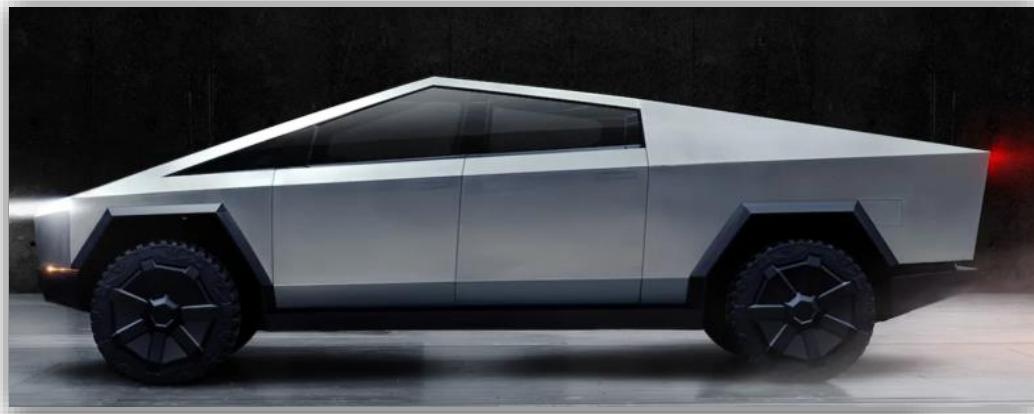


# Real Estate ... getting involved





## Market reaction to the pickup ...

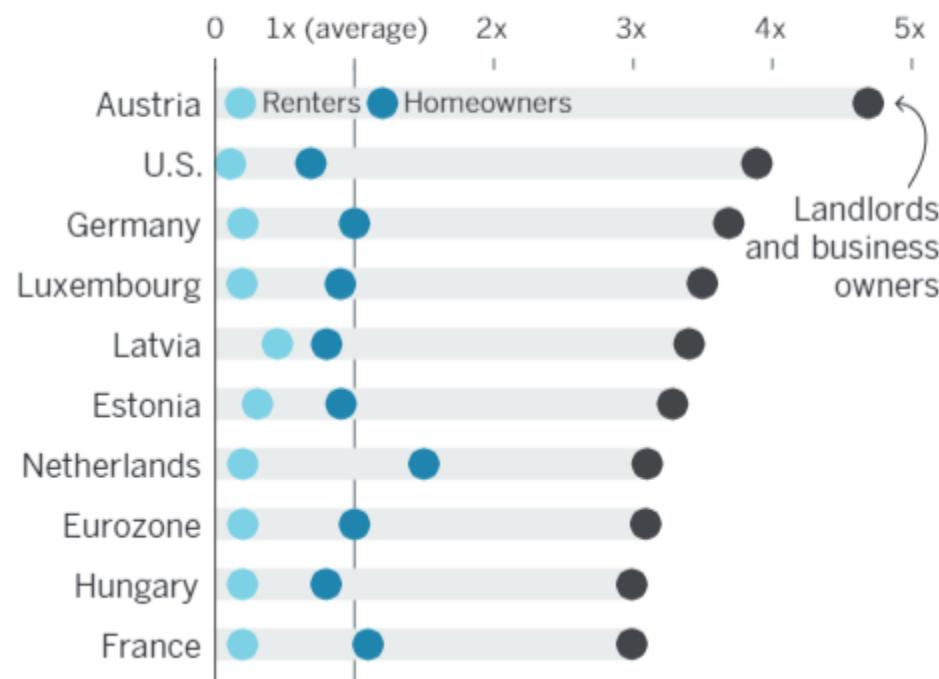


## Ford reaction to the Tesla pickup ...



# Going back to the 99% [90%] / 1% [10%] issue ...

## Household wealth relative to national average



A 2016 study by sociologists Alexandra Killewald of Harvard and Brielle Bryan, now of Rice University, supported this. After controlling for other factors, they wrote, “each year of homeownership between 1986 and 2008 is associated with about \$4,400 more in midlife wealth.”

In their analysis, they split households into three groups. Homeowners, whose primary wealth is also their primary residence, form the bulk of the middle and upper-middle class. Business owners and landlords (about 15% of U.S. households), tend to be among the wealthiest. Their wealth is typically used to generate additional income. Those who pay to rent their residences (about 35% of households), and whose wealth is typically used to cover needs such as emergency expenses or retirement, fill out the bottom of the spectrum. They’re joined by homeowners and business owners whose debt exceeds their equity.

The bottom 40% are most likely to be renters. The top 5% are most likely to own businesses or rental properties. The authors found this polarization has increased since 1962.

# Nominal Justification

.. a summary

- 1. A high-yield investment**
- 2. Ultimate hedge against inflation**
- 3. Retirement planning**
- 4. Tax considerations**
- 5. Candide! (Grow your own garden)**



## Leverage and the tax advantage ...

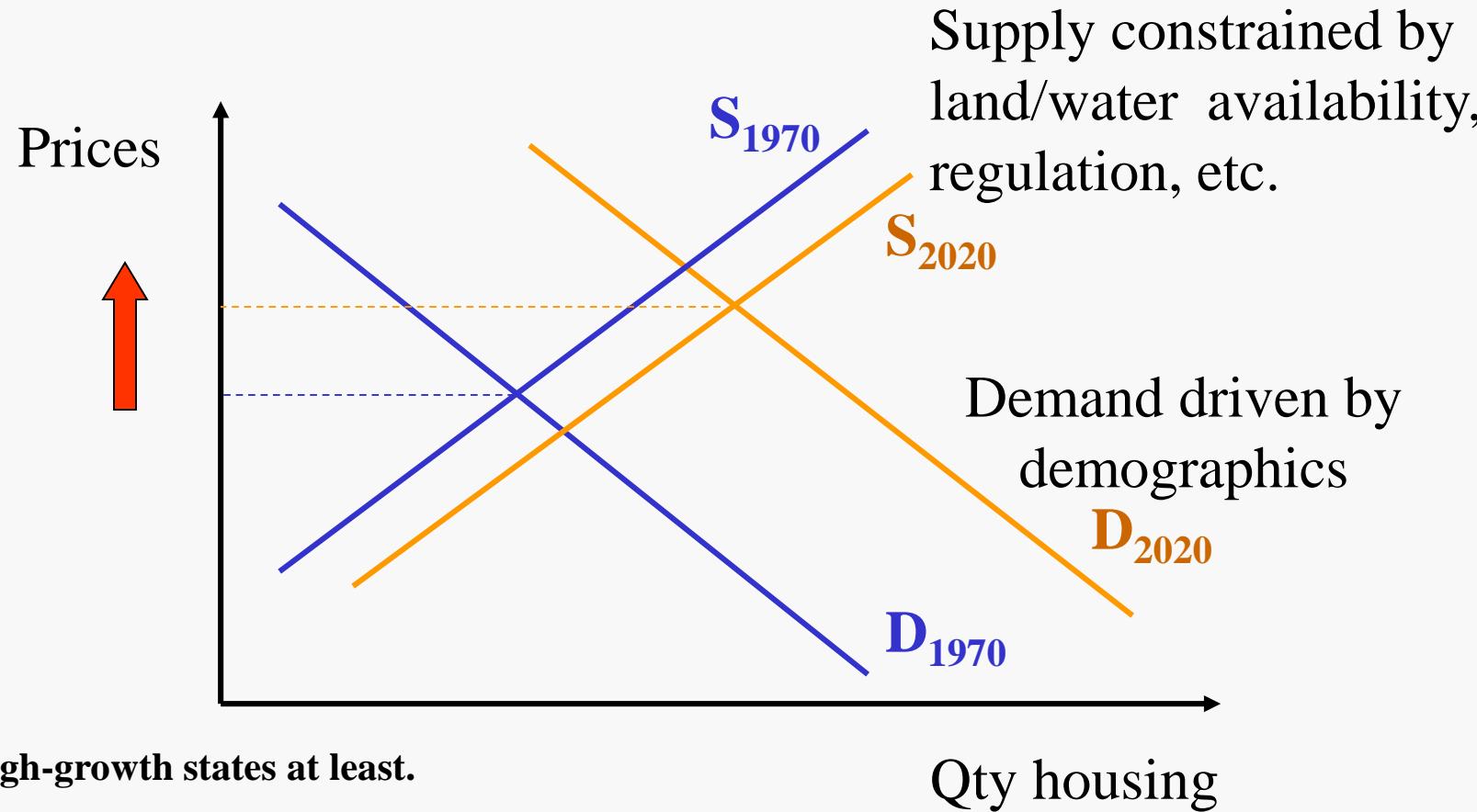
**Leverage** will equal the inverse of the percentage of the down payment on a real estate purchase:  **$1/(\% \text{ down})$**

Example: 20% down,  $L = (1 / 0.20) = 5$ , so if the house rises in value **10%**, your *rate of return on investment* is **50%**.

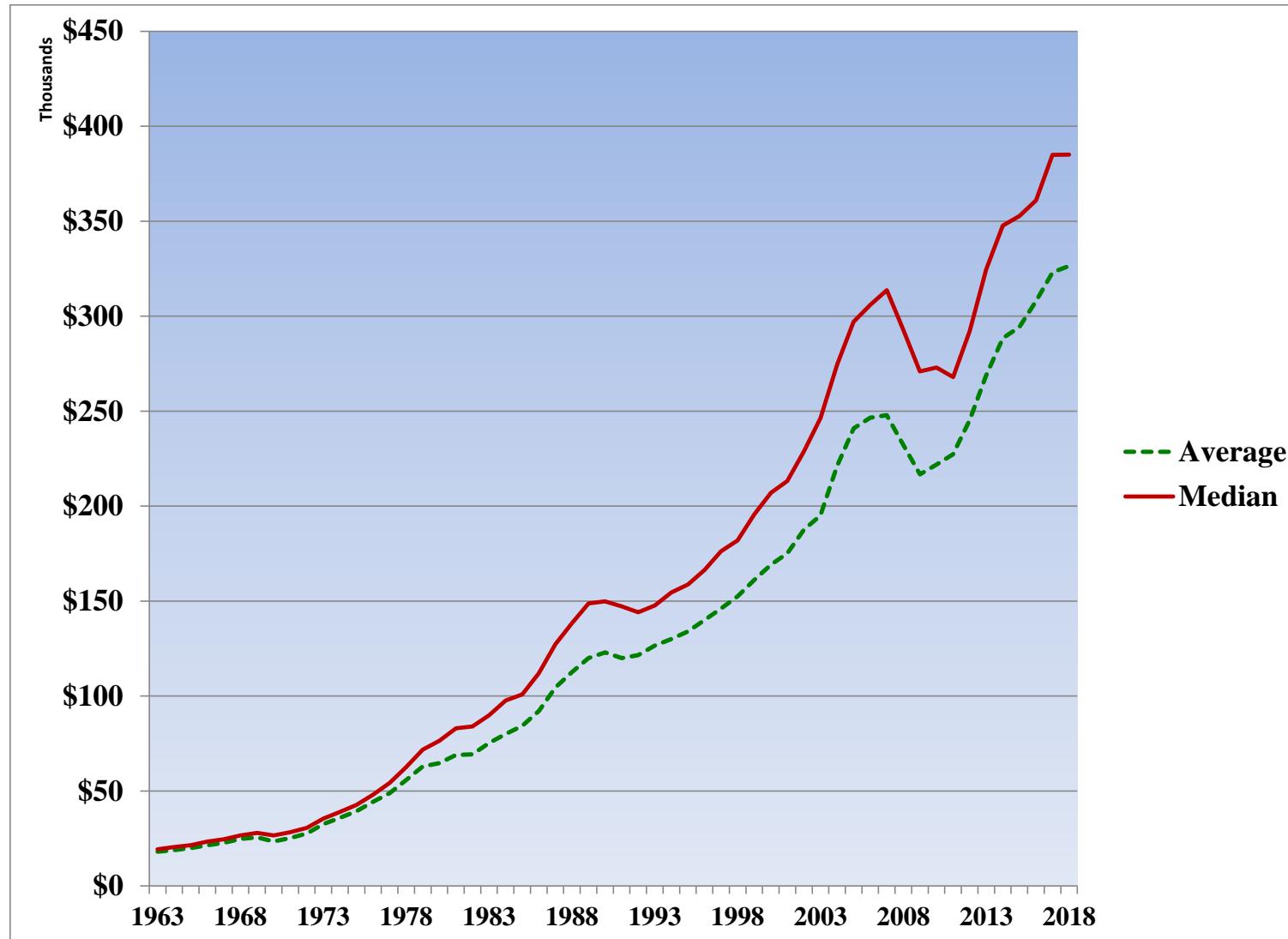
\$50,000 down on \$250,000 (\$200,000 loan). House rises 10% to \$275,000, your equity rises 50% to \$75,000.

**Tax advantage:** The interest payment on your loan and the property taxes you pay are deductible from your taxable income, federal and state, which will lower your taxes considerably and implicitly reduce your net payment for your home by 20% or more.

# The general tendency for real estate prices to rise explained by demographics (which can be local)



# The Median and Average Prices for New Homes, U.S. all regions, 1963-2018



Source: U.S. Census Bureau, 2019 Historical Times Series Data.

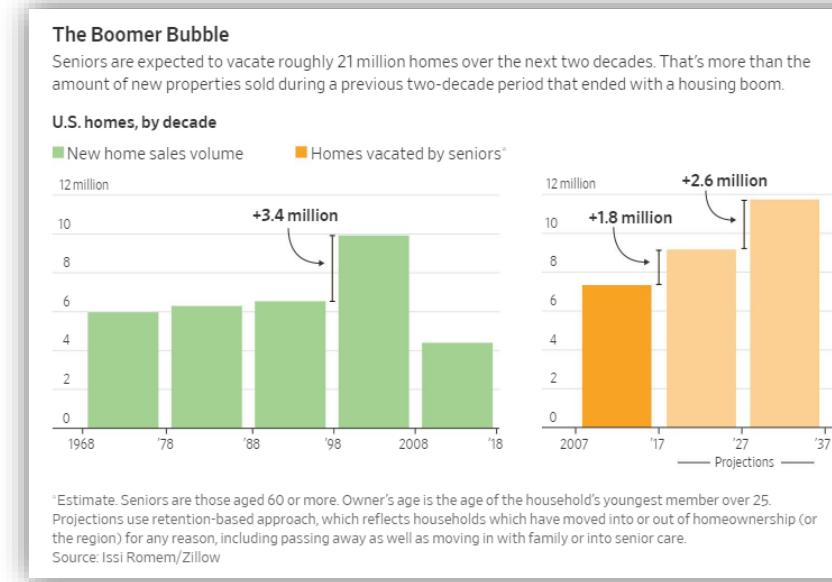
# But location is going to matter ...



REAL ESTATE

## OK Boomer, Who's Going to Buy Your 21 Million Homes?

Baby boomers are getting ready to sell one quarter of America's homes over the next two decades. The problem is many of these properties are in places where younger people no longer want to live. 719



.. describe the Tokyo article.

Laura Kusisto, *The Wall Street Journal*, Nov. 23, 2019

# Components of a Monthly Payment

.. example for \$120,000 30-year FRM

1. Interest

✓ \$950

2. Principle Reduction

✓ \$50

3. Property Taxes

✓ \$120

4. Insurance

✓ \$120

**Impounds:**

Values shown in red are tax deductible from *both* federal and state income taxes, in that they reduce your taxable income on *Schedule D*. This reduces the effective monthly payment by a percent equal to your marginal tax bracket (more or less).

# Fundamental Steps in Buying a Home

## .. go right down the list

1. Figure out the monthly payment that you can afford
  - based upon qualification criteria (later)
2. Figure out the kind of loan that you would like and shop for rates
  - based in part upon your planned down payment
3. Given 1 and 2, figure out the upper limit of the price range that you can afford.
4. Decide between used or new after comparing both.
5. Find the home.
6. Find the lender (if not done in step 2).
7. Find the escrow agent (often done for you).
8. Shop for home insurance (highly variable).

# Financing the Dream

## Real Estate Loans



# Terms (reading)

.. real estate argot

- ✓ PMI
- ✓ Trust deed (1<sup>st</sup> and 2<sup>nd</sup>)
- ✓ Equity
- ✓ Home equity loan
- ✓ Refinance
- ✓ Points
- ✓ Impounds
- ✓ Balloon payment
- ✓ APR
- ✓ ... and all types of loans



The old standards ... now they are back!!

# Qualifying for Traditional Loans

## .. documents needed & conditions

1. IRS 1040s (2 to 3 years)
2. Credit records (should be impeccable, target 750)
3. Balances for all financial accounts (although they can get this from the credit report)
4. List of all debts (also from the credit report)
5. Formal documentation of employment (like to see 2 to 3 years and they will check).



# Qualifying

## Down payment:

- **1%-2%**
  - First time
- **3.5%**
  - VA/FHA
- **10%**
  - Buy-down and special qualifier loans, typically variable rate
- **20-25%**
  - Conventional

## Income required:

This is a conservative standard and a rough rule of thumb, but loan payment should not take more than **30% to 35%** of your **net (after-tax) income** and no more than **40%** of your **net income after debt service**.

General advice: Before buying a house, keep debt to a minimum. Student loan debt can be a big negative.

# Credit scores ...



1. **Never** be late on a credit card or similar payment!
2. Establish credit now with a credit that you occassionally use and pay the balance .. you need to establish a credit rating history.
3. Pay attention to credit card interest rates but they are not an issue if you are committed to paying them off every month. That requires discipline.
4. Review your credit record annually for free (they will not release your credit score).
5. Keep your student loan payments up to date.

**AnnualCreditReport.com**

The only source for your free credit reports. Authorized by Federal law.

**ONLY** this one:  
<https://www.annualcreditreport.com>



danger!

## Relaxed standards in the boom years

In the real estate boom of the early 2000s, especially in 2004 through 2007, real estate lending standards essentially collapsed. Brokers found ways to qualify just about anyone for a home with teaser ARMs that had low initial starting rates and payments were for interest only ... principle reduction kicked in after 3,5, or 7 years (typically). Additionally, you could qualify for these loans with **no money down!!**

What's the potential problem? With no money down the owner has no initial equity in the house at all. Many of these borrowers just qualified under these terms and can *barely* make their current house payment. They face the prospect of rising interest rates and reaching the trigger point where principle reduction kicks in, and unless prices have escalated so they can refinance, many will be in serious financial trouble.

In 2006, in addition to all of this above, lenders began to accept loan applications **with no income documentation** and they did not even do spot checks to seek evidence of fraud, which was widespread.

# Wells Fargo loan rates November 25, 2019

## home purchase (not refinance)

Source: Wells Fargo Home  
Loan web site, this date.

Purchase Rates	Refinance Rates	
Product	Interest Rate	APR
<b>Conforming and Government Loans</b>		
30-Year Fixed Rate	3.750%	3.834%
30-Year Fixed-Rate VA	3.125%	3.454%
20-Year Fixed Rate	3.490%	3.664%
15-Year Fixed Rate	3.000%	3.202%
7/1 ARM	3.125%	3.814%
5/1 ARM	3.000%	3.917%
<b>Jumbo Loans</b> - Amounts that exceed conforming loan limits		
30-Year Fixed-Rate Jumbo	3.500%	3.544% 
15-Year Fixed-Rate Jumbo	3.125%	3.222%
7/1 ARM Jumbo	2.750%	3.604%
10/1 ARM Jumbo	3.000%	3.511%

Fannie Mae  
conforming loan  
limits for 2019:  
**\$484,350K,**  
**high-cost areas:**  
**\$726,525K**

# Memo: FNMA maximum loan limits for high-cost areas, 2019: California

**Mudd Finance**

See this source:

<http://www.fhfa.gov/DataTools/Downloads/Pages/Conforming-Loan-Limits.aspx>

County Name	State	CBSA Number	One-Unit Limit	County Name	State	CBSA Number	One-Unit Limit
BUTTE	CA	17020	\$ 484,350	PLACER	CA	40900	\$ 552,000
CALAVERAS	CA		\$ 484,350	PLUMAS	CA		\$ 484,350
COLUSA	CA		\$ 484,350	RIVERSIDE	CA	40140	\$ 484,350
CONTRA COSTA	CA	41860	\$ 726,525	SACRAMENTO	CA	40900	\$ 552,000
DEL NORTE	CA	18860	\$ 484,350	SAN BENITO	CA	41940	\$ 726,525
EL DORADO	CA	40900	\$ 552,000	SAN BERNARDINO	CA	40140	\$ 484,350
FRESNO	CA	23420	\$ 484,350	SAN DIEGO	CA	41740	\$ 690,000
GLENN	CA		\$ 484,350	SAN FRANCISCO	CA	41860	\$ 726,525
HUMBOLDT	CA	21700	\$ 484,350	SAN JOAQUIN	CA	44700	\$ 484,350
IMPERIAL	CA	20940	\$ 484,350	SAN LUIS OBISPO	CA	42020	\$ 667,000
INYO	CA		\$ 484,350	SAN MATEO	CA	41860	\$ 726,525
KERN	CA	12540	\$ 484,350	SANTA BARBARA	CA	42200	\$ 625,500
KINGS	CA	25260	\$ 484,350	SANTA CLARA	CA	41940	\$ 726,525
LAKE	CA	17340	\$ 484,350	SANTA CRUZ	CA	42100	\$ 726,525
LASSEN	CA	45000	\$ 484,350	SHASTA	CA	39820	\$ 484,350
LOS ANGELES	CA	31080	\$ 726,525	SISKIYOU	CA		\$ 484,350
MADERA	CA	31460	\$ 484,350	SOLANO	CA		\$ 484,350
MARIN	CA	41860	\$ 726,525	SONOMA	CA	46700	\$ 494,500
MARIPOSA	CA		\$ 484,350	STANISLAUS	CA	42220	\$ 704,950
MENDOCINO	CA	46380	\$ 484,350	SUTTER	CA	33700	\$ 484,350
MERCED	CA	32900	\$ 484,350	TEHAMA	CA	49700	\$ 484,350
MODOC	CA		\$ 484,350	TRINITY	CA	39780	\$ 484,350
MONO	CA		\$ 529,000	TULARE	CA		\$ 484,350
MONTEREY	CA	41500	\$ 652,050	TUOLUMNE	CA	47300	\$ 484,350
NAPA	CA	34900	\$ 726,525	VENTURA	CA	43760	\$ 484,350
NEVADA	CA	46020	\$ 486,450	YOLO	CA	37100	\$ 713,000
ORANGE	CA	31080	\$ 726,525		CA	40900	\$ 552,000

← \$726,525

← \$484,350

# Wells Fargo loan rates (page 2): 30-year fixed

## Purchase Rate Assumptions and APR Information

Today's purchase rates are based on the purchase of a single-family, primary residence. This rate assumes a credit score of 740, 0.0 in [discount points](#), which is an upfront \$0.00 included in closing costs below, and assumes the loan will have an escrow account. Contact a home mortgage consultant to learn more.

### Conforming Loan

30-Year Fixed Rate	
<b>Interest Rate</b>	<b>3.750%</b>
<b>APR</b>	<b>3.834%</b>
<b>Loan Amount</b>	\$200,000
<b>Down Payment</b>	25.0%
<b>Term</b>	30 yrs
<b>Monthly Principal &amp; Interest Payment (Excludes taxes and hazard insurance; total payment will be higher)</b>	\$926.00
<b>Closing Costs (includes the cost for required discount points)</b>	\$5,541
<b>Upfront Mortgage Insurance Premium</b>	\$0.00

Rates, terms, and fees as of 11/25/2019 10:15 AM Eastern Standard Time and subject to change without notice.

# Wells Fargo loan rates (page 3): 7-1 ARM

## Conforming Loan

<b>7/1 ARM</b>	
<b>Interest Rate (may increase after closing)</b>	<b>3.125%</b>
<b>APR</b>	<b>3.814%</b>
<b>Loan Amount</b>	\$200,000
<b>Down Payment</b>	25.0%
<b>Term</b>	30 yrs
<b>Time Initial Rate and Payment is in effect</b>	7 yrs
<b>Maximum Lifetime Caps Over/Under Original Rate</b>	5%
<b>Initial Monthly Principal &amp; Interest Payment (Excludes taxes and hazard insurance; total payment will be higher)</b>	\$857.00
<b>First Adjusted Interest Rate (Months 85 - 96)</b>	<b>4.250%</b>
<b>First Adjusted Payment (Months 85 - 96) (Excludes taxes and hazard insurance; total payment will be higher)</b>	\$958.00
<b>Fully Indexed Interest Rate (Months 97 - 360)</b>	4.250%
<b>Fully Indexed Payment (Months 97 - 360) (Excludes taxes and hazard insurance; total payment will be higher)</b>	\$958.00
<b>Closing Costs (includes the cost for required discount points)</b>	\$5,740
<b>Upfront Mortgage Insurance Premium</b>	\$0.00

Rates, terms, and fees as of 11/25/2019 10:15 AM Eastern Standard Time and subject to change without notice.

A 7-1 ARM is a 30-year adjustable rate mortgage, interest rate is fixed for first seven years, then adjustable annually for remaining 23 years, with a cap [5% +]. (Also called a 7/23).

Your option!

## Wells Fargo loan rates (page 4): Low Down Payment VA/FHA 30-year fixed

### Government Loan

#### 30-Year Fixed-Rate VA

##### Interest Rate

3.125%

##### APR

3.454%

##### Loan Amount (excluding VA funding fee)

\$200,000

##### Down Payment

0.0%

##### Term

30 yrs

##### Monthly Principal & Interest Payment

(Excludes taxes and hazard insurance; total payment will be higher)

\$885.00

##### Closing Costs (includes VA funding fee and the cost for required discount points)

\$11,740

##### Upfront Mortgage Insurance Premium

\$0.00

Rates, terms, and fees as of 11/25/2019 10:15 AM Eastern Standard Time and subject to change without notice.

*If* the lender offers a package, the FHA option is often available to you as a borrower. Benefit? A 0% down payment! For that you have to pay two types of mortgage insurance:

1. An up-front premium of 1.75% of loan amount;
2. An annual premium of 0.45% to 0.85%.

# 30-year fixed rate

... the safe bet

## ➤ Features

The interest rate and payment are fixed nominally for 30 years.

## ➤ Advantage

No uncertainty, payments fixed, wonderful during inflations, great tax advantage.

## ➤ Disadvantage

Rates a little higher than other options, often hard to get with less than 20% down.

# 15-year fixed rate (or 10 or 20)

... building equity quick

## ➤ Features

The interest rate and payment are fixed nominally for 15 (or 10 or 20) years.

## ➤ Advantage

Rates lower than 30-year FRM, equity accumulates faster, sometimes wiser for retirement planning

## ➤ Disadvantage

Monthly payments about 18% to 20% higher than 30-year FRM, but each year offers less of a tax break (amount going to interest is lower, to principal reduction is higher).

# 80-10-10 and similar FRM

... less cash down, avoid PMI

## ➤ Features

- ✓ Conventional 30-year or 15-year FRM for 80% of loan value.
- ✓ 10% down
- ✓ 10% financed on 2<sup>nd</sup> mortgage at higher interest
- ✓ also 80-15-5 etc.

## ➤ Advantage

Lower down payment and no PMI.

## ➤ Disadvantage

2<sup>nd</sup> mortgage at higher rate, fairly high monthly payment.

# 5/25s (5/1s) and 7/23s (7/1s)

... also used for 2nd

## ➤ Features

Amortized as though a 30-year FRM (same payment) but loan expires in 5 or 7 years with *balloon payment* (which implies refinancing then) of balanced with 90% of principal still owed.

## ➤ Advantage

Offered at low rates (they are short-term loans) and OK if you think you will be selling your house (or will be able to refinance if a 2<sup>nd</sup> mortgage).

## ➤ Disadvantage

You have to sell or refinance in a few years and you don't know what the market will be like then.



# 30-year /15 year ARMs

danger!

... adjustable rate mortgages

## ➤ Features

Variable rates, often adjusted periodically (i.e. once a year) to some designated interest rate measure, like the “11<sup>th</sup> district cost of funds,” often with caps, teasers (*with prepayment penalties*), and buydowns.

## ➤ Advantage

Rates often low, easier to get, typically have low or no down payment.

## ➤ Disadvantage

You bear **all** inflation and interest risk, loans are hard to understand, often have hidden risks and charges.

# More Loan Jargon (from ARMs)

- **Cap** - The highest level that the interest rate can go on an ARM.
- **Teaser** - A below-market interest rate offered on an ARM (typically) in order to attract the borrower and qualify the borrower for the loan; always connected to an early payback penalty. The teaser rate, which may be as low as 1%, will last from a few months to a couple of years, after which the loan reverts to market or above-market adjustable rates, either in step adjustments (staircase) or in one adjustment.
- **Staircase** - (See above) multiple steps from a teaser rate to a full rate
- **Buydown** - A subsidy by a home-builder for the first few months of a loan.



# Negative Amortization

## ... staircase loans



### ➤ Purpose

**Easier qualifying**, makes earlier years easier, but deceptively so  
– this were a big part of the mortgage meltdown.

### ➤ Features

Payments in the first few (i.e. 5) years so low that they don't even cover interest obligation. Deficiency is added to principal each month so loan balance grows. Then payments begin to increase (the staircase) until principle reduction is achieved, then payment is fixed for duration of loan at a variable or fixed rate, whatever the contract specifies. These loans have ***huge early payment penalties***.



## Subprime Loans

Subprime loans earned many headlines in early 2007 because of their soaring default rates. Subprime loans are loans that require virtually no documentation from the borrower - no income verification or other qualifying documentation listed on our earlier slide. These loans are almost always marketed with very low teaser rates that either step up to above market variable rates or to market rates after negative amortization. The teaser subprime loan will always have an expensive cashout penalty for the first few years (because the lenders are not stupid). Subprime loans are largely financed by mortgage pools and sold to buyers who otherwise would not qualify for a loan. It became clear in early 2007 that many truly unqualified borrowers and speculators had borrowed with subprime loans and, because real estate appreciation had stopped, they were unable to meet monthly payments when the loans stepped up. This guaranteed sizeable default and foreclosure rates beginning in 2007 and continued through 2010.

# Leverage: continuous investment rate of return on owner-occupied real estate

$$\ln\left(\frac{DP + (PV - PP)}{DP}\right)\left(\frac{1}{t}\right) = r$$

where

DP: down payment

PV: present value

PP: purchase price

t: time in years

$$\ln\left(\frac{40 + (154 - 140)}{40}\right)\left(\frac{1}{3}\right) = 10\%$$

example

Three years ago you paid \$40K down to buy a house for \$140K that is now worth \$154K. Your compounded yield is 10%

... of course this works in *both* directions.

# Formula for the monthly payment of a fixed rate mortgage (FRM)

Derived from summing a geometric series:

$$MP = \left[ \frac{LP \left(1 + r/12\right)^n \left(r/12\right)}{\left(1 + r/12\right)^n - 1} \right]$$

where **MP** is the monthly payment,  
**LP** is the loan principle, ***r*** is the  
loan rate, and ***n*** is the number of  
payments.

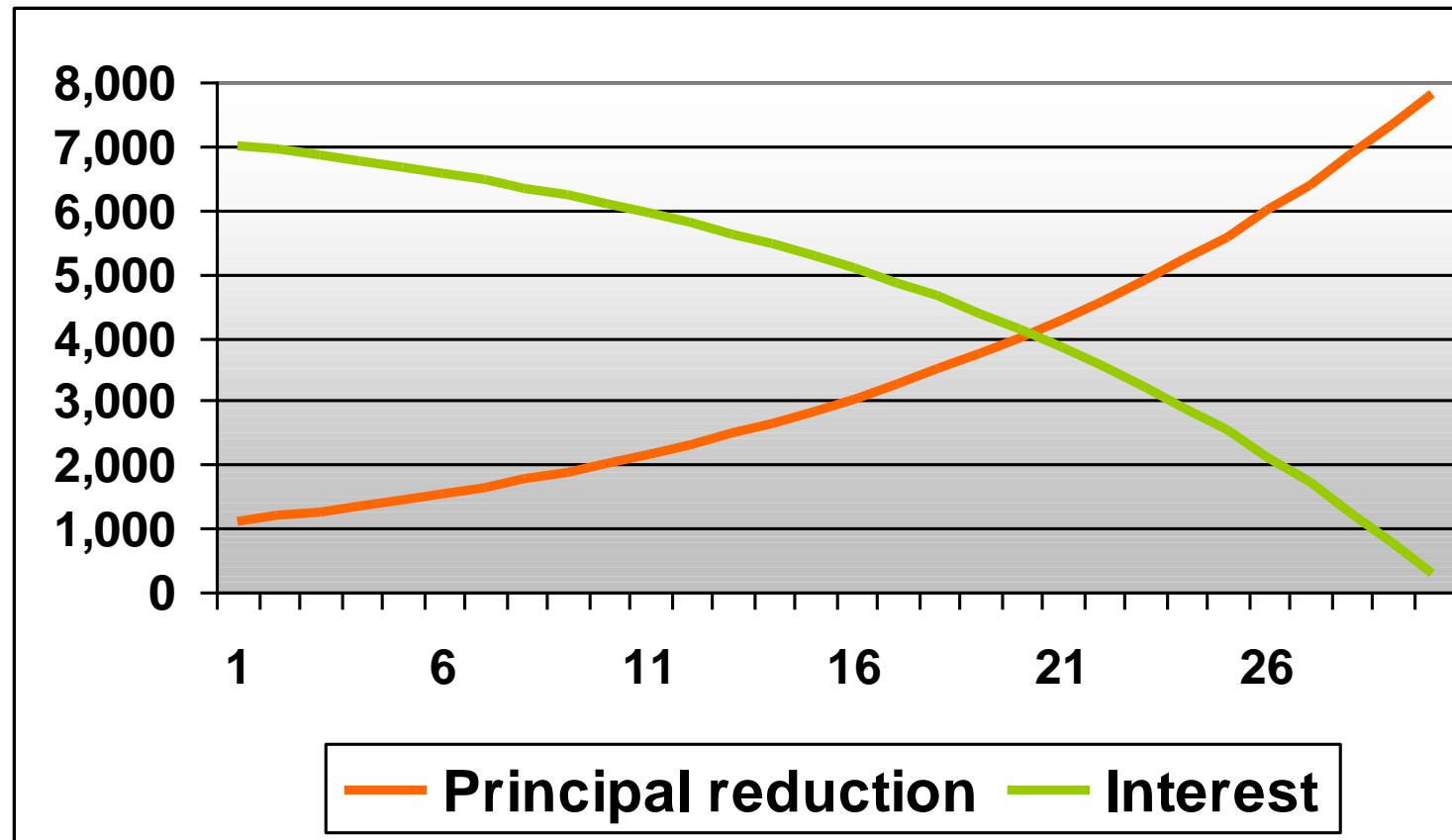
$$\$655 = \frac{[100,000(1.00583)^{360} X (0.00583)]}{[1.00583^{360} - 1]}$$

Example of a \$100,000 30yr  
FRM financed at 7% ... **Note!!**  
**you must convert annual rate  
to monthly:**  $.07/12 = .00583$

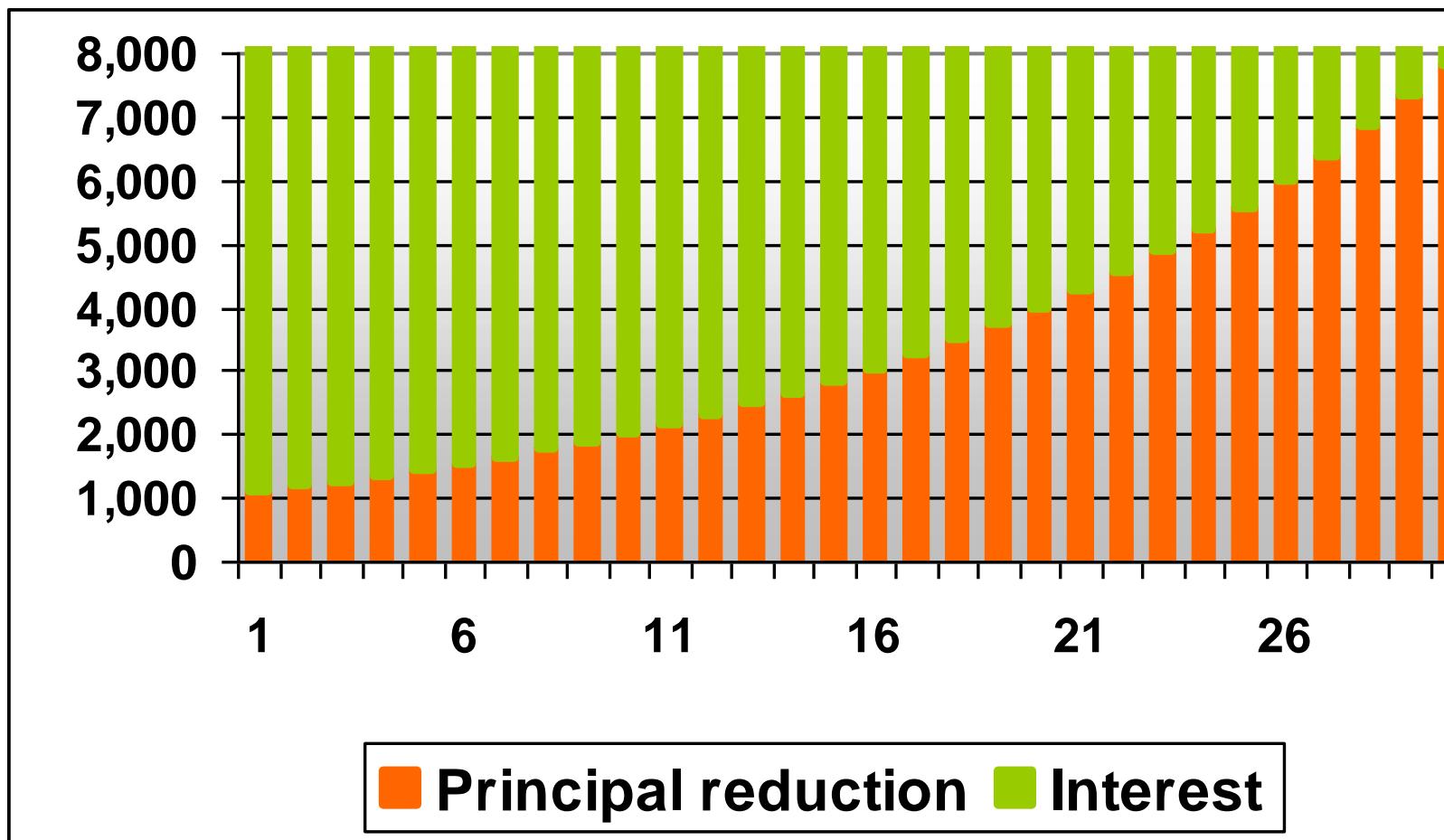
Note: With an ARM, this is simply recalculated every time the rate changes given the number of payments remaining.

# Payment Composition

(30 year FRM, \$665 per month)



...shown a different way



# Formula for calculating the maximum loan value that you can afford

**MMV** = Maximum Mortgage Value and variables have the same definition as in the mortgage formula:

$$MMV = MP \left[ \frac{12}{r} - \frac{12}{(1 + r/12)^n} \right]$$

Two things to remember:

1. The monthly payment should be no greater than 30% to 35% of your income.
2. Here you are calculating the maximum mortgage value (**MMV**), not the maximum home value (**MHV**). Take into account the down payment. So if you have \$25,000 for a

$$\$100,000 = 655 \left[ \frac{12}{0.07} - \frac{12}{(1 + 0.07/12)^{360} \times 0.07} \right]$$

down payment, the maximum home value is \$125,000. If calculated using a percentage down (**PD**), then

$$MHV = MMV / (1 - PD) = 125K = 100K / (1 - 0.2)$$

# Using the mortgage calc ...

**Mortgage Payment Calculator (fixed rate loans)**

Principal:	250,000.00
Points:	2.0
Point Value:	5,000.00
Loan Amount:	255,000.00
Term (yrs):	30
Rate:	5.000%
Payment:	1,368.90

Version 1.6 November 28, 2012

**Part 1 – What will my payment be?**

$$MMV = MP \left[ \frac{12}{r} - \frac{12}{(1 + r/12)^n} \right]$$

**Part 2 – Can you afford this?**

$$MP = \left[ \frac{LP \left( 1 + r/12 \right)^n \left( r/12 \right)}{\left( 1 + r/12 \right)^n - 1} \right]$$

**Maximum Loan Calculator  
(fixed rate mortgage)**

Net Monthly Income:	4,000.00
Threshold %:	40
Max Monthly Payment:	1,600.00
Max Monthly:	1600.00
Desired term:	30
Rate (%):	5.000%
UnAdj Max Loan:	298,051
Points (%):	2.0
Net Max Loan Balance:	292,206
Down Payment %:	10
Max Home Value:	324,674
Memo Down Payment:	32,467



# ... or the Python/Jupyter version

## Mortgage payment calculator

This allows the user to calculate the monthly payment of a mortgage loan, given a principal balance, points, the loan term in years, and the mortgage interest rate. This model conforms to the reduced-form formula used in **Real Estate Lecture 11** used in **Economics 104** at Harvey Mudd College.

Jupyter Version 1.2 dated November 20, 2017. The non-Jupyter version of this model is labeled `mortgage.py`. This uses version 3.6 of Python (Anaconda distribution) Developed by Professor Gary Evans.

In [1]: `import math`

### Assign values:

principal is full loan value before points, dollars and cents. points are added to the loan balance. Enter two points as 2.0. term is the number of years for the loan. Enter the rate as a percent rather than a decimal.

In [2]: `principal = float(250000.00)  
points = float(2.0)  
term = float(30.0)  
annual_rate = float(5.000)`

### Calculate values:

In [3]: `point_value = float((points*principal)/100)  
loan_value = float(principal + point_value)  
rate = annual_rate/100  
payments = term*12  
numerator = loan_value*((1 + (rate/12))**payments)*(rate/12)  
denominator = ((1 + (rate/12))**payments)-1  
monthly_payment = numerator/denominator`

### Print output

In [4]: `print ("Principal value: ", '{:.2f}'.format(principal))  
print ("Points: ", '{:.2f}'.format(points))  
print ("Loan term: ", '{:.2f}'.format(term))  
print ("Loan payments: ", '{:.2f}'.format(payments))  
print ("Loan rate: ", '{:.3f}'.format(rate))  
print ("Point value", '{:.2f}'.format(point_value))  
print ("Full mortgage value: ", '{:.2f}'.format(loan_value))  
print ("Monthly payment: ", '{:.2f}'.format(monthly_payment))`

```
Principal value: 250000.00
Points: 2.00
Loan term: 30.00
Loan payments: 360.00
Loan rate: 0.050
Point value 5000.00
Full mortgage value: 255000.00
Monthly payment: 1368.90
```