# 1. THE GREAT RECESSION.

The Great Recession started around 1am Eastern Standard Time on September 15, 2008. This is when Lehman Brothers, at the time the fourth largest investment bank in the US, filed for Chapter 11 bankruptcy protection, effectively going bankrupt.

The Great Recession is the most important macroeconomic development in 70 years. As it appears now, its consequences will last for a long time. In this course we will spend a lot of time discussing the Great Recession and its aftermath. The goal is twofold:

- It will allow us to use very recent or current events to illustrate macroeconomic concepts, reasoning, and policies

- it will provide you with the knowledge and understanding of, and the ability to intelligently discuss, macroeconomics. This may prove invaluable in your future careers.

## 1.1. LEHMAN BROTHERS BANKRUPTCY.

Lehman Brothers has been in trouble for some time. Caught in the fall of real estate prices, it was losing large amounts of money as its real estate and other assets were rapidly deteriorating. By September it became clear it was not going to survive on its own. On the September 13-14 weekend a high-level meeting took place in New York. The participants included Henry Poulson, then the Treasury Secretary, Ben Bernanke, the chairman of the Federal Reserve (Fed) – the US central bank, and Timothy Geithner, then the president of the Federal Reserve Bank of New York and the current Treasury Secretary. The general expectation was that the government and the Fed will step in and find a buyer who will save the firm from bankruptcy.

This expectation was based on Fed's actions half a year earlier, when another investment bank, Bear Stearns, was failing. In that case the Federal Reserve arranged a purchase of Bear Sterns by JP Morgan Chase by providing a loan of $30billion, secured by risky assets of Bear Stearns. In effect, the Fed limited potential losses from those assets to $1bln, making the purchase attractive. At that time, Ben Bernanke, Fed chairman said: "I hope this is a rare event, I hope this is something we never have to do again.'' But his hopes were not realized. The next rescue, on September 8, was of Fannie Mae and Freddie Mac - private companies created by the US government to improve the liquidity in the housing market and availability of mortgages. A week later it was Lehman's turn.

### *Why was Lehman Brothers allowed to fail?*

The potential Lehman buyers: Bank of America – at that time the second largest financial institution in the US, and Barclays - one of the largest British banks, were interested under the condition that they obtain government guarantees limiting potential losses. But the Fed and the government officials decided against providing such guarantees. Their concern was what economists call moral hazard. Moral hazard arises when a company (or an individual) does not have to bear all consequences of its actions. If a bank knows it will be saved by the Fed when needed, it will engage in excessively risky activities. The reason is simple. The more risky the activity, the greater is the chance of a large profit, which goes to the company. There is also a greater chance of a large loss, but in this case the Fed would limit the losses. The bank expects

unlimited upside and limited downside. Riskier activities increase the upside but have little effect on the downside and so increase expected profits.

Treasury and Fed officials were concerned that, if they save another failing investment bank, the pattern of government intervention will be established. To show financial companies that they cannot count on Fed support, US Treasury and Fed officials decided to let Lehman Brothers fail.

Markets were caught unprepared. While there was a lot of talk about moral hazard, they did not believe that such a large institution will be allowed to fail. The bankruptcy of Lehman Brothers was by far the largest bankruptcy in the US. The company had almost $700 bln in assets. The largest previous bankruptcy was Worldcom, a telecommunication company, which failed in 2002 with $100bln in assets.

Investment banks like Lehman Brothers are quite different than other firms. They borrow large amounts to acquire assets they hope will provide higher returns. They have some capital, but it is very small compared to the size of their assets. Lehman, at time of bankruptcy, owed others well over $650bln.

Under normal circumstances, a bankruptcy of such a large financial firm would lead to substantial losses to its lenders. Some lenders, as a result, may run into financial problems. Sound institutions, ones that had large capital and/or little exposure to the failing company would, however, not be greatly affected apart from the decline in profits.

## 1.2. CREDIT PANIC

But these were not normal circumstances. Since late 2006 house prices were falling and borrowers were defaulting in unprecedented numbers. So the situation of many institutions that held mortgage debt or securities linked to or derived from mortgage debt (more on this later in this chapter) was precarious. The value of these securities was declining. It was not clear who owed money to whom. Financial innovation allowed firms to sell their mortgage loans to others. The transactions were complicated, with many loans consolidated into a big loan pool which was then sold to many buyers. Some financial institutions sold credit-default swaps. These are contracts which shift the risk of an asset from the buyer to the seller. The buyer pays the seller a fee related to the riskiness of the asset. If the value of the asset declines, the seller covers the loss. Credit default swaps were not traded on organized exchanges and there was no central record of transactions. So it was difficult, if not impossible, to assess the effect of mortgage default on individual firms.

Now put yourselves in the shoes of a bank manager that is considering lending money. The economic situation is deteriorating. A large, venerable institution has just gone bankrupt. This increases the fear that many financial institutions and firms are in difficult situation. But you do not know whether your potential borrower will suffer from the collapse of Lehman Brothers. He may be exposed to Lehman Brothers directly (for example if he bought credit default swaps) or indirectly (through lending to others who in turn lent to Lehman). And the danger to the borrower from Lehman bankruptcy is difficult to assess. So you are not sure whether the potential lender will be able to repay the loan.

It gets worse. It is difficult to assess for your existing customers the ability to service their loans. So not only you do not know the financial situation of the potential borrower, but you yourself do not really know the financial prospects of your bank.

What would the bank do in such situation? Refuse the loan and keep its funds in cash as protection against possible problems. And that is what happened. With the complex web of relationship between financial institutions no one was sure what the financial position of other firms was; even own position was in doubt. Financial markets went into panic and it became very difficult to obtain credit. Essentially, credit markets stopped operating. As the financier George Soros said, "the economy fell off the cliff".

Recession is usually defined as two consecutive quarters of falling output. *We will describe how output is measured in part I.3 of the course: "The Data of Macroeconomics – how output is measured".*

According to the National Bureau of Economic Research, the private research institute that provides dates for US recession, the recession started in December 2007. In September 2008 people still hoped it will be a regular recession. But the financial panic made it much worse. Credit is the lifeblood of the economy. Firms borrow to invest, to maintain inventory and to provide operating funds. These credits became much more difficult to obtain. Hence investment fell as firms postponed every project they could. Production declined as suppliers stopped extending the customary credit and demanded immediate payment. As production fell, unemployment increased rapidly. The recession became much more severe and the term the Great Recession was born.

The crisis was called the Great Recession to distinguish it from other, regular recessions. People were actually concerned about the repeat of the Great Depression – the most severe recession in modern history. How bad the recession appeared to be? In January 2011 the Financial Crisis Inquiry Commission reported to the US congress on the causes of the crisis. It revealed a statement made in November 2009 by Ben Bernanke: it was "the worst financial crisis in global history, including the Great Depression"[1] He said all but one of the largest US financial institutions were a week or two from collapse.

When Bernanke mentions the Great Depression it is serious. Few people knew more about the Great Depression than he does. Before he joined the Fed, Bernanke was a professor of economics at Princeton and was one of the best known macroeconomists in the world. A large part of his academic career was devoted to studying the causes and lessons from the Great Depression.

## 1.3 THE POLICY RESPONSE (IN BRIEF)

In the end, the recession was not as severe as feared. During the Great Depression output fell around the world and unemployment reached 20% in Canada and 25% in the US. In the Great Recession the unemployment rate was lower: it stayed below 9% in Canada and 10% in the US.[2] *We will talk about factors affecting unemployment in part II.7 of the course: "Unemployment".*

[1] Crisis Panel's Report Parsed Far and Wide, New York Times, January 27, 2011.

[2] Eichengreen and O'Rurke (2010), What do the new data tell us?, available at www.voxeu.org/index.php?q=node/3421 provide an extensive comparison between the Great Depression and the Great Recession. It is an update of their earlier paper, ominously called "A Tale of two Depressions" which appeared at VoxEU in 2009.

Monetary and fiscal authorities around the world reacted forcefully to stimulate economies, in part taking advantage from the lessons from the Great Depression.

To fight the recession both monetary and fiscal policies were employed. The traditional monetary policy is to affect short-term nominal interest rates. The central bank exerts direct control over the short – term interest rates by buying and selling short-term government bonds. Longer term real interest rates, which matter for investment, are set by market forces. But by affecting short-term interest rates the central bank affects the cost of funds to the banking sector and so affects indirectly longer rates. If the cost of short-term funds goes down, financing costs for banks are lower and they may (but do not have to) lower their longer-term rates.

Note that, in the preceding paragraph, we made a distinction between nominal interest rates (in terms of money) and real interest rates (in terms of goods and services). *We will talk about the relationship between nominal and real interest rates in part II.6 of the course: "Money and Inflation".*

The problem with the traditional approach was that it has a limit. The nominal interest rate cannot be negative. So once the nominal interest rate is near zero, the central bank cannot lower it any further. The bank can use an alternative approach, called *quantitative easing.* This involves the purchases (or sales) of assets of longer maturity, thus affecting longer-term interest rates directly. *We will describe both the traditional and new approaches to monetary policy in part IV. 10 of the course: "Monetary policy: inflation targeting, rules and discretion"*

Fiscal policy involves increases in government spending and tax cuts. Higher government spending directly raises demand for goods and services. Lower taxes raise demand indirectly: they increase disposable income and may raise consumption. They constitute the active part of fiscal policy. In addition, in a recession the fiscal situation is affected by *automatic stabilizers* – mechanisms built into the economy that affect taxes and spending when the economy goes into a recession. When income falls, taxes fall as well and a decrease in disposable income is less that the total decline in income. When people lose jobs, unemployment and welfare payments rise, offsetting in part the drop in income due to job loss.

*We will talk about the theory behind these stimulative policies in part III. 9 of the course: "IS-LM: the basic framework to understand macroeconomic policy".*

Both active and automatic fiscal policies raise government deficit and debt. Indeed, in the Great Recession the debt of many countries exploded. This raised concerns that current policies are not sustainable and led many countries to reduce spending. *We will discuss the fiscal policy issues in part IV. 11 of the course: "Fiscal Policy, government debt, deficits".*

## 1.4 HOW THE MORTGAGE CRISIS DEVELOPED

To understand what happened we have to backtrack a few years. In 2001 the US economy went through a brief recession. The collapse of the tech stock market bubble (S&P fell by almost 30% from its peak a year earlier; the tech-heavy NASDAQ market fell by over 2/3 from its peak in March 2000) reduced wealth of stock owners and, consequently, their consumption. The terrorist attacks on September 11, 2001 scared people into staying at home and retail sales fell. The combined effect was a reduction in consumption large enough to put the US economy into a recession.

The Fed, reacted to the 2001 recession by reducing interest rates. This is the standard approach to monetary policy. When the economy is weak, and inflation is low, central banks reduce interest rates. Lower interest rates lead to higher investment and in consumption.

Inflation matters for monetary policy since many central banks, including the Bank of Canada (but not the Fed), have explicit inflation targets. The Bank of Canada's target is to keep inflation between 1% and 3% per year; affecting the level of output is less important: "The cornerstone of the Bank's monetary policy framework is its inflation-control system, the goal of which is to keep inflation near 2 per cent — the mid-point of a 1 to 3 per cent target range."[3] But the FED's goal is to "to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates."[4] And so the US central bank is more willing to reduce interest rates when the economy is weak.

*We will talk about problems brought about by inflation, and why central banks are concerned about it, in part II.6. of the course: "Money and Inflation".*

Even after the recession ended, with inflation low, the Fed did not raise interest rates. The economy started growing again. Low interest rates and new developments in the financial sector increased the availability of credit to house buyers, allowing many households to buy housing for the first time or to move to more expensive quarters.

## 1.4.1 Developments in the financial sector

Three developments in the financial sector played a major role in the Great Recession: the practice of selling pools of mortgages to investors, the availability of sub-prime loans and leverage. The first development, called securitization, reduced the perceived riskiness of mortgage lending and allowed investors around the world to participate in the US housing boom. The second development: the growth of sub-prime mortgages, provided affordable mortgage financing to people who, in the past, would not have been able to obtain loans or who would have had to pay very high interest rates on these loans. The third, leverage, increased the demand for securities but made the financial system fragile.

### *Loan securitization.*

In the past, the bank that gave out a mortgage (the loan originator) would keep the mortgage on its books as an asset until maturity. If the mortgage was non-performing, when borrower misses payments or defaults on the loan, the value of the asset was reduced and the bank that originated the loan would incur a loss.

Financial innovations, through a process of loan securitization, changed this. Loan securitization is a financial operation in which various assets are pooled and used as collateral to issue securities. These assets can be mortgages, car loans, credit-card debt etc. The operation uses a specially created company, the so called *special purpose vehicle (SPV).* Mortgages are transferred from the bank to SPV, creating a mortgage pool. The pool contains many mortgages (sometimes thousands) and so is perceived as less risky than individual mortgages since risks are

[3] See http://www.bankofcanada.ca/en/monetary/monetary.html.

[4] Federal Reserve Act, section 2a. The full quote is: "The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates."

diversified. The SPV issues securities backed by the pool, called Mortgage-Backed Securities (MBS). Interest and principal payment on the underlying mortgages are used to pay interest on the securities. The mortgaged property is the collateral.

Before being sold, securities backed by the mortgage pool were evaluated by rating agencies and usually received AAA (the top) rating, just as US or Canadian government bonds and higher than Japanese government bonds. The reason for the high rating was that mortgage-backed securities were believed to have very little risk. In the past, house prices across the US rarely, if ever, fell. They would fall in one region but increase in another. So people believed default risk was uncorrelated across regions. A single mortgage is risky, but when only a few mortgages in a pool are non-performing, the total cash flow from the pool is stable. Default rates may increase in one region but not in other regions, ensuring low overall default risk and steady interest payments.

The securities were then sold to investors around the world. The interest they paid was based on the interest rates of the underlying mortgages and was higher than the interest rates on similarly rated bonds. So they were easily sold.

The problem with securitization is that the loan originator no longer suffers a loss if it turns out to be non-performing. The bank makes money not when the loan is repaid, but when the loan is provided and sold. By selling mortgages the bank replenishes its funds and is able to provide more mortgages, increasing its profits. This creates moral hazard. The loan originator gets full benefit from providing mortgages, but does not suffer much from their default. So it focuses on providing as many mortgages as possible and may not pay sufficient attention to evaluating borrowers.

The process of securitization was a very profitable one. The creators of mortgage pools (usually investment banks) received fees, investors who bought them received high interest payments and originating banks sold the risky assets and were able to issue more mortgage loans.

### *Sub-prime loans.*

The demand for mortgage-backed securities was high. There was a huge inflow of funds from high savings in booming Asian countries as well as from oil producers. Owners of these funds were looking for relatively safe investments. US government bonds were the preferred instrument but interest rates on the bonds were low. So funds flowed into mortgage-backed securities which had higher returns and good credit ratings. The demand exceeded the supply of high quality mortgages. A consequence was a rapid increase in sub-prime mortgages. Sub-prime mortgages are those provided to borrowers with poor credit rating, who cannot get regular (prime) mortgages. They may have had credit problems in the past, short employment history or high payments on existing loans. Such borrowers have a higher risk of default and are charged higher interest, to compensate the lender for higher risk. So securities backed by sub-prime mortgages had high yield (paid high interest). Pooling sub-prime mortgages with prime mortgages created securities with high yields that appeared relatively safe the risk was diversified and the loans w ere supported by property that could be repossessed in case of non-payment.

To expand the market for mortgages, lenders provided the so called adjustable rate (ARM) mortgages. In these mortgages, the initial interest rate, called a teaser rate, is low. After a few years (usually two or three) the interest rate is raised to a higher level that depends on the

interest rates at the time. The bank may charge a 3% interest rate for 2 years and then increase the rate to 7%, doubling the required repayments. Also, the down payment was often reduced. In 2005 almost 30% of buyers financed the entire purchase.[5,6]

Sub-prime loans made buying own housing a possibility for many Americans who, in the past, had problems obtaining mortgage credit. Low down payments and low initial interest rates made the purchases affordable. Even people with limited funds could buy housing: the initial payment could be zero, and mortgage payments for the first two years were low. So, in the end, mortgage credit became available to risky borrowers at favourable terms, encouraging them to buy housing.

## *Leverage.*

Leverage is based on the concept of using borrowed money to acquire assets. This multiplies potential gains and losses. There are many definitions; a simple one is that leverage is equal to the ratio of assets to the difference between assets and liabilities (excluding capital). Consider a bank that has $100 in capital. It buys $100 in mortgage-backed securities. Assests are $100 and liabilities are $0 so the leverage is $100/($100-$0)=1. The securities pay an interest rate of 6% so that the interest payment is $6. Let the value of the securities after one year increase by 6%, to $106. The total gain is $12 dollars: $6 in interest payments and $6 in asset appreciation. The return is 12%=$12/$100.

Now assume that the bank, with $100 in capital, borrows $1900 and buys $2000 worth of mortgage-based securities. The leverage is 20: assets/(assets-liabilities) = $2000/($2000-$1900)=20. The interest rate on the borrowing is 5% so the bank pays $95 in interest on the loan: $95=$1900*5%. It receives $120 in interest on the securities: $120=$2000*6%. It gains $120 from the increase in the value of the securities: $120=$2000*6%. So the net gain is $145: $145=-$95+$120+$120. The return on the operation is 145% since the bank earned $145 using $100 if capital. By increasing its leverage the bank realized much higher return on the operation.

Consider now the same example with one difference: instead of increasing by 6%, the value of the securities falls by 6%. Without borrowing, the return is 0% instead of 10%: the bank receives $6 in interest on the securities and loses $6 from the drop in the value of the securities.

With borrowing, the bank pays $95 in interest payments on the loan, receives $120 in interest on the securities and **loses** $120 because the value of the securities drops. It suffers a loss of $95: $95= -$95+$120-$120. The rate of return is -95% instead of 105%, since the bank lost $95 using $100 of capital. Furthermore, bank capital has fallen almost to zero: the bank now has $45 in capital.[7]

As you can see from this example, with leverage gains and losses are multiplied. In addition, a relatively small decline in the value of bank assets can wipe out its equity and make it insolvent. Leverage raises the risk of a bank crisis.

As it turned out, financial institutions around the world were very heavily leveraged. Leverage of 33 was not uncommon; some institutions had leverage of 50. This greatly increased the risk of

[5] National Association of Realtors, 2005 Profile of Home Buyers and Sellers.

[6] In contrast, in Canada the minimum down payment is 20%.

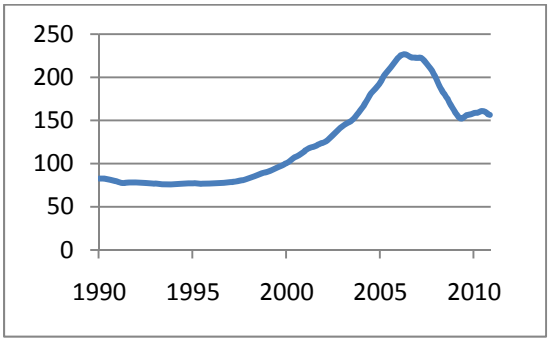
[7] You may wonder why the bank makes $145 when times are good and loses only $95 when times are bad. This is because the bank found a profitable trade: borrow at 5% and lend at 6% (buying bonds is similar to lending).

collapse. But while everyone knew leverage was high, the exact extent was not known: through various accounting tricks some institutions reduced the reported leverage.

## 1.3.2. Rising house prices

Sub-prime and ARM mortgages make sense in a rising market. When the value of the house increases, the borrower can refinance the house, taking on a bigger loan. The proceeds from refinancing are used to make mortgage payments. So even borrowers with weak credit history are expected to be able to service their mortgage. Similarly, buyers who took out ARM mortgages were expecting to refinance when the interest rate increased. House prices have, indeed, been increasing in the US:

Figure 1.1 US house prices




Source: S&P/Case-Shiller National Home Price Index, 10 cities, seasonally adjusted, nominal

Rising house prices provided a feeling of security to both borrowers and lenders that the risk of default is limited. New buyers flocked to the market as lending was easily available at favourable terms. With house prices rising, they were concerned that delaying purchase will lead to a higher expense in the future, or even prices will increase beyond reach.

Other factors contributed to the increase in house prices. There was a significant amount of speculation, with large proportion of housing bought for investment purposes, and not as residences. Properties were bought at early stages of construction and resold at a profit without even taking possession.

The decline in lending standards played an important role. As already mentioned, securitization allows the bank providing the mortgage to eliminate the risk. The incentive is then to provide as many mortgages as possible. So borrowers were not adequately checked and loans were made without sufficient attention to the ability to repay. As lending increased, more households bought housing, pushing prices up.

### *Wealth effect of higher house prices*

The increase in house prices made homeowners feel wealthier. *As we will discuss in part II.4.: "Consumption" higher wealth means higher demand for consumption.* When households feel wealthier, they increase spending. The increase in house prices allows homeowners to borrow money against the value of their property. A simple example illustrates this. Consider, for example, a house worth $250 000 with a $200 000 mortgage. Homeowner equity is $50 000 or 20% of the current value. When the house appreciates by 10%, to $275 000, homeowner equity

increases to $75 000, or 27.3% of the new value: 75000/275000=27.3%. If the homeowner wants to keep his equity at 20% of the value of the house, he can borrow $20 000. His debt is then $220 000 and equity is 20%= $55 000/$275000.

So the result of the increase in prices was a rapid increase in consumption and a drop in savings. American households took on an unprecedented level of debt. The ratio of debt to disposable income increased by 2/3, from 77% in 1990 to 127% in 2007. As long as interest rates remained low, the burden of the debt was bearable: the debt service ratio (the ratio of debt repayment to disposable income) increased from 12% in 1990 to only 14% in 2007. Investment also increased rapidly. With demand for housing high, residential construction, which is counted in national income accounts as investment, grew fast. As the economy was expanding, all other types of investment were increasing. The economy grew fast, leading to higher incomes, more house buying and so on.

To summarize, the housing boom created favourable economic conditions. The economy was expanding fast, stimulated by demand for housing. Many new buyers entered the housing market, taking on large amount of debt. As long as house prices were increasing and interest rates were low, households were able to service the debt. There was a consumption boom, financed by home refinancing. At the same time, the financial system was becoming fragile, with high levels of bank leverage, complex links between financial institutions and large volume of loans to weak borrowers.

### *Was it a bubble?*

In retrospect, the rapid increase in house prices was a bubble. A bubble is a situation when the asset is overvalued (not justified by fundamentals) but people continue to buy it in the expectation that its price will increase even more. . The purchases raise the price of the asset, confirming the expectation, which leads more people buy it pushing prices further up and so on.

Bubbles are easy to identify after the fact: a rapid increase in prices is followed by a rapid decrease. But they are difficult to identify contemporaneously. Asset prices may increase because of changes in fundamentals. There were reasons to believe that fundamentals in the housing market have changed. Financial deregulation reduced the cost of financing. Securitization reduced the risk of sub-prime lending. So housing credit became cheaper and easier to obtain. Housing fundamentals suggested house prices should increase and so, to many participants in the market, the rapid increase in house prices was not a bubble.

## 1.5 THE FINANCIAL CRASH

### 1.5.1. The decline in house prices.

The boom in the housing market, increase in household debt and financial developments, in particular the expansion of risky, sub-prime lending created a fragile macroeconomic system. As long as house prices were increasing and interest rates were low, the boom continued. But rising house prices led to overbuilding and a surplus of new homes. In July 2004 the Fed started increasing the interest rates; by July 2006 they increased by 4%. As a result, mortgage interest rates rose as well, reducing demand for housing. With large supply and decreasing demand, house prices started decreasing in the second half of 2006.

## 1.5.2. Mortgage defaults

The decrease in the price of housing led to mortgage defaults. Recall that adjustable rate mortgages were based on the assumption that, when the interest resets to a higher level, the borrower will refinance the home taking on a bigger loan and use the proceeds to fund higher mortgage payments. With house prices falling, this was no longer possible. Many borrowers found themselves unable to pay the higher interest rates and began to default on their mortgages. In addition, people who bought near the peak of the boom with little down payment had negative equity: their house was worth less than the amount of the mortgage debt. Houses with mortgage exceeding their value are called *under* water. It is a little like scuba diving, but without the scuba gear. Sooner or later the owners give up and walk away from the house, defaulting on the mortgage.

### *Why more defaults in the US? – Non-recourse loans*

Defaults were facilitated by the nature of mortgage loans in many US states. Unlike in most countries, they are non-recourse loans. Non-recourse means that the mortgage loan is secured with property but the borrower is not personally responsible for the loan. So, in the case of loan default, the lender can take over (foreclose) the mortgaged property but has no claims against other assets of the borrower. A person walking away from a home loses it and suffers deterioration of credit rating (making borrowing in the future difficult) but can keep other assets. No further payments need to be made to the lender.

Defaulting is much harder to agree to in case of a recourse loan. In recourse loan the borrower remains liable for the losses of the lender. When the bank forecloses and sells the property for less than the value of the mortgage, the former owner has to cover the difference. What is worse, the bank has little incentive to get the best price possible since the borrower is responsible for the losses. So the former owner often ends up with a large debt. That is why people make extraordinary efforts not to fall behind in their payments and defaults are less common.

This difference in loan responsibilities is the reason why defaults were a much bigger problem in the US than in other countries, even though house prices in several countries (South Africa, Spain, UK, Ireland) increased much more rapidly. With less defaults the decline in house prices in these countries was less dramatic than in the US.

### *Foreclosures and further decrease in house prices.*

The combination of resetting interest rates on ARM mortgages and large number of properties that were worth less than outstanding debt led to rapid increase in the number of defaults. Properties were foreclosed and put up for sale. This raised the supply of housing and led to a bigger decline in the price of housing, resulting in more default and foreclosures, further depressing housing prices. A vicious cycle was created: as house prices fell, defaults and foreclosures increased, raising housing supply of housing and leading to further decline in prices.

### *Financial institution losses.*

Defaults and foreclosures led to a decline in the value of mortgage-based securities. Financial institutions around the world holding these securities started incurring losses. Some of the losses

were covered by credit default swaps, but these just moved losses from one institution to another.

As discussed before, the complex web of relationship between institutions made it difficult to assess the situation of potential borrowers. So banks were reluctant to lend money. Many institutions, in particular investment banks, found themselves in difficult financial position, unable to borrow. Investment banks typically borrow money in short-term market and use the funds to buy less liquid assets, like real estate or mortgage-backed securities. As they now were not able to borrow in the short – term market, to repay maturing loans they had to resort to selling the securities, further depressing their prices and exacerbating problems in financial markets. This created another vicious circle: as the value of mortgage-based securities fell, many institutions sold them, further decreasing their price.

In the end, total losses were estimated by the International Monetary Fund to be as high as $1.5 trillion. These losses wiped out a large portion of banking capital, leaving banks seriously undercapitalized.

## 1.6. EFFECT ON THE REAL ECONOMY.

The problems described above were mostly of financial nature. But finance, and the banking system, is the central part of the economy. The role of the banking system is to take savings from people and institutions with excess funds and put them to most effective use, providing credit to firms and consumers. Finance is like the blood system: when funds flow smoothly, everything works fine.; when funds stop flowing, the economy stops.

Consumption declined for several reasons. Household wealth declined due to falling house prices and stock markets. Just as increasing wealth raises consumption, declining wealth reduces it. Households were no longer able to finance additional consumption by withdrawing housing equity. Consumer credit became much more difficult to obtain and demand for cars and various large-ticket items which are bought on credit, fell dramatically. As production fell, unemployment increased. Concerned with the possibility of losing a job households cut expenses, leading to a further decline in consumption

As is typical in recessions, the decline in investment was much larger than the decline in consumption. *We will discuss factors affecting investment in part II.5 of the course: "Investment".* In national income statistics, there are three types of investment: business fixed investment , inventories and residential construction. All three fell due to reduced availability of credit. Business fixed investment (building new factories, buying machinery etc) is, by its very nature, forward looking. When economy's prospects look bad, firms postpone investment projects. Firms reduced inventories to cut operational costs. And, as we already discussed, residential construction fell dramatically.

## 1.7 THE CRISIS SPREADS ABROAD.

The US economy constitutes about 20% of the world economy and world's biggest importer. The typical effect of a recession in the US on other countries is through international trade. When output in the US falls, so do US imports from the rest of the world. But a recession in the US need not, in general, cause a recession in other countries. For example in 2001 the recession in the US did not spread even to Canada, even though our economy is more dependent on exports to the

US than the economy of any other country. Also, unlike Canada many countries have weak links to the US and are not greatly affected.

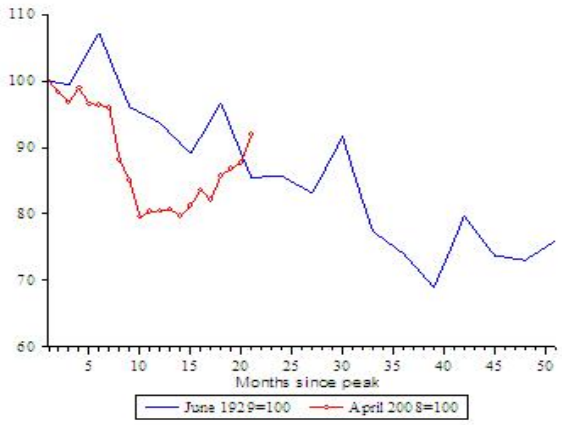
## *Channels of transmission.*

In the Great Recession the transmission was quite different from this scenario. There were three channels: 1. through financial markets, 2. International trade and interconnected supply chains and 3. the effect of the crash in the US on business and consumer attitudes in other countries.

The most important channel was the effect through financial markets. Recall that the mortgage-based securities were sold around the world. German banks, Spanish pension funds, Argentinean insurance companies and other financial firms around the world bought securities which were rapidly declining in value. As in the US, the quality of assets on financial institutions' balance sheets was unknown. Apart from holding securities backed by sub-prime mortgages, many institutions sold credit-default swaps. They were not traded on organized exchanges and so there was no record on who owned money to whom and how a given institution was affected by the crisis.

One of the first banks to run into trouble was Northern Rock, a mid-size British bank that suffered a bank run in September 2007 and was nationalized a few months later. Many banks, especially in Europe, incurred large losses. Many European banks were even more leveraged than US banks. The decline in the price of securities they held as assets led them, just as US banks, to reduce their lending activity. Credit became difficult to get, reducing investment and consumption.

The second channel was through international trade. As recession took hold, US imports from the rest of the world declined. As the recession spread, other countries reduced their imports and international trade declined rapidly. The decline was unprecedented: world trade fell by over 20%; in Taiwan, they fell over 40%. Figure 1.x below compares the decline in international trade to that in the Great Depression.[8] As you can see, the decline was, initially, much more rapid than during the Great Depression. No wonder economists and politicians were concerned!




Why did trade international trade collapse? In modern economies, complex goods are rarely produced in a single country. Production is organized through international, interconnected

[8] Source: Eichengreen and O'Rurke (2010).

supply chains. Components are made in many different countries and the product assembled in another. The example illustrates this for the iphone.[9]

| Manufacturer | Component | Cost |
|---|---|---|
| Toshiba (Japan) | Flash Memory | US$24.00 |
| | Display Module | US$19.25 |
| | Touch Screen | US$16.00 |
| Samsung (Korea) | Application Processor | US$14.46 |
| | SDRAM-Mobile DDR | US$8.50 |
| Infineon (Germany) | Baseband | US$13.00 |
| | Camera Module | US$9.55 |
| | RF Transceiver | US$2.80 |
| | GPS Receiver | US$2.25 |
| | Power IC RF Function | US$1.25 |
| Broadcom (US) | Bluetooth/FM/WLAN | US$5.95 |
| Numonyx (US) | Memory MCP | US$3.65 |
| Murata (Japan) | FEM | US$1.35 |
| Dialog Semiconductor (Germany_ | Power IC Application Processor Function | US$1.30 |
| Cirrus Logic (US) | Audio Codec | US$1.15 |
| **Rest of Bill of Materials** | | **US$48.00** |
| **Total Bill of Materials** | | **US$172.46** |
| **Manufacturing costs** | | **US$6.50** |
| **Grand Total** | | **US$178.96** |

The phone is assembled in China using parts from all over the world. Assume that, because of the recession, one phone is not produced. The decline in world output is $178.96. This is equal to the decline of China's exports. In addition Japan's exports fall by $60.60 (the top three items and FEM), Korea's exports by $22.96 etc. The decline in international trade is much bigger than the decline in output. We will return to this issue when we talk about the effect of the recession on Canadian exports.

The third channel of transmission was through the crisis' effect on confidence and demand. With the US economy in recession, and banks everywhere in trouble, businesses postponed new investments and consumers reduced purchases of durable goods, for example cars. This led to an increase in unemployment and further declines in investment and consumption.

## 1.8 THE CRISIS IN CANADA

When the Great Recession started, the Canadian economy was in good shape. Unemployment was low, economy was growing fast and both the federal and provincial governments had been running surpluses for a long time. The banking system was in good shape. Yet the Canadian economy followed the US economy into recession. The two channels of transmission were through exports and effect on consumer and business confidence.

The Canadian banking system weathered the Great Recession relatively well. Banks did not need government support and remained profitable. This was thanks to the prudent nature of Canadian banks which led to lower leverage and higher capital ratios, and tight regulatory regime. The housing boom was more modest than in the US, and decline in house prices limited. Canadian banks tend to keep mortgages rather than securitize them. This means they incur losses from mortgage default and so loan standards did not decline and mortgage defaults were limited. While it is possible to buy a house almost entirely with borrowed money, such mortgages must be insured. In fact, the World Economic Forum, called Canadian banks the best in the world. *We*

[9] The table was prepared by isupli: http://www.isuppli.com/Teardowns/News/Pages/iPhone-3G-S-Carries-178-96-BOM-and-Manufacturing-Cost-iSuppli-Teardown-Reveals.aspx. It is copied here from Yuqing Xing and Neal Detert (2010), How the iPhone Widens the United States Trade Deficit with the People's Republic of China, Asian Development Bank Institute working paper 257. The authors added country of origin information to the isupli table.

*will discuss the Canadian banking system at some length in part IV.12: "Experience from the Great Recession".*

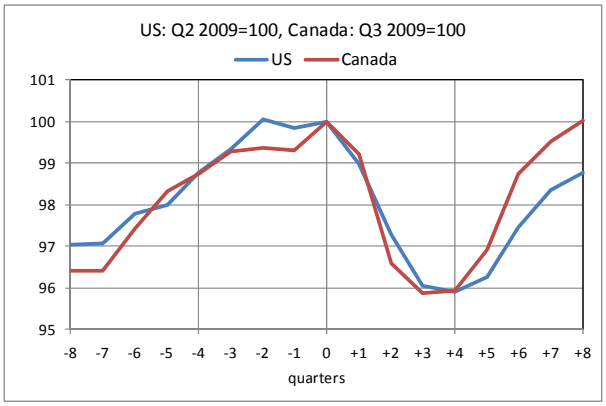
The export channel of transmission of the recession is particularly strong in Canada. The US economy is our largest trading partner, by far. Three quarters of Canadian exports go to the US; for comparison, our second largest trading partner is Britain, with 3%. Canadian economy depends crucially on exports to the United States. The severity of the US recession resulted in a large decrease in demand for Canadian goods and services. In particular the car industry declined dramatically, with Canadian automobile exports falling by 40%.

The third channel of transmission was also important. Canadian households became concerned about the severe recession in the US and reduced spending. Investment fell as firms took a "wait and see" approach and delayed projects.

We will now briefly compare the Canadian experience with that in the US. We will do a more detailed comparison, and analysis, later in the course, using your newly acquired macroeconomic knowledge.

## Output

There is the popular saying that if the US sneezes, Canada catches a cold. In the Great Recession both countries caught a cold. Canada caught it from its neighbor. It was about as bad but did not last as long. The figure below compares the recessions in Canada and in the US. The scale on the horizontal axis is quarters. The rapid decline in Canada started one quarter later than in the US (the third quarter of 2009 versus the second quarter of 2009). In the following three quarters output fell by 4%. Recovery in Canada started quicker and was more rapid than in the US.



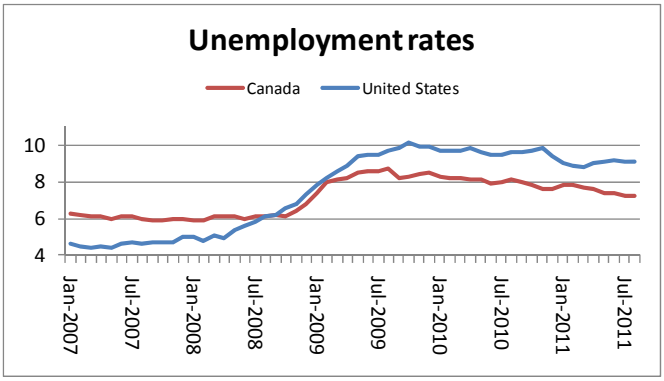

Why did we do better? There were two main reasons. First, our banking system did not suffer, and the disruption in the banking system was smaller and shorter. Second, our resource sector benefited from high demand for raw materials from fast growing Asian countries and from high resource prices.

## Unemployment

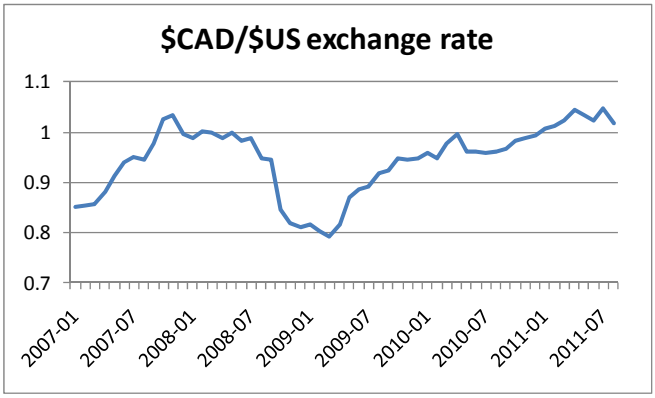
Perhaps the biggest difference between the performance of the US and Canadian economies was in unemployment. Traditionally, unemployment in the US was lower than in Canada, mainly due to less generous unemployment insurance and slower increase in participation rate. The

difference used to be around 2%, and increased to as high as 4% during the Clinton presidency when the US unemployment was very low.

Just prior to the Great Recession the unemployment rates in both countries were similar: in August 2008 the unemployment rate was 6.5% in Canada was 6.5% and 6.1% in the US. They increased significantly, reaching a peak of 8.8% in March 2010 in Canada and 10.6% in January 2010 in the US. They then declined in Canada to around 7%, and in the US to around 9%. So between August 2008 and August 2011 the unemployment rate in Canada increased by less than one percent, while in the US it increased by over 3%. The high unemployment in the US has been neglected by politicians who concentrated on debt and deficits; but it has just become the top issue with the speech by Obama on September 8. With the latest employment figures in Canada showing a weak labour market (the number of jobs actually fell in August) unemployment is likely to become the major issue during our course.




An important factor in Canadian economic performance was the exchange rate. In October 2007 the Canadian dollar reached parity with the US dollar. This was the consequence of weak US economy and high resource prices. It stayed at parity until the beginning of the Great Recession, when, during the financial panic, the US dollar appreciated. This was because money managers, to avoid risk, bought US bonds. The market for US bonds is the largest and the most liquid, and so offered a safe place to park funds temporarily until the situation cleared up. The Canadian dollar fell by 20%. Since March 2009 it started appreciating and has remained at or above parity throughout 2011. *We will talk about exchange rates in part V of the course:" Open economy".*



## 1.9. SUMMARY

In this introduction to the course we described the Great Recession: its causes and consequences. The goal was to show how the macroeconomic topics covered in the course will be useful to analyze current events.

During the course there will be many new events, some of which may be quite dramatic. The US economy is weak and may slide into another recession (the popular term is double-dip recession). This is especially likely as, in the next few months, fiscal cuts will be announced. These cuts were part of the debt-limit increase deal signed in August that averted the default on US debt. The Canadian economy is growing slowly and there are signs that the government is concerned and may introduce measures to stimulate it. Then there is the sovereign debt crisis in Europe, where several countries are unable to borrow money at acceptable cost. If any of these countries defaults (Greece is the prime candidate) a major banking crisis may erupt, pushing European countries into a recession. *We will be discussing current events as they happen and in the last part of the course: VI. "Major policy issues".*