Under this type of loan, the contract rate of interest is fixed for the first 3 years. It is "as if" they have a fixed rate loan (with the monthly payment calculations the same as taking out a 30 year fixed rate loan) for 3 years. After three years, the loan converts to an adjustable rate mortgage wherein the rate adjusts annually based either on the COFI or treasury rate depending on the index that they choose. Their line of reasoning is that not only would the interest rate be relatively lower but also they can refinance/roll over the

¹¹You can verify this by going to <http://www.dinkytown.net/java/DebtRolldown.html> and assume an APR of 21% with an unpaid balance of \$45,000.

mortgage at the end of 3 years into a fixed rate mortgage. What is the total mortgage payment per month for the first 3 years assuming that they can get the seller to agree to accept an offer price of \$530,000? What are the total long-term debt payments per month? What is the monthly housing expense? What are the total housing expense-to-gross income ratio and the long-term debt-to-gross income ratio? Do the DeLimas qualify for the mortgage? Please discuss.

7. Buying Down the Loan: Frank and Francine's neighbor, Mr. Souza suggests that they buy down the loan for 3 years to a contract interest rate of 4% in lieu of taking out a 3/1-hybrid loan. His reasoning is that at the end of 3 years, both Frank and Francine should be earning a higher salary and should thus be in a better position to cover the mortgage payments. This is essentially a graduated payment mortgage with one-step or gradation. How much must Frank and Francine pay to the lender in order to buy down the loan for 3 years? Do the DeLimas qualify for the mortgage based on the initial payments from the buydown? In particular, what is the total housing expense-to-gross income ratio and the long-term debt-to-gross income ratio based on the initial payments from the buydown? Is this a viable alternative for the DeLimas? Why or why not?
8. Decision: Best Way to Structure the Deal: Assuming that the DeLimas want to purchase the house at 533 Franklin Turnpike, under what terms (financing and offer price) would they qualify for the house? Which alternative would you recommend that they choose and why? Please explain.

Reminder: This is an individual assignment. Please turn in a hardcopy of your printout with the answers highlighted in **yellow**. Also, turn in your disk with your name printed clearly on the disk. Please scan your disk for viruses.