The Implications of Speculative Behavior in the Housing Market

Interactive Qualifying Project Report

Worcester Polytechnic Institute

By

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March 2009

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Abstract

This project is done at the time of an financial crisis that has put many firms out of businesses and many Americans out of jobs, when only a few years ago the economy was still experiencing tremendous growth and prosperity, particularly in the housing market. So what went wrong? Many must have raised this question in their minds.

The purpose of this paper is to answer this question. By looking at the current economic situation, the paper will explore the chain of events that occurred and stories of Americans that suffered from the turmoil. And then, the paper will discuss Hyman P. Minsky's *Financial Instability Hypothesis*, and how it could have justified the current crisis. The paper will use a methodology named causal-loop diagram to justify the argument that the system of housing market was inherent to instability, and the presence of speculative behavior in the market had caused such instability to become more severe and destructive. At last, the paper will make suggestions on what methodology the U.S. policy makers can use in dealing with the system's instability.

Acknowledgement

I would like to offer my appreciation to Professor Arthur Gerstenfeld of Management Department and Professor Michael J. Radzicki of Social Science Department, who gave me precious advises for the project.

Table of Contents

I. **Background**

Throughout the course of past two years, the U.S. economy has taken a long and exhausted journey. From initially the turmoil in housing market, to the point that even the whole economy was officially in a recession, this generation of Americans had observed a depression in the severity that only could be compared by the one in during 1920s to 30s.

The financial crisis was triggered by sudden decline in house values in 2007. Inability to meet monthly payments for mortgages forced many house owners to default on their loans and faced foreclosures and repossessions. In 2008, more than 2.3 million American homeowners faced foreclosure proceedings, an 81% increase from 2007.[1] The borrowers that had not defaulted were having difficulties to meet monthly payments or refinance on home equities. In the third quarter of 2008, 6.99% of mortgage holders were behind in their payments.[2] Those two situations were most common in the group of the so-called subprime mortgages borrowers. Because this group of borrowers had credits and incomes that were not supposed to be given the loans. As a result, the subprime mortgage crisis began to stir up a series of domino effects.

The crisis in the mortgage market led to the collapses of many loan originators, investment banks and debt insuring companies. Wall Street leading firms such as Bear Stearns, Lehman Brothers and Merrill Lynch fell as the victims of credit crunch. They either went into bankruptcy or placed for fire sales. Even those that survived such as Citibank, Bank of America

and AIG were heavily indebted with "bad assets" and had to take in tremendous amount of write-offs in their balance sheets. Those events had frightened many investors and investment managers from injecting cash into the market. Thus the skepticism and restrain led to the so-called "credit crunch", in which tightened credit had slowed the velocity of money circulation in the financial market. Those troubled banks and many other participants in the financial industry were desperately seeking support and aids from the federal government. One of the latest efforts by the federal government was seen from President Barack Obama's administration, which was considering buying $100 billion to $200 billion "bad assets" from banks using President George W. Bush's $350 billion leftover Troubled Assets Relief Fund (TARF). Followed the injection, the treasury could sell government-backed debt or lending from Federal Reserve to bring the size of bailout up to as much as $1 trillion to $2 trillion.[3]

Series of bankruptcies and mergers certainly placed an army of people out of jobs, either in the financial industry or other sectors. The unemployment rate heightened to 7.2% on the last month of 2008, thus 11.1 million Americans were out of jobs, a 2.3% increase from a year ago.[4] Among those unemployed, many required the support from unemployment insurance. The claims for insurance had reached a

seasonally adjusted 509,000 in Dec-2008, escalated from 340,000 in a year ago. The four-week average of initial claims even grew to 524,500, the highest level since December 1982.[5]

Facing such a tough economic status, the federal government and the federal reserve came into rescue very quickly. Soon after the recession officially began, President Bush proposed a $700 billion stimulus plan named TARP to mainly rescue banks that suffered in the credit crunch from the write-offs of high risked assets, particularly collateralized debt obligations pooled with subprime mortgages and backed by their monthly payments.[6] President Obama's $789 billion stimulus plan was also approved by the Congress in Feb-2009. The plan was packaged with spending increases and tax relief, intended to spur the economy and create jobs by injecting cash into the market and preventing credit from further tightening. The bill included $507 billion in spending programs and $282 billion in tax relief.[7]

The long-term effectiveness of these two packages was yet revealed. However, in short-run, many house owners were able to avoid defaulting on their mortgages and keeping their credit scores in good standings by refinancing or modifying terms of the loans. Banks and mortgage originators could also be rescued from "troubled assets" as treasury purchasing or insuring some of their "at risk" mortgages. The most direct link from the stimulus package to economic recovery was the creation of millions of jobs with public programs and the increase of consumer spending from stimulus payments.

However, those bills were surrounded with controversies along the way of approval. President Obama's initial proposal for stimulus package amounted to be more than $800 billion. After the proposal went through the House and reached Senate, the bill met challenges from many G.O.P senators. The central opposition claimed that the package was too large to be applied efficiently, and it would also deepen the government-spending deficit that was already in a considerable amount during President Bush's administration. Another concern was on whether some of the public programs proposed by states and cities for federal fund could produce any benefits for the communities and economy. In order to prevent the financial crisis from worsening, President Obama and Democratic Senators had to make some comprises on the bill. At the end, the stimulus package was trimmed to $789 billion.

II. Impact on Society

In the macro level, the U.S. economy was facing a crisis and recession that influenced every participant of the market, particularly those in the financial industry. On an individual base, Americans were suffering from historical unemployment rate and the deterioration of job market.

Such situation was most severe for professionals. The shrinking job market made going back to workforce so much harder once being laid off. Even positions that were opened might very well be a in a completely different sector of the

industry. Brian Murphy, 35, lost his position as an associate in the investment banking division, as Bear Stearns crashed to the ground. He remained unemployed for several months. During this time, his finance went into trouble due to the lack of income and the high cost of living in New York City. Eight months later, he was eventually able to obtain an offer from a new investment bank. In spite of the fortune, Murphy was forced to work for restructuring, an entirely unfamiliar sector for him.[8]

The saturation of job market did not only take effects on aggregate demand, but also the demand for high profile individuals. The phrase *high profile* here applies to the acquisition of graduate degrees, years of management experience, or high salaries during past employment. Dawn Jordan, a former operations vice president at Bank of America, lost her position like many of her colleagues in the company. When she attempted to land a next job, she realized that her M.B.A. degree and management experience had become a burden instead of desired qualities. Without a doubt, this situation was frustrating for many other professionals similar to Jordan. Besides personal satisfaction, Jordan also considered her graduate degree to be a factor of security for jobs. However, it did not prevent her from being laid off, and it had not helped her to land the next one, either.[9]

The challenges that the economic crisis brought to the professionals are sometimes were beyond financial or career-wised. The frustration from losing a job and not able to move to a new one certainly would post a mental and psychological burden to them. Michael Crehan, a former senior vice president at Lehman Brothers Holdings in the ratings advisory group left

the company in March 2008, six months before the firm went into bankruptcy. His motivation to move forward was being quickly replaced by the continuing lack of good leads or an interview gone wrong. To make the matters even worse, the thousands of additional layoffs announced each week laid a gray curtain on his career path. In such a tough time, it was easy for someone like Crehan to not be able to recover from the stress.[10]

III. Financial Instability Hypothesis

Before the subprime crisis took place, few had foreseen it from coming. Robert J. Shiller was one of those few. In several instances, Shiller had warned that the economy was on the edge of collapsing. In his book *The Subprime Solution*, Shiller described that the financial crisis was led by a chain of events. Overly aggressive mortgage lenders, compliant appraisers, and complacent borrowers proliferated to feed the housing boom.[11] To understand the origin and correlations of those events, the paper will now go into a hypothesis named *Financial Instability*.

During the economic crisis of 1929, John M. Keynes' *General Theory* had offered a theory of the capitalist process, which was able to justify financial instability as the result of market behavior in the face of uncertainty. In Keynes' rebuttal to Jacob Viner, Keynes insisted that instability in the financial market was caused by some disequilibrating forces. Those disequilibrating forces directly affected the valuation of capital assets relative to the prices of current output, and thus

determined the level of investment activities in different markets. The fluctuations of those price ratios and investment activities led to the instability in economy. In particular, the financial attributes of a capitalist economy were constantly impacted by changing views on the future economic status.

While this thinking was widely accepted by the public during and after the Great Depress during 1920s to 1930s, Hyman P. Minksy suggested the application of systematic thinking to matter, which justified financial instability as systemic rather than accidental events. In the production of consumer goods, the markup on labor costs generated gross profits from operations, and such excessive funds were available for meeting commitments on debts. Therefore, the liability structures that firms possessed could have represented their current speculation on the course of future investment. In other words, the level of future investment was determined by current gross profits, and gross profits were largely determined by previous investments. Therefore, the decision on debt financing was on the expectations of future investment and that gross profits would be high enough to generate cash flows to meet debts commitments.[12]

In the concept of debt financing, Minsky had reached into even more details. The instability hypothesis realized three different categories in liability structures: hedge, speculative, and ponzi finance. Hedge financing occurred if the firm's cash flow or equity could meet all its liabilities. In other words, if the firm decided to discontinue its operations, its assets and cash flow on the sheet would be able to cover all its debts. Speculative financing indicated that the firm's actual and expected cash

flows could not cover its liabilities on the balance sheet, thus the firm must roll over debt. This means that the firm's cash flow could only meet partial of its liabilities, and the rest must be incurred. Ponzi financing was the point where the firm could not even afford to meet its interest payment. In this situation the firm would not realize any profits because all its cash flow could only meet portion of the interest payments.[13]

In a later working paper, Minsky offered a more detailed explanation of the hypothesis. He indicated that in capitalist economies, the market system exhibited the quality of inflations and debt deflations. The increasing demand for consumer goods drove prices up and so did gross profits. The profits were distributed to investors as return to investment and workers as wages, thus raised the demand for capital and consumer goods, and prices rose even further. On the other hand, debt-deflation, a phrase introduced by Irving Fisher, assumed that when there was mild gloom and shock to confidence, debt liquidation caused money interest on safe loans to fall but on unsafe loans to rise. This leads to distress selling and more liquidation. Subsequently, the domino effects in economy broaden pessimism and distrust in the debt market. The process of roaring debt liquidation fed on itself, and brought a self-reinforcing debt-deflation to the market.[14] In sum, those activities led to "inflation feeds upon inflation and debt-deflation feeds upon debt-deflation".[15] The self-reinforcing process would not stop without intervention of "big institutions", unless it reached a shocking point.

This shocking point is the where the fluctuation of financial system reaches the level of severity that can be defined as a crisis. Minsky noticed that before the Second World War, depressions were quite frequent events. Those depressions typically coincided with a Fisher-type debt deflation. This tells that in a capitalist system financial instability is not an unnatural event; indeed, the system is inherently unstable. After the war, however, there were no financial crises in the US until 1966. This was due to that significant growth of government spending in the postwar period.[16] In the fiscal year of 1929, the federal government's spending was $3.8 billion while GDP amounted to be $103.6 billion. In the fiscal year of 1965, government's spending was $118.2 billion while GDP was $719.1 billion. Percentage-wise, overall government spending as portions of GDP had grown from 3.68% to 16.44%.[17] With such a large portion of government spending, budget swings could offset fluctuations of consumer and investment spending and thus stabilize return on investment and worker wages. Without the fluctuations of those two types of incomes, there would be not fluctuations in the prices of consumer goods or capital assets. Hence, the disturbance of "inflation feeds on inflation" would be solved.

Another issue in financial instability hypothesis was Fisher's type of debt-deflation. Here is when the "Big Banks" should kick in. In the US, the Federal Reserve could have taken this role. The Feds would behave as lender of last resort. If there is distress selling in debts, the Feds can provide lending to banks and provide confidence for the debt market when lending activities among banks were prevented by tightened credit. However, the problem with this mechanism is that banks

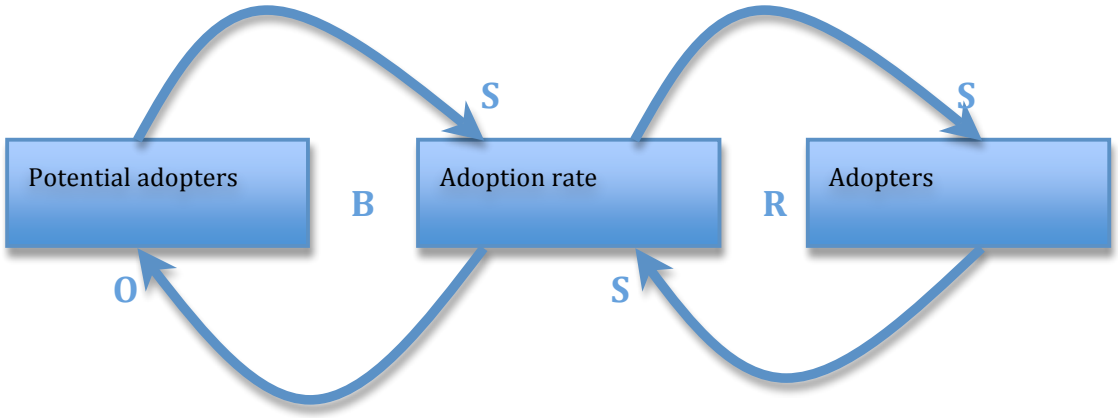
know that the Feds will always back them up if their liability structures become fragile. It will encourage them to intake more high-risk assets and speculation. Therefore, supervision and oversight is still needed to monitor their operations.[18]

Under those two mechanisms, the U.S. economy should have experienced continuing and stable growth. But this was not true during the subprime crisis. So what went wrong? This is because speculation of houses took place in the housing market and the structure of the system is inherent to failure. In the following, the paper will go into system modeling in attempt to justify this argument. The methodology used is called *causal-loop diagram* (CLD), below is an explanation of this methodology.

IV. Causal-loop Diagram (CLD)

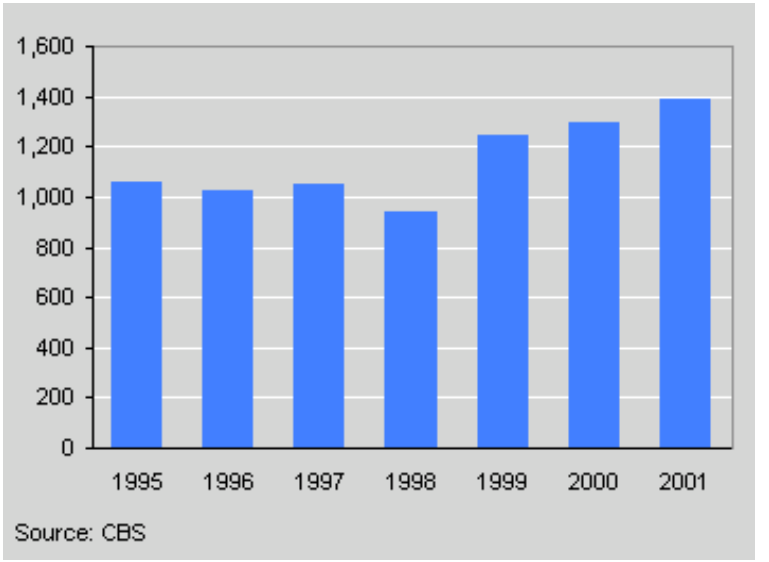
A causal-loop diagram is a methodology that aids in visualizing how interrelated variables affect one another. The diagram consists of a set of nodes representing the variables connected together. The relationships between these variables, represented by arrows, can be labeled as positive or negative.[19] Because in the financial instability hypothesis, financial crisis is systematic and therefore its occurrence can be traced to the failure of a particular financial system. The application of causal-loop diagram to model the housing and mortgage markets before the financial crisis took place can be used to discover the issues with the system and possible solutions.

To help the understanding of this methodology, below is sample of CLD that models the changes in adoption rate due to the changes in number of adopters and number of potential adopters.[20]



In this diagram, two agents are impacting adoption rates. The number of adopters has positive causal link with adoption rate, which is labeled as "S"—"S" stands for same direction of movement. At the same time, adoption rate also has positive correlation with the number of adopters. This is probably due to the word of mouth effect that introduces more people to the option of adoption as adoption rate increases. And as the number of adopters increase, the adoption rate inclines even more. Hence, those two agents reinforce the growth of each other. Together, they form a reinforcing loop that can generate growth infinitely if there is no interference. The loop is marked with "R" for reinforcing. Certainly this is not the whole story. Because as adoption rate increases, the market becomes saturated, the pool of potential adopters will get smaller. This negative causal link is marked as "O", meaning opposite correlation. But an increasing number of potential adopters will drive up adoption rate; therefore, there

is a positive causal link in return. Together, they form a balancing feedback loop that stabilizes the adoption rate when the word of mouth effect is attempting to spin the rate out of control. The loop here is marked as "B"—meaning balancing. In this system, the existence of both reinforcing loop and balancing loop ensure that the fluctuation of adoption rates is under certain level of control.



Certainly the model is only a simplification of reality and can be subjected to the addition of lots of other agents and variables, such as economic status, GDP per capita and birth rates. The graph on the side shows the number of children adopted in Netherlands from 1995 to 2001. This graph shows the adoption rate was climbing slight over the years. It is the evidence that the model above can be considered valid for those years, despite of its simplicity.[21] For policy makers, the diagram can provide guidance on how to establish policies for various purposes related to the system. For instance, if they desire to increase the number of adopters rapidly, they can enlarge the pool of potential adopters by laws such as allowing foreign population to adopt locally or easing the requirements and limitations on adopter qualities.

Nevertheless, this model lacks a time horizon for the system. This component is essential because systems change overtime due to social and technological progress. Therefore, this diagram must set a time boundary for the model and indicate that the feedback loops only reflect the behavior of the system during this particular period of time.

With an understanding on the fundamentals of system modeling, the paper can now present a model that is trying to understand the implications of speculative behavior in the housing market.

V. Modeling the Housing Markets

Appendix I contain the causal diagram that is modeling the housing markets. The purpose of this model is to understand the implications on the stability of financial system, when there is speculation presenting in the housing market. With a thorough understanding of the system, it is possible to expose which part of system will inherently cause crisis in the market if there is no interference, and discover potential solutions for the instability.

The time horizon of this model is from January 2006 to December 2008, the period from when the housing market experienced tremendous growth to the point of the bubble burst, and led to liquidity crisis and credit crunch.

Each agent in the diagram is considered an essential variable for the system. Below is an explanation for the meaning of each agent.

- Amount of Mortgage Securitized: Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac) were chartered by the US government as institutions to buy mortgages, pool them, and sell them as "mortgage-backed securities". Although the two agencies were purchasing different types of mortgages in the secondary markets, their purpose and function in the mortgage market are similar. This variable is the dollar amount of mortgage they purchase from the secondary market.
- Cash Flow to Mortgage Originators: Mortgage originator can be either a mortgage broker or a mortgage banker, and is the original mortgage lender.[22] Wells Fargo and IndyMac were both among the largest mortgage originators in the US. Those originators create mortgages to finance homebuyers in the primary market. When Fannie Mae and Freddie Mac purchase the mortgages from them in the secondary market for securitization, the originators receive cash inflows. This variable is the amount of cash inflows they receive in exchange for mortgage.
- Ability for Mortgage Originators to Lend: This is determined by the liability structure of the originators. If the ability to lend is higher, it means the mortgage originators are able to finance more mortgages, and vice-versa.
- Credit Requirement to Borrow: The requirement is subjected to the checking and verification of credit score, income level and past credit history. The measurement typically applies to individual decision-making. This variable is a general inclusion of all the different credit requirements.

- Ability to Finance Through Mortgage: The ability for house buyers to finance their purchases through mortgage on average.
- Ability to Payback Mortgage: The ability for house buyers to meet the monthly payments for the mortgage they borrow on average.
- Demand for Houses: The market demand for houses, regardless of specific communities or neighborhoods. This variable can be considered as the demand curve in a neoclassical economic theory of market supply-demand.
- Home Prices: This variable is using the monthly house price index from the Federal Housing Finance Agency, which is calculated using purchase prices of houses backing mortgages that have been sold or guaranteed by Fannie Mae or Freddie Mac.[23]
- Willingness to Speculate: Speculation in the housing market is defined as the purchases of houses that are not used as primary residence, but rather intended for earning return from renting or reselling. The variable is a psychological factor.
- Speculation: The purchases of houses that are not used as primary residence, but rather intended for earning return from renting or reselling. This variable is the level of speculative activities in the market.

- Home Purchases: The number of purchases of houses in the US market. This variable is using the data from US Census Bureau on the number of houses sold every month.
- Foreclosure Rates: The rates of mortgage foreclosure in the US housing market. This variable can be accessed from RealtyTrac on the number of foreclosure filings every month.
- Monthly Payments to Mortgage Securitization Issuers: The monthly payments made by mortgage borrowers to the servicers, and then to the issuers. This is the amount of monthly payments made by all borrowers, lessened fees charged by mortgage servicers, if any presents.
- Cash Flow to Investors: Once the mortgage securitization issuers receive the money from servicers, they will channel them to each institutional and individual investor as their return on investment. This is the amount of monthly payments collected by servicers, lessened the fees charged by issuers. And that is the amount that eventually reaches investors.
- Investors Willingness to Invest: Investors willingness to invest is determined by the market perception of risk and return. This variable is a psychological factor.
- Purchases of Mortgage-backed Securities: The amount of MBS that is purchased by institutional or individual investors from issuers such as Fannie Mae and Freddie Mac.

Because of the complication of the model, it will be broken down into three feedback loops for discussion.

Appendix II is a reinforcing loop of the system, which is marked with "R1". R1 represents the feedback in the demand of mortgage in the market. When mortgage originators create mortgages for house buyers to finance their purchases, Fannie Mae and Freddie Mac buy those mortgages from the secondary market, pool them, and sell them to investors.

The money these two agencies pay becomes cash flow for mortgage originators. As the originators receive money, they are able to lend to more homebuyers. However, if the growth of potential buyers cannot meet those originators' expansion of lending ability, such as the decline in potential adopters in the sample diagram above, the originators will possess excessive cash in their accounts. This is not an acceptable situation for any profit-seeking entities. Instead, they will choose to lower the credit requirement for house buyers to borrow mortgages. As the requirement goes lower, more people will be able to finance their home purchases. This raises the demand for houses in the market and thus sales and purchases will surge.

Because those purchases are financed by mortgages, more monthly payments will be made from homebuyers to servicers, and reach to mortgage securitization issuers. Those monthly payments are the cash flow to institutional and individual investors that invest in MBS previously. Attracted by the return generated from those securities, investors' confidence increases and they are willing to put more money into this investment vehicle. However, similar to the issue with

potential adopters, the amount of secured, low-risk mortgage pools is also growing slower than investors' demand. Therefore, investors take on investment strategies that are more aggressive, by buying mortgage pools that are riskier but with higher return. During this change of perception on risk, investors begin to step on the pattern that described by Minsky in his three categories of debt-financing—from hedge to speculative, and eventually to ponzi financing. Because housing market is the focus of this paper, the analysis on the deterioration of investment strategy will not be taken further. But the point of bringing up Minsky's theory here it to justify how mortgage originators and investors will become negligent on risk inherently as their caution against risk is loosened up by over-optimism and growing profits.

In response, Fannie Mae and Freddie Mac securitize more mortgages in order to meet the growing demand. This reveals that the mortgage demand is a self-reinforcing feedback loop. Nonetheless, it cannot spin out of control easily due to the presence of a balancing feedback loop.

Appendix III is the balancing loop of the system, which is marked with "B1". B1 represents the feedback in the supply of mortgage in the market. As a result of lower credit requirement, the ability for borrowers to payback both the principal and interest amounts will drop. Without sufficient income to meet monthly payments, foreclosure rates will rise.

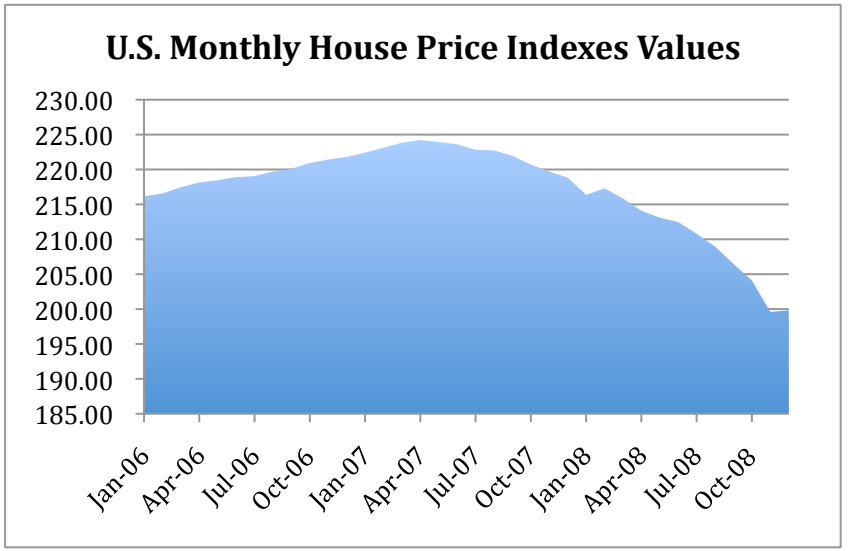
Subsequently, the monthly payments that go to mortgage securitization issuers will decrease because more borrowers default on their loans. This blockage on cash flow to investors offsets part of the reinforcing movement in the mortgage demand loop. Because of this counter-effect, the mortgage can remain fairly stable without interference, until the presence of speculation in the housing market that causes another reinforcing loop in the system.

The speculative behavior is modeled by the feedback loop in Appendix IV. When the demand for houses rise, it raises not only the number of home purchases, but also their prices. This attracts people to start buying houses not for the purpose of residence, but rather to rent out or resell for profits. As a result, speculation appears and becomes more and more frequent in the housing market. This further drives the demand for houses up, which causes a reinforcing loop in the housing market.

The reinforcing impact from speculation can drive rapid growth in both the housing and mortgage market. This is when the bubble in housing market forms. However, as the balancing loop continue to function, the diminishing ability for borrowers to meet monthly payments and rising foreclosure rates will still cause blockage on monthly payments. Eventually, when it reaches a shocking point, investors' confidence will plunge and pull back from investing at MBS. Once the cash flow to mortgage originators is dwindled, fear and pessimism will spread in the demand of mortgages and houses. At this point, the reinforcements in both mortgage demand and the housing market will fail to generate growth. As a result, the two markets can collapse in only a short period of time.

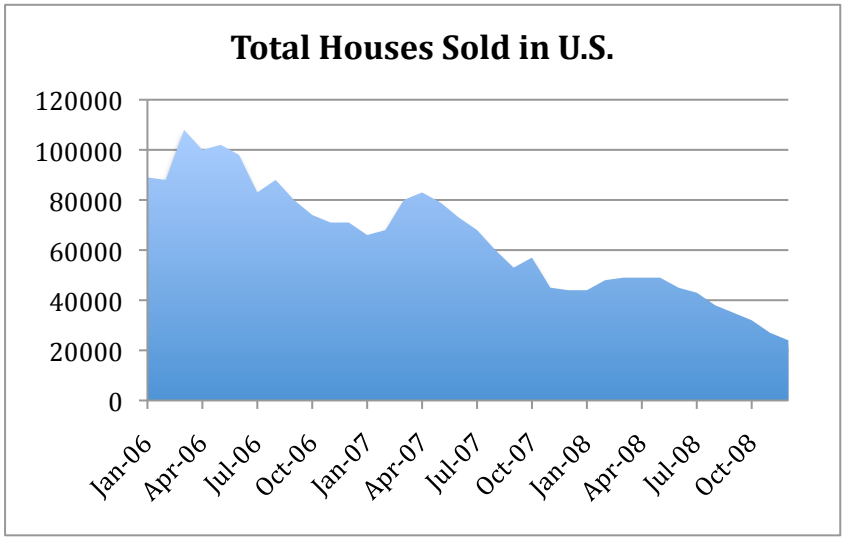
VI. Applying the Model

According to the model, home purchases are pushed by both the primary and speculative demand of houses. Looking at the monthly house price index from the Federal Housing Finance Agency, the house prices in U.S. did follow a rapid growth from Jan-06 to Apr-07.[24] But when the price showed downside on Apr-07, it plunged exponentially from that point on. This was because the shocking on investors confidence led to debt-deflation that fed on itself. The "snowball effect" brought the prices down in a uncontainable rate.



The same phenomena occurred in the number of home purchases. Looking at the number of total houses sold in U.S. published by the U.S. Census Bureau, the amount of home purchases rose to a high level on Apr-06. The number dropped steadily for a year and rebounded shortly on Apr-07. After this period, it plunged rapidly for the rest of the time horizon. Again, that was caused by the failure of the system. It showed weakness a year earlier than price indexes because it was the primary house buyers that initially withdrew from the market, while speculators were still pushing prices upward. In other words, it was R1 in the model that declined initially from Apr-06, and R2 also started to drop from Apr-07.[25]

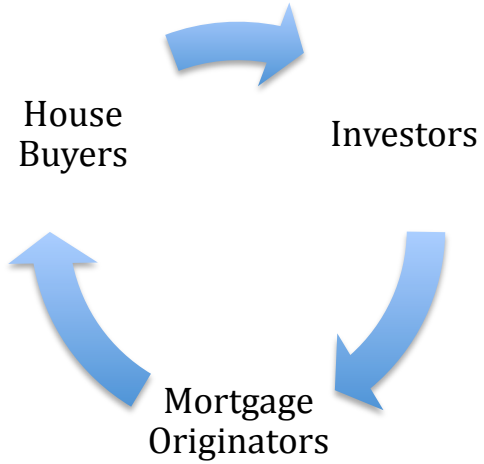
For policy makers, their have the responsibilities to encourage growth in the U.S. housing market. At the same time, they are also accountable for maintaining a healthy economy. Healthy economy is an economy where growth is accompanied by moderate inflation and a stable financial system. While Keynes and Minsky's suggestions on large government spending can provide protection against inflation, the U.S. economy still lacks an effective mechanism or institution to wrestle with the Fisher's type debt-deflation. Despite that the Feds could behave as the lender of last resort, the financial crisis that took place had proven its ineffectiveness.



The causal diagram has indicated that in the past mortgage and housing markets, such debt-deflation was not avoidable and the system was inherently subjected to failure at some point. Especially when speculation takes momentum in the market, the second reinforcement effect makes crisis even more severe once it occurs. One way to prevent this level of crisis from ever happening again in the future, or at least to diminish its severity, the federal government should take out a portion of the tax revenue to finance partial mortgages directly to borrowers in the housing market.

This concept comes from the tactic of large government spending to fight inflation. Government spending is effective in fighting inflation because it can put limitation on the fluctuations of consumer goods and capital assets, thus restrict the fluctuations of worker wages and investor returns. The same idea can be applied to the housing market. If there is some kind of restrictions laid on the housing market that can limit the fluctuations of house demand, then the profits that speculators can get from speculating will be restricted. Without substantial speculation in the housing market, the R2 reinforcing feedback loop will be less likely to drive the system out of control.

While price control on houses is an option, President Reagon had proven that it is definitely not a good option. Policy makers should consider using treasury money to ensure that the cycle of cash flow from investors to mortgage originators, then from mortgage borrowers back to investors can experience less degree of fluctuations. A way to do this is to act as a moderator in the cycle of cash flows.



Looking at Appendix V, a new agent named "Government Lending" is added to system. The government lending here means the federal government will establish or charter an agency to lend portions of house mortgages—possibly 5%-10% of the amount of mortgage—at rates and terms that are better than private entities, directly to house buyers. If home purchases

increase, the government will reduce its lending window, and mortgage originators must finance a larger portion of the mortgage, which gives them more risk. As a result, those originators will be alarmed to raise their general credit requirements, which can slow the self-reinforcement on primary and speculative purchases. On the opposite, when home purchases decrease, government will loosen its lending window, and smaller portion of the mortgage will be financed by mortgage originators. This encourages them to lower their credit requirement and allow house demand to grow.

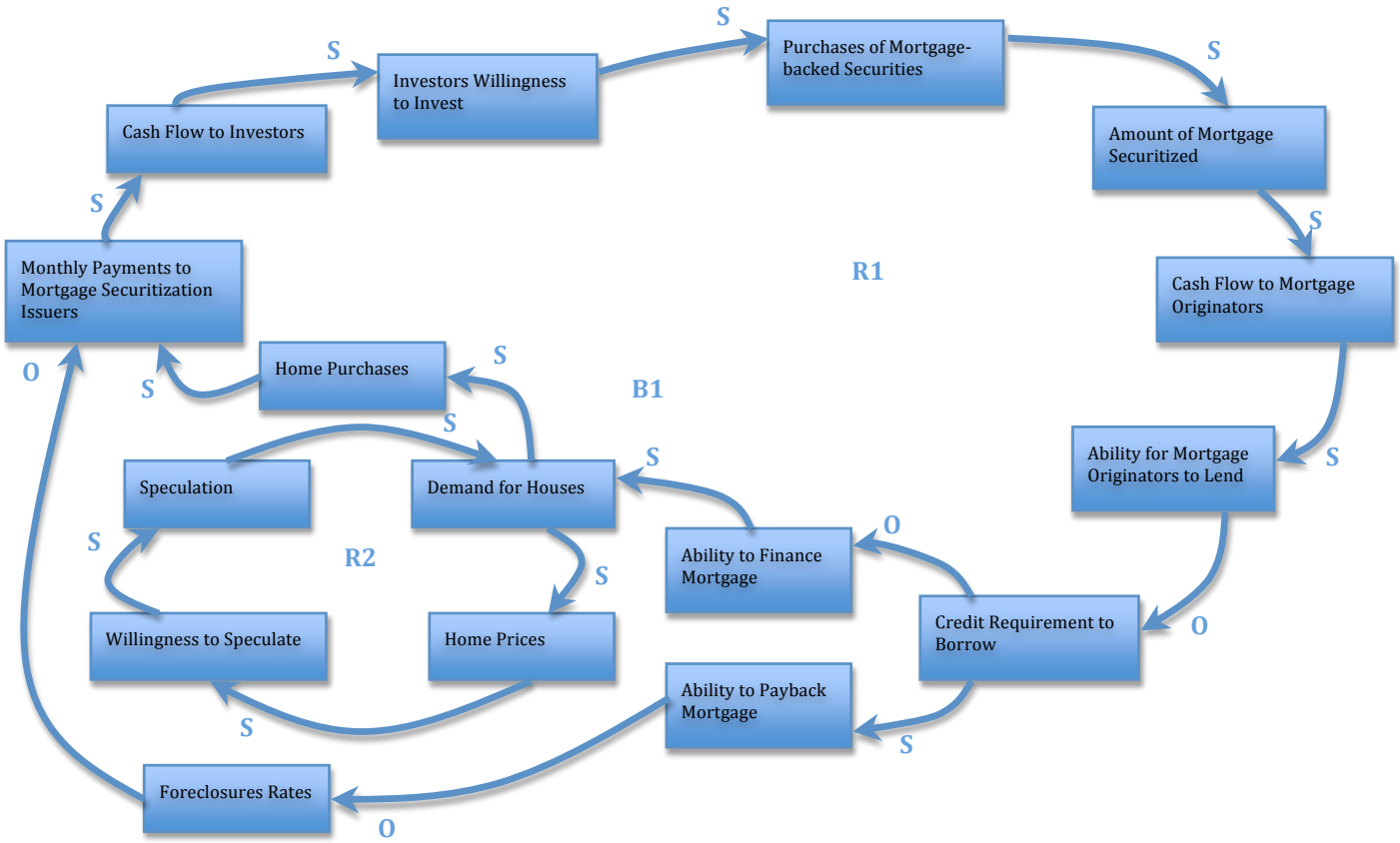
In terms of the model, the addition of this variable can create another balancing loop to the diagram. This is not to say that the system is not completely safe from failing. But this loop can bring in more stability to the system and to solve the debt-deflation issue that cannot be addressed by the Federal Reserve.

VII. Conclusion

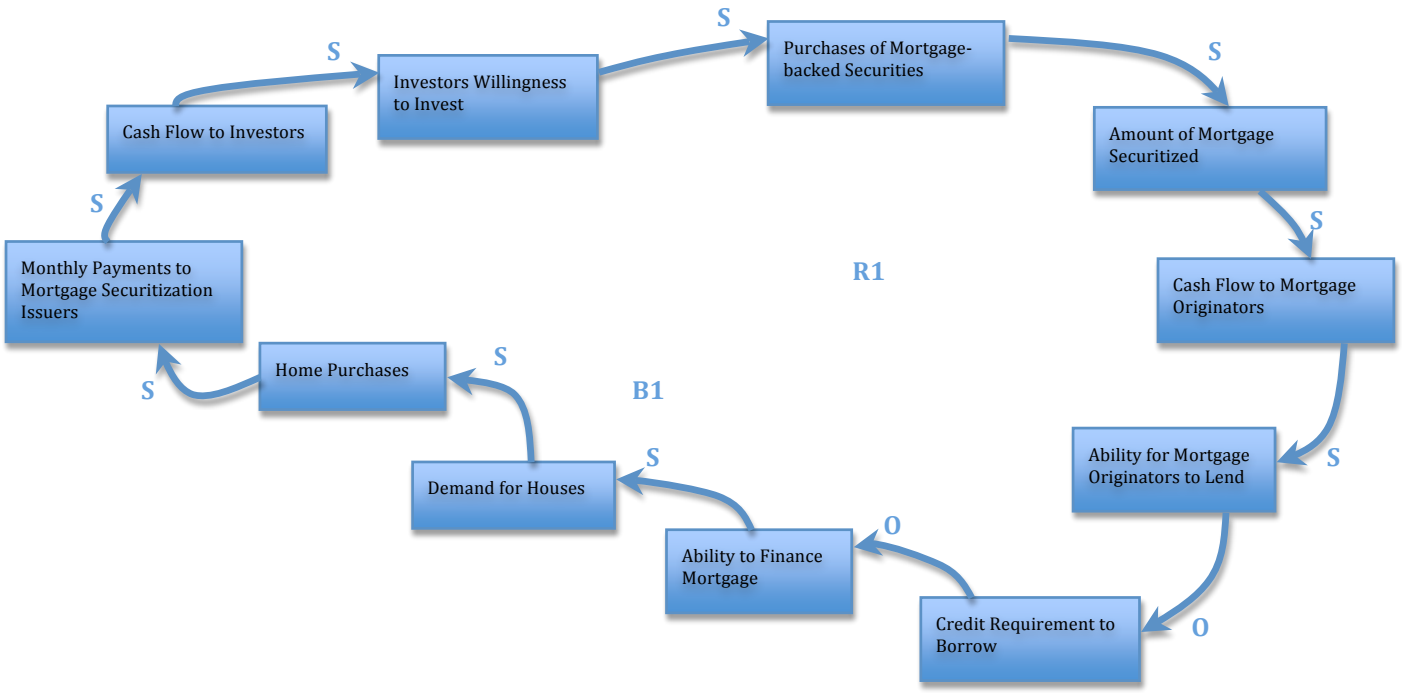
In a capitalist economy, the process of "inflation feeds on inflation, debt-deflation feeds on debt-deflation" is a systemic failure that proven by history to be destructive. While the increase of government spending after the war has shown to be effective in dealing with inflation, the recent financial crisis is telling economists and policy makers that their methodologies were not sufficient enough in dealing with the Fisher's type of debt-deflation.

Therefore, while modifying or dictating the system are not acceptable, adding an agent to the diagram that can limit the reinforcement is a preferable methodology. Government provide funds to finance portions of the mortgages have the advantage of alarming mortgage originators when to heighten or lower their general credit requirement on borrowers, thus indirectly limit the fluctuations of demand for houses and cash flow in the financial system. Certainly, in order to attract house buyers to borrow, the government must justify the benefits by giving out favorable rates and loan conditions.

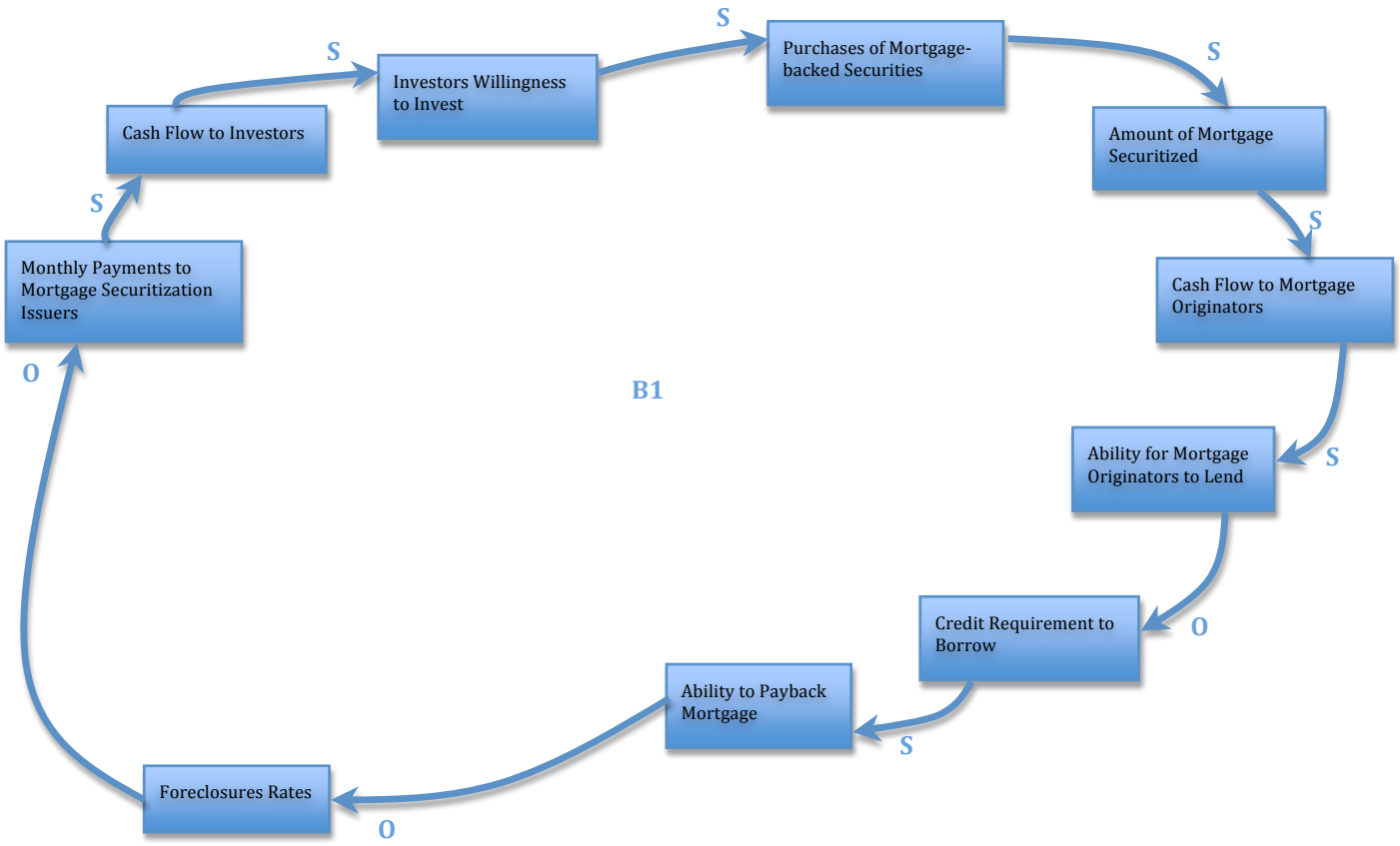
Appendix I


Investors Willingness to Invest
Purchases of Mortgage-backed Securities
Amount of Mortgage Securitized
Cash Flow to Mortgage Originators
Ability for Mortgage Originators to Lend
Credit Requirement to Borrow
Ability to Payback Mortgage
Ability to Finance Mortgage
Demand for Houses
Home Prices
Home Purchases
Speculation
Willingness to Speculate
Foreclosures Rates
Monthly Payments to Mortgage Securitization Issuers
Cash Flow to Investors
R1
R2
B1
S
O

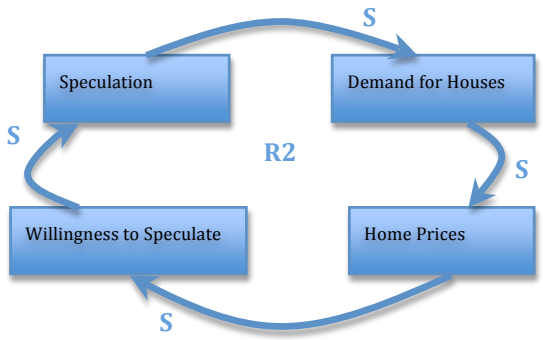
Appendix II


Investors Willingness to Invest
Purchases of Mortgage-backed Securities
Amount of Mortgage Securitized
Cash Flow to Mortgage Originators
Ability for Mortgage Originators to Lend
Credit Requirement to Borrow
Ability to Finance Mortgage
Demand for Houses
Home Purchases
Monthly Payments to Mortgage Securitization Issuers
Cash Flow to Investors
S
S
S
S
S
O
O
S
S
S
R1
B1

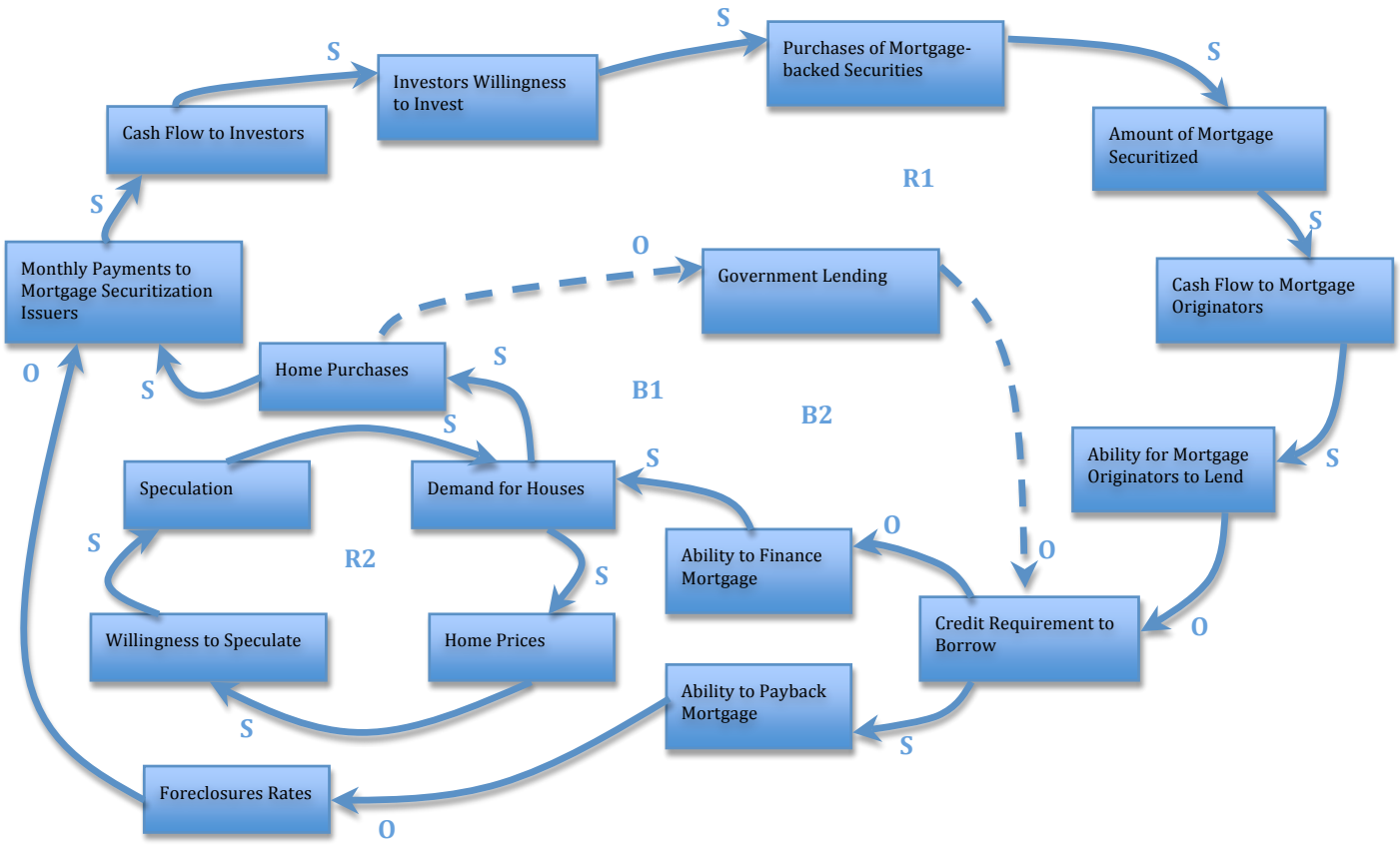
Appendix III



Appendix IV


S
Speculation
Demand for Houses
S
R2
S
Willingness to Speculate
Home Prices
S

Appendix V


Investors Willingness to Invest
Purchases of Mortgage-backed Securities
Cash Flow to Investors
Amount of Mortgage Securitized
R1
Monthly Payments to Mortgage Securitization Issuers
Government Lending
Cash Flow to Mortgage Originators
Home Purchases
B1
B2
Ability for Mortgage Originators to Lend
Speculation
Demand for Houses
Ability to Finance Mortgage
R2
Credit Requirement to Borrow
Willingness to Speculate
Home Prices
Ability to Payback Mortgage
Foreclosures Rates
S
O

[1] "Foreclosure Filings Up 81% in 2008." Associated Press 01 Jan 2009 17 Mar 2009 <http://www.cbsnews.com/stories/2009/01/15/politics/main4722948.shtml>.
[2] Hagerty, James R., and Deborah Solomon. "Rising Number of Homeowners in Trouble." The Wall Street Journel 06 Dec 2008 17 Mar 2009 <http://online.wsj.com/article/SB122848957359182795.html>.
[3] David, Deborah, David Enrich, and Jon Hilsenrath. "New Bank Bailout Could Cost $2 Trillion." The Wall Street Journal 29 Jan 2009 17 Mar 2009 .
[4] "The Employment Situation: December 2008." Bureau of Labor Statistics. 09 Jan 2009. United States Department of Labor. 17 Mar 2009 <http://www.bls.gov/news.release/empsit.nr0.htm>.
[5] Gutierrez, Carl. "America, The Jobless." Forbes 04 Dec 2008 17 Mar 2009 <http://www.forbes.com/2008/12/04/jobs-factory-recession-markets-econ-cx_cg_1204markets12_print.html>.
[6] Dodd, Christopher J.. "Summary of The "Emergency Economic Stabilization Act of 2008." United States Senate Committee on Banking, housing, and Urban Affairs 02 Feb 2009 <http://dodd.senate.gov/?q=node/4581>.
[7] Herszenhorn, David M. and Carl Hulse. "Deal Reached in Congress on $789 Billion Stimulus Plan." The New York Times 12 Feb 2009 17 Mar 2009 .
[8] Murphy, Brian. "Getting Back on My Feet: Adjusting to New Job." Laid Off and Looking 29 Jan 2009 17 Mar 2009 <http://blogs.wsj.com/laidoff/2009/01/29/adjusting-to-new-employement/>.
[9] Jordan, Dawn. "As the Economy Tumbles, Feeling Eager to Help." Laid Off and Looking 04 Mar 2009 17 Mar 2009 <http://blogs.wsj.com/laidoff/author/djordan/>.
[10] Crehan, Michael. "Making New Compromises to Stay Afloat." Laid Off and Looking 06 Mar 2009 17 Mar 2009 <http://blogs.wsj.com/laidoff/author/mcrehan/>.
[11] Shiller, Robert J.. The Subprime Solution. Illustrated. Princeton University Press, 2008.
[12] Minsky, Hyman P.. "The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to "Standard" Theory." Challenge 20(1977): 22-27
[13] Wolfson, Martin H.. "A Pot Keynesian Theory of Credit Rationing." Journal of Post Keynesian Economics 18(1996): 43-470.
[14] Fisher, Irving. "The Debt-Deflation Theory of Great Depressions." Econometrica 1(1933): 337-357.
[15] Minsky, Hyman P.. "The Financial Instability Hypothesis." (1992): 1-10.
[16] Papadimitriou, Dimitri B., and L. Randall Wray. "Minsky's Analysis of Financial Capitalism." (1999): 1-16.

[17] Chantrill, Christopher. United States Federal, State and Local Government Spending. 18 Mar 2009 <http://www.usgovernmentspending.com/#usgs302>.
[18] Tse, Janelia. "Minsky's Financial Instability Hypothesis." Oeconomicus IV(2001): 77-81.
[19] "Causal Loop Diagram." Wikipedia. 2009. 18 Mar 2009 <http://en.wikipedia.org/wiki/Causal_loop_diagram>.
[20] "Adoption CLD." Wikipedia. 2006. 18 Mar 2009 <http://en.wikipedia.org/wiki/File:Adoption_CLD.gif>.
[21] Zee, Marcelle van. "Adoption Rate Up Again." Web Magazine 23 Dec 2002 18 Mar 2009 <http://www.cbs.nl/en-GB/menu/themas/veiligheid-recht/publicaties/artikelen/archief/2002/2002-1099-wm.htm>.
[22] "Mortgage Originator." Investopedia. 18 Mar 2009 <http://www.investopedia.com/terms/m/mortgage_originator.asp>.
[23] Calhoun, Charles A.. "OFHEO House Price Indexes: HPI Technical Description." 1996. Office of Federal Housing Enterprise Oversight. 18 Mar 2009 <http://www.ofheo.gov/Media/Archive/house/hpi_tech.pdf>.
[24] "Monthly Seasonally-Adjusted and Unadjusted Indexes: January 1991 - December 2008." House Price Index. 2008. Office of Federal Housing Enterprise Oversight. 18 Mar 2009 <http://www.ofheo.gov/hpi_download.aspx>.
[25] "Total Houses Sold." Economagic. U.S. Census Bureau. 18 Mar 2009 <http://www.economagic.com/em-cgi/data.exe/cenc25/stagemon01>.