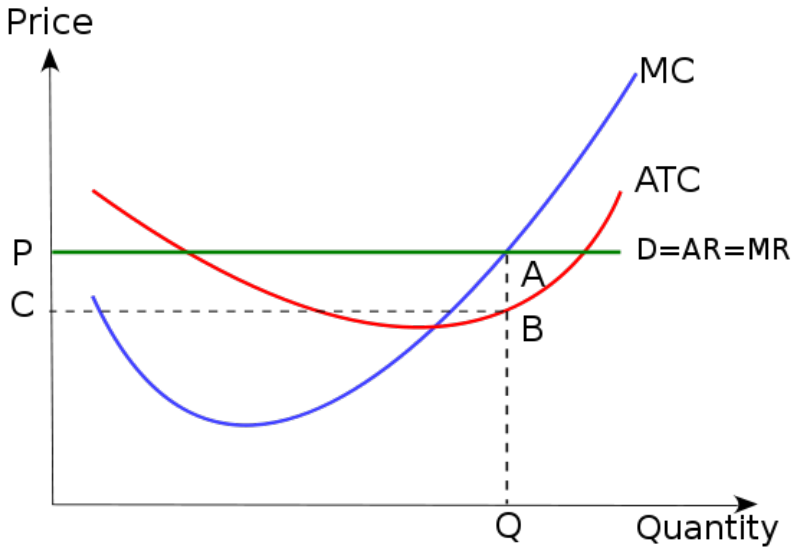
Chapter 2 Keeping Score:

Throughout his monologue the late great comedian Rodney Dangerfield would ask “How am I doing?” Economic forecasters, before they can contemplate the future, need to agree on a set of rules for organizing information pertaining to the past. Economic statistics, of course, provide the basis for much of our opinion about the current state of economic affairs. Accounting, in turn, provides the organizing principles from which we develop many macroeconomic variables.

Let's remind ourselves of the microeconomic foundations that are the bedrock of conventional economic thinking. We can recall the profit maximization strategy of a firm in a market that exhibits perfect competition.

The firm knows its costs, a function of various levels of output:
AFC, AVC, SRMC



Its share price reflects the discounted present value of its profit stream. It is an interest rate "taker", it cannot influence the discount rate used to value its earnings stream, so to maximize shareholder value the company maximizes profits.

Profits are a function of total revenue minus total cost. For output level X,

Π(x) =TR (x) – TC(x)

To maximize profits we look for the level of output, X*, after which the change in profits is negative. In other words we take the first derivative:

$$\frac{\partial \pi\,(x)}{\partial x} = \frac{\partial TR\,(X)}{\partial x} - \frac{\partial TC\,(x)}{\partial x}$$

= MR(x) – MC(x) = 0

So, to maximize profits the firm chooses X so that marginal revenue equals marginal cost. In a perfectly competitive market the firm is a price taker, So, MR = Price

Ergo the firm sets price equal to MC to maximize profits. Second order⟹ ‘

$$\frac{\partial^2 \pi}{\partial x^2} = \frac{\partial MC(x)}{\partial x} < 0$$

i.e. MC Curve Is upward Sloping.

This, of course, is the bedrock of the economic world. Notice the issue is how much to produce. The language is calculus.

Is choosing the right level of production, a function of production considerations, the key issue CEOs and CFOs? In many cases, no.

Hyman Minsky, a great financial economist, argued throughout his life that in a capitalist economy, dominated by issues of **finance,** the key issue is how big a bet to make. And the language you need to learn to calibrate the size of the wager is **accounting** not **differential equations**.

Moreover, Minsky asserted, and we will embrace in this class, the notion that business cycles are intimately tied to the world of **finance**. More to the point, as people, companies, banks and countries change their attitudes toward risk they change the vulnerability of the overall economy to small disappointments. Hyman Minsky believed that the best way to analyze these vulnerabilities was to think of all economic actors—individuals, companies, countries—as if they were banks manipulating their income statements and balance sheets:

> *“…Minsky wrote that capitalism is essentially a financial system…Minsky means that in a capitalist economy every economic unit—every firm, household, government, even every nation—is, in essential respects, like a bank facing the problem of daily balancing cash inflow against cash outflow. For him, the key problem an economic unit faces is* ***not*** *the familiar economist’s problem of maximizing profit or utility subject to a budget constraint. More fundamental is the problem posed by the “survival constraint” that requires cash outflow not exceed cash inflow.”* **Minsky and Modern Finance, Perry Mehrling**

How do we organize economic and financial information so as to be able to measure risk conditions? Financial accounting ratios provide economists with barometers that attempt to quantify risk exposure. When interest payments are very high, relative to income streams, and cash reserves are low, the situation is risky. When company share prices are very high, relative to their profit streams, the situation is risky. After we have mastered some simple accounting concepts we will be able to judge the macro economy’s risk of financial system havoc, a function of how much margin for safety is in the system.

In sum, we need to master basic accounting, in order to understand the underpinnings of macroeconomic statistics and in order to manipulate basic financial accounting ratios.

Accounting History:

Modern Accounting began in Venice in the 13th century. The Venetian merchants developed a double entry system—all transactions are recorded twice—and it remains the basic concept embedded in accounting today. Debits and credits, the system of Venice, informs all of financial, managerial and economic accounting. Apparently some impressive folk, even in the 13th century, sensed that accounting was going to remain big. *The Summa*, written by Fra. Luca Pacioli in 1494 is the first surviving accounting book. None other than Leonardo da Vinci did the illustrations!

Accounting Model: The Bathtub Analogy

Stock/Flow Model

Faucet/Inflow minus Drain/outflow
= Income statement (revenues minus costs)

Level of water in tub (stock of water at a moment)
= Balance sheet

The essential computations that drive accounting are best explained by thinking about bath tubs. Glance at a tub and you can estimate the water in the tub. If the faucet is on and the drain is open, you have inflows and outflows, the net of which will change the level of water in the tub. Accounting splits these observations into two tasks. The level of water in the tub, at a moment in time, is a stock calculation—in accounting it is a balance sheet assessment. The faucet inflow, drain outflow, over a period of time, is a flow calculation—in accounting it is an income statement. The flow calculation also determines the period to period change in the stock. In accounting terminology, the income statement and balance sheet articulate around one another.

Accounting Basics/Five Key Concepts:

1. Dual-Aspect Concept
    - Assets = Liabilities + Equity
    - Two aspects, assets vs. liabilities + equity, always equal.
    - A Balance Sheet Is In Balance, Thanks to Dual Aspect
2. Money-measurement
    - Money is the unit of account
    - We count dollar value of apples and oranges, not apples and oranges
3. Entity
    - A business entity exists. We count solely from its perspective.
4. Going-concern
    - We presume that the entity survives indefinitely
5. Asset-measurement
    - Financial (liquid) assets are valued at mark-to-market prices.
    - Physical (hard) assets are valued at cost

Key Definitions:
Balance Sheet Basics (Snapshot of a Moment in Time):
Assets are economic resources (items that have the ability to provide future benefits)
Liabilities are creditors' claims on the assets (obligations; they require future payment)

Equity is the owner's residual claim on assets (claim on assets in excess of creditors')

ASSETS = LIABILITES + EQUITY

Income Statement Basics (Results of Activities over a Period of Time):

Income (Earnings) is the difference between revenues and costs

Revenues measure the inflow of assets (or reduction in liabilities) from providing goods and services to others

Expenses measure the outflow of assets (or increase in liabilities) used in generating revenues.

NET INCOME = REVENUES MINUS EXPENSES

Note: The income statement links the balance sheet at the beginning of the period with the balance sheet at the end of the period.

Accounting Scorecard for Graduating Hopkins Senior, 2004.

STUDENT GIVEN $20,000 GRADUATION PRESENT and "GOOD LUCK"!

We can organize Han's situation, in an accounting framework, by declaring Han our entity. We then create an initial balance sheet for Han:

Table 4			
	5/31/2004		
	Assets	Liabilities	Plus Equity
Cash	20,000	Equity	20,000
Total	20,000	Total	20,000

Han makes no effort to work for a month. He does, however, buy a car, using $10,000 of his cash and financing the rest. No effort, no revenues or expenses, no income statement. But he does change the nature of his balance sheet:

Table 5			
	6/30/2004		
	Assets	Liabilities	Plus Equity
Cash	10,000	Car Loan	20,000
Auto	30,000	Equity	20,000
Total	40,000	Total	40,000

Note that the car purchase simply raises the assets and liabilities by the amount of the loan. Equity changes reflect the net of changes in revenues and expenses. Since neither occurred over this month, no change in equity was recorded.

Han now sets out to improve his economic lot. He goes into the software business. Han's wages are recorded as revenue. His living costs are recorded as expenses. Revenues minus expenses total to income. Han earns $80,000, faces taxes of $26,000, and spends $44,000, excluding considerations associated with his car.

What about the car? Over the course of a year, some portion of the car's economic use is eroded. And each year, Han pays off part of his loan, with some of the loan payment paying off interest and some paying off principal. To account for the car's diminishing value, we depreciate, over time. One method, straight line depreciation, simply reduces the value of an asset the same amount over the useful life of the asset. In Han's case, we assert that the car has 10 years of useful life. Each year we will register a $3,000 expense. At the end of 10 years, the asset will have been fully depreciated.

What about Han's car payments? Han financed the car, over four years, at 10%. To make matters easy we will assume he secured a loan with simple interest. Thus he will pay back $22,000, each year paying $5,500. The interest he pays, $500 per year, is an expense and reduces his income.

How do we treat the repayment of principal? Remember that the income statement *drives* balance sheet changes. When we repay principal we drive cash lower and we reduce our mortgage liability by a like amount. In other words, payment of principal does not change our net worth. We simply have less cash and a smaller loan. Contrast that transaction with our payment of interest. We use cash to pay interest and it lowers our net income. Since changes in net income drive changes in our equity (net worth), interest payments are an expense.

We now can present Han's income statement, over the next year:

Table I	
Income Statement	7/1/2004
	Through
	6/30/2005
	Revenues
Wages	80,000
Total	80,000
	Expenses
Cash Expenses:	
Rent	12,000
Food	10,000
Gas & Utilities	3,000
Entertainment	8,000
Clothes	7,500
Medical & Insurance	3,500
Total	44,000
Other Expenses	
Car Depreciation	3,000
TOTAL	47,000
Earnings (Before Interest, Taxes)	33,000
Interest	500
Earnings (Before Taxes)	32,500
Taxes	26,000
Net Income	6,500
Payment Of Principal:	
Car	5,000
House	0
Total	5,000
Cash Flow:	
Wages	80,000
Cash Out Flows:	75,500
Cash Expenses	44,000
Interest & Taxes	26,500
Payment Of Principal	5,000
Total Cash Flow	4,500

We now transform the balance sheet, using the information tallied over the previous year.
Note that the change in equity, $6,500 equals the change in net income reflected in the income statement over the period in question.

		2004 To 2005			
		Additions To	**Additions To**		
		Assets	**Liabilities**	+	**Equities**
Wages	Cash	80,000	Equity		80,000
Cash Expenses	Cash	-44,000	Equity		-44,000
Car Depreciation	Car	-3,000	Equity		-3,000
Interest	Cash	-500	Equity		-500
Taxes	Cash	-26,000	Equity		-26,000
Principal Payment	Cash	-5,000	Car Loan		-5,000
Totals:					
	Cash	4,500	Equity		6,500
	Car	-3,000	Car Loan		-5,000
	Total	1,500	Total		1,500

The information provided allows us to tally Han's balance sheet for 6/30/2005:

Table 6			
	6/30/2005		
	Assets	Liabilities	Plus Equity
Cash	14,500	Car Loan	15,000
Auto	27,000	Equity	26,500
Total	41,500	Total	41,500

Han and Hilary Each Buy a Home

Han, captivated by the early 2000s housing market boom, decides to buy a home. His Mom, a physician and a conservative investor, suggests that his home purchase should be linked to his income. A good rule of thumb, she explains, is to make a 15% down payment, and to have monthly mortgage payments that do not exceed one third of after tax income. She offers Han $26,500 as a Birthday present. He now has $45,000 to put down on a house.
Han decides to work through the accounting, assuming that he follows his Mom's advice. If he buys a $300,000 house, he will be able to put $45,000 down. He qualifies, at his local bank, for a 30 year fixed rate mortgage, with a 6.2% interest rate. A $255,000 mortgage, at 6.2% translates to a $1,562 monthly mortgage payment.

Can Han afford to pay $1562 per month, according to his Mom's maxim? Han's gross income is $80,000 per year. He pays taxes of $26,000 per year, leaving him with DPI of $54,000 a year. But if he buys a house his taxes fall as he deducts interest and his after tax income rises to $58,000. His monthly payments are 32% of DPI, close enough to Mom's Maxim. Han now feels he can buy the house. After accepting Mom's gift and making the purchase, how will his balance sheet change?

Familial Gift drives *Cash* and *Equity*:

Table 7			
	6/30/2005		After Gift Of 32,000
	Assets	Liabilities	Plus Equity
Cash	46,500	Car Loan	15,000
Auto	27,000	Equity	58,500
Total	73,500	Total	73,500

Han buys the house:

Table 8			
	6/30/2005		After Home Buy
	Assets	Liabilities	Plus Equity
Cash	1,500	Car Loan	15,000
Auto	27,000	Mortgage	255,000
Real Estate	300,000	Equity	58,500
Total	328,500	Total	328,500

Han now pays a mortgage, not the rent. We need to account for this change on the income statement and it will result in changes for Han's balance sheet, in mid-2006. Table II is his income statement from mid-2005 through mid-2006:

Table 2	
Income Statement	7/1/2005
	Through
	6/30/2006
	Revenues
Wages	80,000
Total	80,000
	Expenses
Cash Expenses:	
Rent	0
Food	10,000
Gas & Utilities	3,000
Entertainment	8,000
Clothes	7,500
Medical & Insurance	3,500
Total	32,000
Other Expenses	
Car Depreciation	3,000
TOTAL	35,000
Earnings (Before Interest, Taxes)	45,000
Interest	16,244
Earnings (Before Taxes)	28,756
Taxes	22,000
Net Income	6,756
Payment Of Principal:	
Car	5,000
House	3,000
Total	8,000
Cash Flow:	
Wages	80,000
Cash Outlays	78,244
Net Cash Flow	1756

We need to make a key intermediate observation at this point. Han is **cash flow positive**—that is, his income comfortably covers his living costs and his financial obligations. Moreover, Han has locked in his financing costs. He has no need to reenter the financial world to preserve his positive cash flow situation. His risk? He needs to keep his job, to pay his mortgage. But as long as his wages keep pace with inflation and he keeps his job, he will remain cash flow positive. Minsky called this situation **hedge finance**. Minsky emphasized that in this world, Han had only one risk, the risk that he loses his income stream.
Again, we organize the flows from the income statement, in order to account for changes on the next year's balance sheet:

		2005 To 2006			
		Additions To	Additions To		
		Assets	**Liabilities**	+	**Equity**
Wages	Cash	80,000	Equity		80,000
Cash Expenses	Cash	-32,000	Equity		-32,000
Car Depreciation	Car	-3,000	Equity		-3,000
Interest	Cash	-16,244	Equity		-16,244
Taxes	Cash	-22,000	Equity		-22,000
Principal Payment	Cash	-5,000	Car Loan		-5,000
Principal Payment	Cash	-3,000	Mortgage		-3,000
Totals:					0
	Cash	1,756	Equity		6,756
	Car	-3,000	Car Loan		-5,000
			Mortgage		-3,000
	Total	-1,244			-1,244

We use the tallies above to create the mid-2006 balance sheet:

Table 9			
	2005 To 2006		
	Assets	Liabilities	Plus Equity
Cash	3,256		
Auto	24,000	Car Loan	10,000
Real Estate	300,000	Mortgage	252,000
		Equity	65,256
Total	327,256	Total	327,256

Accountants stop at this juncture. Economists, however, look beyond book value. So too, do investors, like thoughtful home buyers. Where does Han stand, if we account for the change in house prices? He finds that prices rose by 10%. We adjust his house price up by 10%. We always double enter, when we account. In this case, the good news is that the rise for house price, dollar for dollar, increases Han's net worth, or equity. So table 10, on the next page gives a mark-to-market balance sheet for Han:

Table 10			
	2005 To 2006		
	With Mark-To-Market On Home		
	Assets	Liabilities	Plus Equity
Cash	3,256		
Auto	24,000	Car Loan	10,000
Real Estate	330,000	Mortgage	252,000
		Equity	95,256
Total	357,256	Total	357,256

Over the next year Han earns the same, and house prices, again rise by 10%. The accounts unfold as follows:

Table II	
Income Statement	7/1/2006
	Through
	6/30/2007
	Revenues
Wages	80,000
Total	80,000
	expenses
Cash Expenses:	
Rent	0
Food	10,000
Gas & Utilities	3,000
Entertainment	8,000
Clothes	7,500
Medical & Insurance	3,500
Total	32,000
Other Expenses	
Car Depreciation	3,000
TOTAL	35,000
Earnings (Before Interest, Taxes)	45,000
Interest	16,040
Earnings (Before Taxes)	28,960
Taxes	22,000
Net Income	6,960
Payment Of Principal:	
Car	5,000
House	3,204
Total	8,204
Cash Flow:	
Wages	80,000
Cash Outlays	78,244
Net Cash Flow	1756

		2006 To 2007			
		Additions To	**Additions To**		
		Assets	**Liabilities**	+	**Equity**
Wages	Cash	80,000	Equity		80,000
Cash Expenses	Cash	-32,000	Equity		-32,000
Car Depreciation	Car	-3,000	Equity		-3,000
Interest	Cash	-16,040	Equity		-16,040
Taxes	Cash	-22,000	Equity		-22,000
Principal Payment	Cash	-5,000	car loan		-5,000
Principal Payment	Cash	-3,204	Mortgage		-3,204
Totals:					0
	Cash	1,756	Equity		6,960
	Car	-3,000	Car Loan		-5,000
			Mortgage		-3,204
	Total	-1,244			-1,244
HOUSE VALUE*	Real Estate	33,000	Equity		33,000
	Total	31,756			31,756
*Mark-To-Market					

Table 11

	2006 TO 2007		
	Mark-To-Market		
	Assets	Liabilities	Plus Equity
Cash	5,012		
Auto	21,000	Car Loan	5,000
Real Estate	363,000	Mortgage	248,796
		Equity	135,216
Total	389,012	Total	389,012

As the balance sheet above makes clear, Han did well. His net worth rose substantially, and he has cash on hand. Going forward he can comfortably pay his mortgage, and he enjoys his home. His only problem? His twin sister Hilary! She has always been the risk taker in the family, defying Mom's advice, usually producing exciting upside, with occasional disastrous consequences. Hilary managed to buy twice the house that Han bought, with a view of the Inner Harbor! This elicits in Han a growing envy. As the late great economist Charles P. Kindleberger put it, "*nothing disrupts one's' sense of well being as the prospect of a neighbor getting rich*". But your twin sister!

What She Did and How She Did It

Hilary, Han's adventurous twin, had a much bolder plan!!! Like her brother she has a job that pays $80,000. She had the same living expenses. And Mom grudgingly gave her $46,500 as well. But she has a very different attitude toward *risk and reward*. Hilary knows that home values have risen 10% per year in her neighborhood of choice in each of the past five years. Furthermore, she has learned that median home prices

have gone up in every year since 1966, when the National Association of Realtors began to track national home prices(see chart below). Finally, Hilary understands that "to make a lot of money you have to risk some money". In economic phraseology, she understands the concept of leverage!

(Wikopedia puts it this way: *In finance **leverage** (or **gearing**) is using given resources in such a way that the potential positive or negative outcome is magnified. It generally refers to using borrowed funds, or debt, so as to attempt to increase the returns to equity.)*

Median House Prices: In Positive Territory,
Without Exception, From 1966 Through 2004.

Hilary muses about her net worth, or equity position, two years hence, if she follows her Mom's advice. She thinks about her additions to net worth that arise from her day job. She also dreams about a house with a spectacular water view! "Why not bank on rising house prices, by buying a much bigger house. I can put only a small amount down, and use my remaining cash to pay interest for two years. Moreover, I can get a teaser rate loan, one that has small debt payments for two years. Before I run out of cash I'll refinance. When I refinance, I will increase my loan, so as to take more cash out. The money I take out will give me the cash for two purposes. It will fund the big prepayment penalty that all teaser rate loans have. If I want to stay in the house, it will give me the money needed to meet the next two years worth of monthly mortgage payments.

Hilary proceeds to buy a house for twice the price of Han's modest home. She puts only 2% down. She gets a 2-28 sub-prime loan, where you pay a low rate for 2 years, then a high rate for 28 years. She has no intention of paying the higher rate, two years out. In two years time she will refinance, securing another 2-28 loan. What about the big prepayment penalty, that translates the effective rate for her loan to a higher rate than the one that Han pays? No problem. She will simply increase the size of her loan when she refinances to pay the prepayment penalty.

Hilary's income statement, see below, the same as Han's with several key differences. Debt service is much higher, and taxes are higher. Net cash flow is meaningfully negative:

wages	80,000
total	80,000
Cash expenses:	
Rent	0
Food	10,000
Gas & Utilities	3,000
Entertainment	8,000
Clothes	7,500
Medical & Insurance	3,500
Total	32,000
Other Expenses	
Car Depreciation	3,000
TOTAL	35,000
Earnings (Before Interest, Taxes)	45,000
Interest	29,840
Earnings (Before Taxes)	15,160
Taxes	24,000
Net Income	-8,840
Payment of Principal	
Car	5,000
House	6,408
Total	11,408
Cash Flow:	
Wages	80,000
Cash Outlays	97,248
Net Cash Flow	-17,248

Hilary's income statement drives her balance sheet changes as follows:

wages	80,000	equity	80,000
cash x	32,000	equity	-32,000
car dep	3,000	equity	-3,000
interest	29,840	equity	-29,840
taxes	24,000	equity	-24,000
principal car	5,000	car loan	-5,000
principal house	6,400	mortgage	-6,400
totals			
cash	-17,240	equity	-8,840
car	-3,000	car loan	-5,000
		mortgage	-6,400
total	-20,240		-20,240
house value	60,000	equity	60,000
total	39,760		39,760

Hilary's balance sheet changes:

		6/30/2005		
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	34,500		car loan	15,000
Auto	27,000		Mortgage	588,000
Real Estate	600,000		equity	58,500
Total	661,500		total	661,500

		6/30/2006		
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	17,260		car loan	10,000
Auto	24,000		Mortgage	581,600
Real Estate	660,000		equity	109,660
Total	701,260		total	701,260

		6/30/2007		
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	20		car loan	5,000
Auto	21,000		Mortgage	575,200
Real Estate	726,000		equity	166,820
Total	747,020		total	701,260

Thus after two years, Hilary is out of cash, but has substantially increased equity.
She refinances, increasing her loan to meet her prepayment penalty, and to restore her cash balance to a level that will allow her to service her debts, notwithstanding her negative cash flow position:

		7/1/2007		
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	28,612		car loan	5000
Auto	21,000		Mortgage	608,632
Real Estate	726,000		equity	161,980
Total	775,612		total	775,612

Below are the results of Han vs. Heather two years later:

Han's Balance Sheet				
		2007		
Cash	5,012			
Auto	21,000		Car Loan	5,000
Real Estate	363,000		Mortgage	248,796
			Equity	135,216
Total	389,012		Total	389,012
Hilary's Balance Sheet				
		2007		
Cash	28,612			
Auto	21,000		Car Loan	5,000
Real Estate	726,000		Mortgage	608,632
			Equity	161,980
Total	775,612		Total	775,612

Hilary, two year's out, as the balance sheet comparison above reveals, did quite well. She spent the past two years in a palace overlooking the Bay. And, amazingly, despite her lavish purchase, her net worth rose to $161,980, almost thirty thousand more than her brother Han. In other words, she lived more lavishly and grew richer that her conservative brother. Quell Disastre for Hans!

She accomplished these gains by leveraging up her balance sheet, and collapsing her cash flow margin of safety. How do Han and Hilary's plans look, when we make judgments about risks? Below we have a table

that looks at two measures of financial well being, debt to equity and debt service to disposable income. The latter, debt service to disposable income is nothing more than the measure quoted by Han and Hilary's Mom. She advised that your monthly payment should not exceed 1/3 of your after tax, i.e., disposable income. Han took her advice. His debt service/ income ratio, at 47%, reflects both his house and car payments. His house payments alone total to 36% of his after tax income, close to Mom's number. Hilary, in stark contrast, makes debt payments of nearly 80% of her after-tax income. And if we include the eventual prepayment penalty she will have to make, two year's forward, her debt service totals to her entire after tax income—and then some. THUS Hilary's return has been greater, precisely because she took greater risk:
Leverage exaggerates the gains of any transaction.

	Post House Financial	**Purchase Ratios**				
	Debt	Equity	Debt/Equity	Debt Service	Disposable Income	Debt Service/Disposable Income (%)
Han	270,000	58,500	5	24,244	58,000	42
Hilary	603,000	58,500	10	41,248	56,000	74
Cash Basis						
Hilary	603,000	58,500	10	52,444	56,000	94
Effective						

Hilary does well if house prices rise. But what if they fall? Let's replay the above outlined scenario, with one change in the storyline. House prices, bucking history, fall 5% in both 2006 and 2007. How do Han and Hilary fare? Their mid-2007 balance sheets are depicted below:

		HAN		
		7/1/2007	(falling house	prices)
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	5,012		car loan	5,000
Auto	21,000		Mortgage	248,796
Real Estate	270,750		equity	42,966
Total	296,762		total	296,762
		HILARY		
		7/1/2007	(falling house	prices)
	ASSETS		LIABILITIES	PLUS EQUITY
Cash	20		car loan	5,000
Auto	21,000		Mortgage	575,200
Real Estate	541,500		equity	-17,680
Total	562,520		total	562,520

Han finds that his equity position is much smaller than he envisioned. He has a net worth of roughly $43,000, less than half his expectation. Nonetheless, he is in a comfortable cash flow position. His job throws off income that makes it easy to service his debts. His house, now worth a bit more than 270,000 is still above his mortgage on the property.

Hilary now faces bankruptcy! The fall in her house price wipes out all of her equity. Most importantly, for her cash flow needs, the fact that her house is now worth almost $30,000 less than her mortgage eliminates any chance for her to refinance. That means she cannot prevent the sharp jump in interest payments that are slated to occur with her 2/28 loan. Even if the government freezes her payments at the teaser rate, she can't meet her monthly debt service costs. Her plan required refinancing, to take money out of the house capital gain, in order to pay debt service.

Hilary's strategy, in Minsky's framework, introduced three types of risk, as compared to Han's one risk. Han simply needs to keep his job, in order to remain cash flow positive. Hilary needs to keep her job. She needs to be able to refinance, so the vagaries of the lending market create potential risks for her. And she needs to see her house price rise to allow her to service her debts.

What is the moral of the story? Leverage is great as long as things go according to plan. Small disappointments, however, can have catastrophic consequences, if they occur when you are super leveraged.

What was the ideal strategy? Use leverage in housing though 2005, then remove the gearing ahead of the slide for home prices. Had Hilary bought mid-2003 and sold mid-2005, she would have picked up substantial equity, and been none the worse for it.

When Bernard Baruch was asked how he remained wealthy he replied:

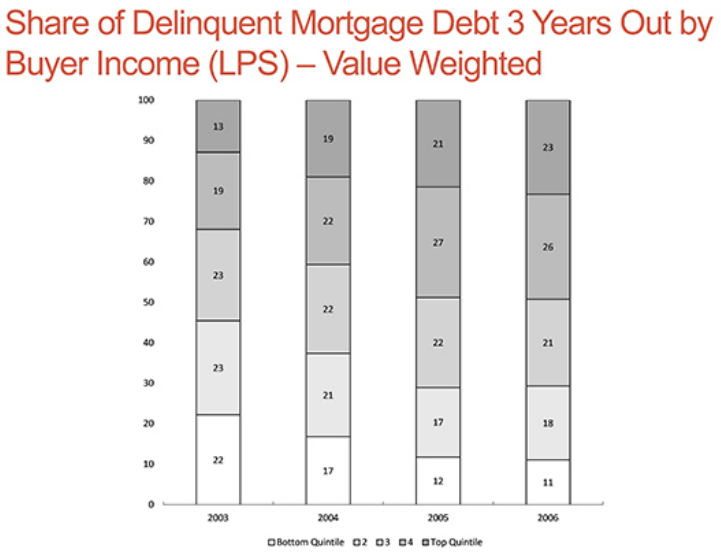
"I always sold too early".

Hanna and her brothers and sisters

So Hanna was highly leveraged and went bankrupt. Her bank had to sell her house. As there were many Hanna's in 2007, suddenly there were many houses for sale. An M.I.T. study documents that many homeowners in Hanna's position were not labeled risky borrowers, leading up to the crash. They had good jobs and good credit ratings. But they all shared one thing in common. *They were all highly leveraged.*

The lead author in the M.I.T. study documenting this put it this way:

> "A lot of the narrative of the financial crisis has been that this [loan] origination process was broken and therefore a lot of marginal and unsustainable borrowers got access to funding," Schoar said in September at the MIT Golub Center for Finance and Policy's annual conference. "In our opinion, the facts don't line up with this narrative … Calling this crisis a subprime crisis is a misnomer. In fact, it was a prime crisis."



Check out the chart above. In 2003, before the crisis, 45% of the total value of delinquent mortgages were held by people making less than $45,000 per year, versus 32% for those earning more than $68,000/year. At the onset of the crisis, in 2006, households making less than $45,000 per year held only 29% of the total value of delinquent mortgages. In contrast, households earning in excess of $68,000/year held 49% of delinquent mortgages[1].

1. *Rethinking How the Housing Crisis Happened*. M.I.T. Newsroom. A summary of the M.I.T. paper http://mitsloan.mit.edu/newsroom/articles/rethinking-how-the-housing-crisis-happened/

The Leverage Cycle, John Geanakoplos

Scary Bad News

Scary bad news reduces the world's collective mean expected outcome. It also greatly increases the range of possible outcomes. Finally, it dramatically increases the divergence in views, between those with bullish and bearish outcomes. How might we Apply this view to today's circumstances? Think Trump, trade, and our bicameral legislature.

Trump proposes a 45% tax on Chinese imports, and needs both the Senate and the House for this to become law. Everyone agrees that this would provoke an all-out trade War with China, and share prices would implode. Optimists think the Senate and House will almost certainly reject this proposal. They view each House as, independently, 90% likely to reject the proposal. Pessimists worry that each house, independently, are 20% likely to approve of this legislation.

Optimists Notions:

Senate rejects Trump proposed 45% tax on Chinese imports: 90% likely
Senate approves Trump proposed 45% tax on Chinese imports: 10% likely

Pessimists Notions:

House rejects Trump proposed 45% tax on Chinese imports: 80% likely
House approves Trump proposed 45% tax on Chinese imports: 20% likely

Asset prices equal 1, unless both the House and the Senate approve the legislation. If both approve, asset prices fall to 0.2%

Optimists Output expectations:

Senate	House	Probability
R	R	.9 × .9 = .81
R	A	.9 × .1 = .09
A	R	.1 × .9 = .09
A	A	.1 × .1 = .01

MEAN EXPECTED OUTCOME:
(.99 × 1) + (.01 × .2) =.992

VARIANCE OF OUTPUT EXPECTATIONS:
$V = [\Sigma X^2 \bullet Px] - \dot{U}^2$
$= [(1^2 \bullet .99)+(.2^2 \bullet .01)] - .992^2$
$= .0063$

Pessimists Output expectations:

Senate	House	Probability
R	R	.8 × .8 = .64
R	A	.8 × .2 = .16
R	A	.2 × .8 = .16
A	A	.2 × .2 = .04

MEAN EXPECTED OUTCOME:
(.96 × 1) + (.04 × .2) =.968

VARIANCE OF OUTPUT EXPECTATIONS:
$V = [\Sigma X^2 \bullet Px] - \dot{U}^2$
$= [(1^2 \bullet .96)+(.2^2 \bullet .04)] - .968^2$
$= .025$

SCARY BAD NEWS: THE SENATE APPROVES THE TARIFF

Optimists Output expectations:

Senate	House	Probability
A	R	1 × .9 = .9
A	A	1 × .1 = .1

MEAN EXPECTED OUTCOME:
(.9 × 1) + (.1 × .2) =.92

VARIANCE OF OUTPUT EXPECTATIONS:
$V = [\Sigma X^2 \bullet Px] - \dot{U}^2$
$= [(1^2 \bullet .9)+(.2^2 \bullet .1)] - .92^2$
$= .058$

Pessimists Output expectations:

Senate	House	Probability
A	R	1 × .8 = .80
A	A	1 × .2 = .2

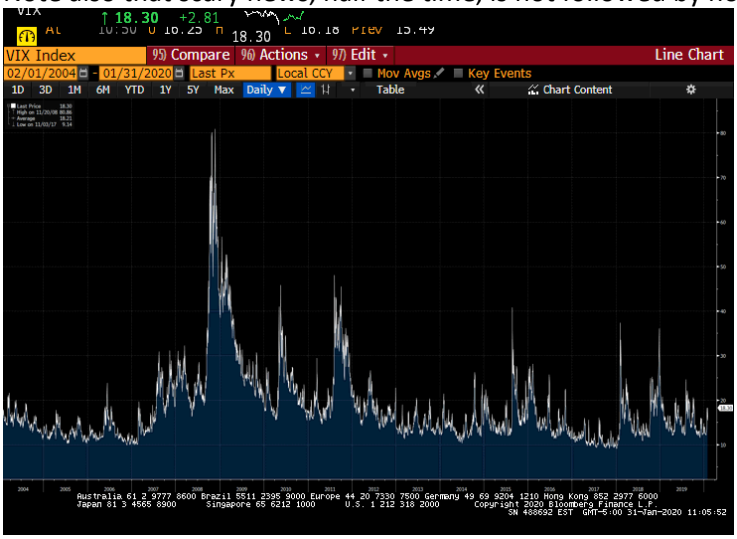
MEAN EXPECTED OUTCOME:
(.8 × 1) + (.2 × .2) =.84

VARIANCE OF OUTPUT EXPECTATIONS:
$V = [\Sigma X^2 \bullet Px] - \dot{U}^2$
$= [(1^2 \bullet .8)+(.2^2 \bullet .2)] - .84^2$
$= .102$

	Opt. mean	Opt. var.	Pess. Mean	Pess. Var.
Before Bad News	.992	.0063	.968	.025
After Bad News	.92	.0580	.84	.102

Optimists variance goes up nearly 10 fold!
Optimist/pessimist mean outcome spread MORE THAN TRIPLES!
Pessimists now see a 20% chance of Armageddon—those are worse odds than Russian Roulette!
(And no Sane person plays Russian Roulette)
The point? Negative resolution of one of the two conditional events has powerful effects.
The asset market, pre-Senate vote, assigned somewhere between a 1 in 100 and a 4 in 100 chance of Armageddon.
After the vote? Somewhere between 1 in 10 and 1 in 5.

The VIX: An estimate of market participants' expectation for future volatility, based upon weighted averages of equity market futures prices. Note that it slowly falls then violently jumps.
We slowly convince ourselves of shrinking risks. Then we get scary news.
Note also that scary news, half the time, is not followed by horrible reality.



Leverage and the Law of One Price

A workhorse of modern macroeconomic theory is the *representative agent.* This entity is assumed to be rational, forward looking, intergenerational, and an approximation to how, in aggregate, all of us would respond to differing economic developments. We all know, however, that people have very different notions about how the world works, and we witness a wide variety of reactions to emerging developments. The Geanakoplos paper explicitly rejects this framework, to great effect. He assumes different people present us with a continuum of beliefs about the future. And he uses elegant math to show that these people will trade and produce one market price in a world that does not allow borrowing, and a higher price, once we introduce the right to borrow.

What does this world look like?

There are two time periods: t_0 and t_1.
Individuals, in t_0 are given one unit of a Consumption good, c, and one unit of an investment good, Y.
Y pays either 1 unit of c, in an UP world, or 0.2 units of c, in a DOWN world.
The individuals want to maximize their utility. Utility is derived from consuming, in t_0 or t_1.
Individuals don't care about when they consume (No discount rate, they are not 'impatient')
Individuals may costlessly warehouse consumer goods, w. (these are canned peas not fresh bananas)
(We make the result easy to see by assuming all agents warehouse all c in t_0, and consume all c in t_1)
Most importantly, there is a perfect spread of opinion about Y's payoff:

Some are sure it will pay 1 unit of c. Some are sure it will pay 0.2 units of c.
And a spectrum of others populates the gaps.

Agents can trade c in period 0 for Y.
We arrive at an equilibrium price for P, how much c one must pay to get a unit of Y, in t_0.
Each agent will have values for c, y, and w in t_0.
Each agent, in period t_1, will get utility from the amount of c they have.
Utility, in t_1 is a function of whether the world is UP or DOWN.
Each agent h, is configured as follows:

$$(c_0, y_0, w_0, c_U, c_D)$$

Suppose there are 100 agents. They are all rational. They can all do some simple math. They simply have a wide range of opinions about what the future will look like. Given their range of opinions about how much c Y will deliver in period 1, we can derive P, the equilibrium price.

We can use a spreadsheet to see that agents 60 to 100 are buyers and agents 1 to 59 are sellers:

	UP	MEAN Y
agent h =	PROBABILITY	value
100	100%	1
90	90%	0.92
80	80%	0.84
70	70%	0.76
60	60%	0.68
59	59%	0.672
50	50%	0.6
40	40%	0.52
30	30%	0.44
20	20%	0.36
10	10%	0.28
1	1%	0.208

Agent 60's mean expected outcome? $Y = (0.6 \times 1) + (0.4 \times .2) = 0.68$
All agents above agent 60 have higher expectations. They will buy Y, if P = 0.68
All agents below agent 60 have lower expectations. They will sell Y, if P = 0.68

So 41 buyers trade 1 unit of c for 1/.68, or roughly 1.47 units of Y. They buy 59 units.
Sellers, h 1 to h 59, sell 59 units.

The market cleared. At P = .68, the following is true:

$(c_0, y_0, w_0, c_U, c_D) = (0, 2.5, 0, 2.5, 0.5)$ for $h \geq 60$

$(c_0, y_0, w_0, c_U, c_D) = (0, 0, 1.68, 1.68, 1.68)$ for $h \leq 60$

WHAT Happens when we allow for borrowing?

Let us think about that qualitatively today. We will move look at it formally, in the second half of this course. It is easy to see that if I am very optimistic, and I can find a willing lender, offering a low interest rate, I will accumulate more. And this drives the equilibrium price higher! Why? Because we end up with the assets held by the most optimistic agents.

From Accounting Basics to Real World Applications

Economic seers traffic in macroeconomic entities. We talk of the household sector, the banking industry. We also focus on government and quasi governmental entities. We look at the U.S. economy as an entity. We pore over information about the Federal Reserve. In all of these cases, implicitly, we organize our facts about the entities using accounting techniques. Four topical issues are discussed below.

I. Households: Deconstructing the 1984-2005 Plunging Savings Rate:
Falling saving rates, debt growth in excess of income gains, and anecdotal evidence of conspicuous consumption provided the fodder for legions of economic prognosticators to warn that the end was nigh for over 20 years. In the Great Recession of 2008-2009, those warnings proved prophetic. The accounting that led to such warnings is easy to reproduce. Look at the 1984-2005 performance for household income, spending, saving and debt service:

	DPI	Outlays (Billions of Dollars)	saving	saving as % of DPI	debt service as % of DPI
1984	2891	2595	296	9.3	10.8
2005	9277	9150	128	01%	13.7
2010	11,378	10723	655	5%	12.1

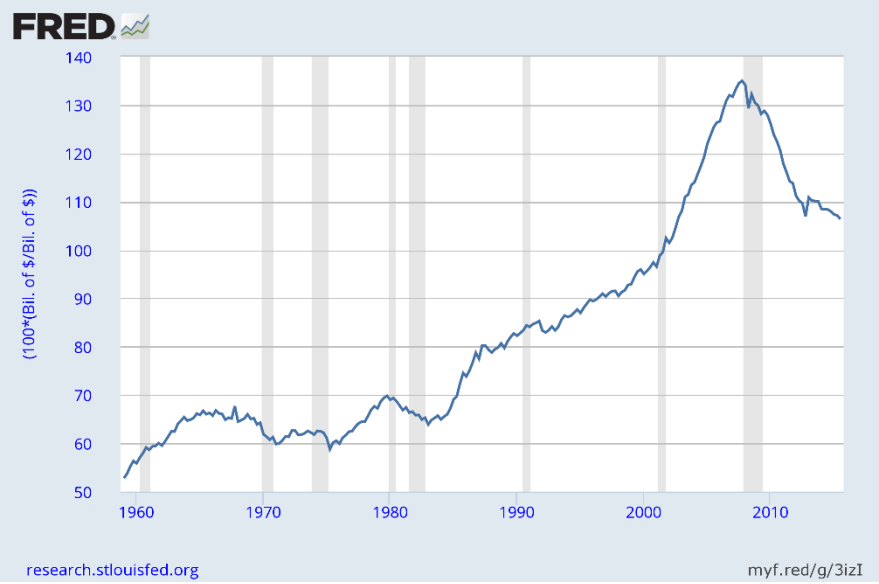
The analysis, however, is incomplete, failing to account for the big rise for the value of U.S. asset prices.

	Assets	Liabilities	Net Worth	DPI	NW/DPI
1984	14871	2,011	12,859	2891	4.4
2005	71,641	12,184	59,457	9277	6.4
2009	67,860	14,070	53,790	11,035	4.87
Average annual Growth rate, 1984-2005:	7%	8.6%	6.9%	5.6%	

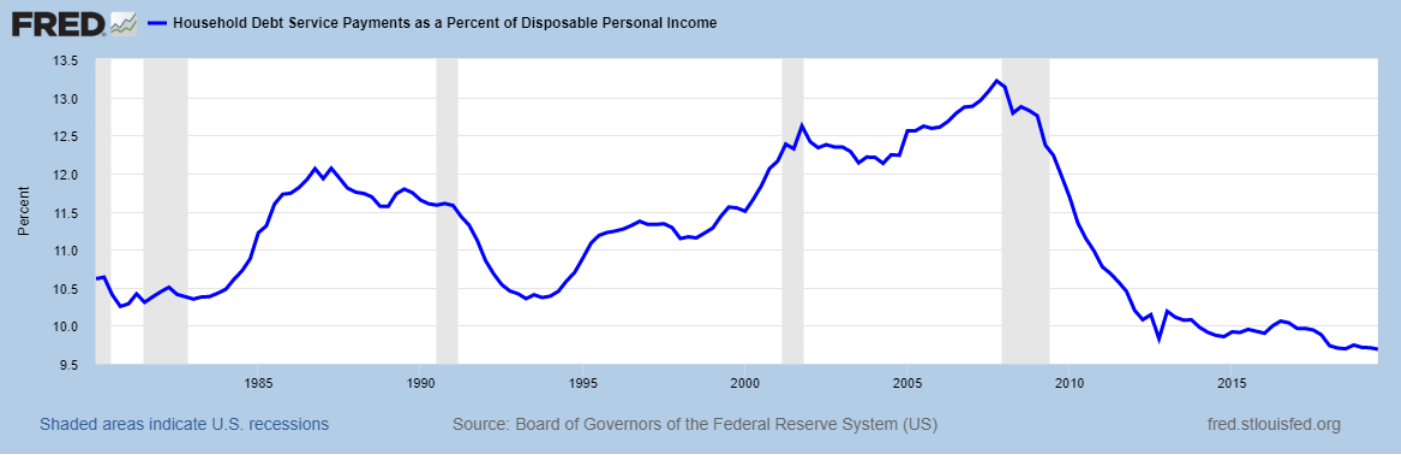
Make no mistake about it, saving flows, on average 1984-2005, were puny, equaling less than 1% of asset values. How can the value of household assets have risen by 7% per year over the 20-year period? In succession, fabulous bull markets in bonds, stocks, and most recently homes drove household net worth sharply higher, without the help of material saving of current incomes. According to Federal Reserve flow of funds data, 80% of the increase in household net worth arrived via asset price appreciation. Simply put, soaring asset prices took care of wealth accumulation needs, freeing up income flows for current consumption. The collapse in asset values in 2007-2009, reversed this fabulous dynamic and it now appears that U.S. households, chastened to be sure, have begun saving again.

The accounting lesson? The interplay between the balance sheet and income statement needs to be carefully scrutinized. **Economists, in contrast to accountants, need to be ready to render judgments about mark-to-market changes in the value of assets. Economists recognize that mark- to-mark judgments drive economic decisions. In this example, households "knew" that they were wealthier, a consequence of asset price appreciation, and**
their savings decisions reflected this. And the blast they experienced, in 2008-2009, forced them to change their attitudes toward saving.

Debt as a percent of disposable personal income:



Debt Service Payments as a share of disposable personal income:



II. Banks: "T" Accounts, Managing Risk, FRB lender-of-last-resort:

Understanding the interplay between balance sheets and income statements—in particular as mark-to-market changes in asset prices come into play—holds a key to understanding U.S. and global business cycle swings. Using simple "T" accounts, we can see how changing expectations, over the course of a business cycle, shift asset prices, confidence in bank solvency, and Federal Reserve Board Monetary policy decisions.

Banks are in a special business. Simply put, they borrow short and lend long. More elaborately, banks largely borrow from households via checking, saving and CDs. Households provide the funds to banks over very limited terms. Banks lend to consumers home buyers and corporations, over longer terms. Corporate loans are backed by business endeavors. Attitudes about the health of such companies, and therefore the safety of the loans, are subject to dramatic changes at business cycle turning points.

If we follow the dynamics of a business cycle bust through corporate/household and bank balance sheets, we can see the moment when Fed policy makers view their "lender of last resort" responsibilities as paramount.

A stylized view of the U.S. economy can be depicted using three "T" accounts. We can envision the household sector as the savers, the corporate sector as the investors and the banking sector as the intermediary. Obviously life is much more complex. We have Wall Street increasingly acting as an intermediary and we have international saving and investment flows that cannot be ignored. But this super-stylized model allows us, using basic accounting, to capture some of the dynamism of the U.S. business cycle. Consider the following three "T": accounts:

Households		Banks		Corporations	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Deposits		Corp. loans	Deposits	factories	Corp. loans
C.D.s			C.D.s		

The household sector has their money in the bank. They have easy access to the money, i.e., they lend to the bank over a very short duration. The corporation borrows from the bank, with a somewhat longer duration. The corporation depends upon the income generating capability of their business to service their debts. The bank, the intermediary, owes money to the households, and is owed money by the businesses.

			HOUSE	HOLDS	
	ASSETS			LIABILITIES	PLUS EQUITY
BANK	DEPOSITS	80		LOANS	0
	equity	20		EQUITY	100
TOTAL		100		TOTAL	100

		NON-	BANK	COMPANIES	
	ASSETS			LIABILITIES	PLUS EQUITY
	FACTORIES	90		BANK LOANS	80
				EQUITY	10
TOTAL		90		TOTAL	90

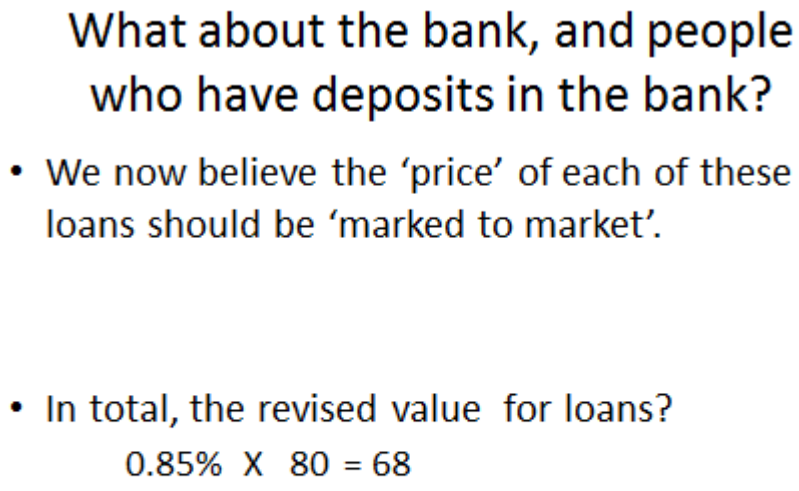
			BANKS		
	ASSETS			LIABILITIES	PLUS EQUITY
LOANS TO	COMPANIES	80		DEPOSITS	80
	RESERVES	10		EQUITY	10
TOTAL		90		TOTAL	90

What is the value of the corporate asset? An asset provides a stream of earnings. That stream of earnings depends upon a great many things, including the skill of the company in question and the health of the overall economy. The expected stream of earnings, therefore, is a problematic calculation. Given that expectational stream, we use a market determined interest rate to present value the stream.

What happens when the economy falls into recession? Expectations about future business deteriorate rapidly. In many cases, the expectations swoon is accompanied by a jump for market determined interest rates. If the mean expectation for earnings plunges, and the interest rate used to discount that stream surges, the present value of the asset drops precipitously.

In a deep recession bankruptcy is much more likely

- The company promises to pay 5% per year, for three years.
- When you made the loan, you thought there was a 2% chance they would go bankrupt.
- Now, amid big economic decline, you fear there is a 20% chance they could go bankrupt.
- 0.98 X 5% = 4.9%
- 0.80 X 5% = 4.0%



Let's revisit the three "T" accounts above. A swoon for business expectations drives the mark-to-market value of corporate assets sharply lower. In turn, their ability to make good on their bank loans becomes an issue. Banks now find that a great many of their loans are non-performing.

What does the household sector do? In the 1930s, as growing numbers of corporate borrowers seemed incapable of loan repayment, households fled their banks, concerned about the bank's ability to honor their loans. Over 9,000 banks failed in the Great Depression.

The regulatory response? F.D.I.C. insurance. Now Ma and Pa know that their deposits are government guaranteed. Bank runs are no longer a feature of business cycle turning points.

But that leaves us with a crazy mismatch between bank assets and liabilities at turning points. Plunging short rates, at turning points remains an unmistakable feature of recessions. A sharp fall for rates can be looked upon as the Federal Reserve effort to raise the discounted present value of impaired earnings streams.

At sharply lower interest rates, the net present value of the corporate earnings stream is higher—even though the assessment of business prospects remains depressed. We can assert that big Fed ease reflates the left had side of bank balance sheets, so they live to lend, and we live to spend, again!

Nations: U.S. Trade Deficit/Net Debtor Status/Positive Net Income:

http://www.bea.gov/newsreleases/international/intinv/intinvnewsrelease.htm

http://www.bea.gov/newsreleases/international/intinv/2015/pdf/intinv315.pdf

Key Points:
U.S. Trade deficit requires foreign capital inflows and lifts book value net debtor status.
The $ price of assets change, thus mark-to-market affects market value of net debtor status.
The rates of return on U.S. assets held abroad exceeds rate of return on foreign held U.S. liabilities. This explains lower net payments, despite a net debtor status.

U.S. purchases of foreign goods and services greatly exceed its exports of goods and services. Foreign entities, in aggregate must accept I.O.U.s for the excess of goods and services that the U.S. buys. More formally, the U.S. receives foreign capital inflows to finance the U.S. current account deficit. Gross capital flows, however, exceed the amounts needed to finance the U.S. trade deficit. Remember that U.S. companies and individuals are investing globally thereby accumulating large quantities of foreign assets. Likewise, foreign individuals, corporations and governments are large buyers of U.S. assets. Nonetheless, the fact that the U.S. runs a trade deficit guarantees that total U.S. purchases of foreign assets will be smaller than total foreign purchases of U.S. assets by the amount of the U.S. trade deficit.
Over the last two decades the persistence of a large U.S. trade deficit has led to an accumulation of U.S. assets by the rest of the world that exceeds U.S. ownership of foreign assets. The U.S. net debtor status captures that difference. As of the end of 2015, the net debtor status stood at $7.3 trillion.
A great many articles have been written about the need for a spectacular dollar fall, to put the U.S. trade picture into surplus and thereby stabilize and begin to shrink the large U.S. net debtor status. Not so. A look at the currency values of U.S. assets and liabilities shows that the U.S., unlike any other Nation, has a major advantage. As the signore Nation, it borrows in dollars. Its assets, in contrast, are mostly rest-of-world denominated direct investments. Thus a relatively modest move down for the dollar, because of its effects on mark to market assessments of assets, will shrink the net debtor status. Simply put, the U.S. as Korea story simply doesn't fly.

Moreover, the gross position of assets and liabilities somewhat tempers the scary nature of the net debtor status. In 2015 the U.S. owned $23.3 trillion in assets held around the world. The rest of the world owned $30.6 trillion of U.S. assets. U.S. assets owned abroad, are largely multi-national company factories and businesses, and they generate high returns. U.S. liabilities, in stark contrast, have a large component of government debt. This debt yields little. As a consequence the payments on USA debt are roughly equal to the receipts collected on USA assets.

Chart 2. U.S. Assets and Liabilities, 2007:IV-2015:III

(Quarterly, not seasonally adjusted)