

This Time It's Different: The Spread of the Worldwide Financial Crisis, 2007-2010\*

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## Abstract

The worldwide financial crisis of 2007-2010 was set off by the collapse of the subprime mortgage market in the U.S. This crisis caused widespread banking failure in the U.S. and forced the federal government to provide a massive bailout to the financial sector. The crisis then reverberated to banks around the world, and eventually brought about a worldwide recession. This paper documents the spread of the crisis particularly across the OECD countries, the largest and most developed countries. We explore various mechanisms by which the financial crisis might have spread including the existence of similar regulatory schemes, export connectedness, and the presence of a housing bubble. We conclude that the main mechanism by which the crisis spread was the purchase of American backed mortgage securities by foreign banks. We end by considering the implications of our results for the literatures on financialization and the sociology of finance.

## Introduction

The U.S. mortgage market began to turn down in 2006 and subprime mortgages began to default. Beginning in 2007, these defaults spread to the wider mortgage market. They began to undermine the large banks that were heavily invested in mortgage originations, mortgage securitization, and buying mortgage backed securities such as collateral debt obligations (CDO) (for an account of these events, see Fligstein and Goldstein, 2010). The banks themselves began to fail in the spring of 2008 and this caused a financial panic. In the next year, this panic spread to other countries around the world. By one count, 23 countries experienced a systemic bank crisis by the end of 2009 (Laeven and Valencia, 2010). These crises were followed by a deep and long lasting recession. The main purpose of this paper is to untangle why this domino effect occurred.

There are two unusual features of this financial crisis. First, the crisis started in the U.S. While the U.S. has not been immune to financial crises in the postwar era (Kauffman, 2010), they have tended to be localized and mostly contained. For example, the savings and loan crisis of the late 1980s destroyed a large part of the savings and loan industry and dramatically affected the economy of the southwestern U.S. Yet, it failed to even cause a recession in the U.S. (Barth, 2004). Second, most of the cases of economic contagion in the postwar era world have involved less developed countries. This crisis did not generally spread to the less developed world, but instead was most virulent in the advanced industrial societies. Particularly hard hit were European countries. Indeed, one of the most stunning features of the world wide recession caused by the collapse of the subprime mortgage market in the U.S. was that for the first time since the Great Depression, the advanced industrial societies went into a deep and sustained

recession together. Moreover, this economic collapse happened in just a little over a year. What explains what happened?

There are two main theoretical perspectives that have tried to understand international financial crises and their spread. The first originates in international economics (Forbes and Rigabon, 2001; Reinhart and Rogoff, 2008; 2009; Claessens, Dornbusch, and Park, 2001; Forbes, 2004, for a recent review, see Claessens and Forbes, 2004). Here, scholars have tried to track out the causes of such crises in the first place and then the contagion of those crises to other countries. The literature argues that financial crises spread across countries in two main ways. First, there is some fundamental cause that comes to affect multiple countries. This might include shocks like a rapid increase in the price of oil. They might also be related to trade linkages whereby a turndown in one country directly impacts the economic path of another. A second set of causes has to do with the behavior of international financial investors. Here, financial investors disinvest in a second country in order to protect their financial assets because of the downturn in a first country. They may do so because they believe that the underlying economic and political conditions in a second country are similar to those in the first. They might also leave countries they consider more risky as investment sites and move their assets to less risky investments like U.S. treasury bills producing what is called a “flight to safety”. To analyze the spread of any given crisis, analysts try and partition these forms as explanations of what happened.

This perspective has been applied to the current crisis (Rose and Spiegel, 2010, Claessens, et.al., 2010). Here, scholars have drawn mostly negative conclusions. Surprisingly, there is little evidence that countries that have gone into recession share fundamental features that may have left them more likely to have a recession or push financial investors towards a

flight to safety. Rose and Siegel (2010) note that the thing most of the countries that had a deep recession appear to have shared in common was that they were amongst the richest countries in the world.

This paper uses a more sociological perspective to gain some leverage on what happened. We develop an argument drawing on the sociological literatures concerning financialization, the globalization of finance, and the sociology of finance. Financialization is the increasing importance of financial markets, financial motives, financial institutions, and financial elites in the operation of the economy and its governing institutions, both at the national and the international level (Epstein, 2006). Scholars interested in financialization have tried to document its origins and spread, including its effects on households (Martin, 2002; Krippner, 2005; Stockhammer, 2004; Fligstein, 2001; Davis, 2009; Zorn, et. al., 2004).

The globalization literature takes up financialization as one of its central themes. This literature begins with the premise that financial markets and financial products have now been deployed on a global basis. The main mechanism in this argument to explain why this has happened comes from neomarxist theories (Harvey, 1985; Boyer, 2000, Engelen, 2002; Froud, et. al. 2000). The basic argument is that in advanced industrial countries, investment opportunities have declined. This pushes financial capital to seek out new opportunities around the world for profit. In the past 30 years, this has produced a constant search for the next new thing. Money flows into less developed countries seemingly poised for an economic take-off. It also flows into activities such as currency trading and the trading of financial instruments where returns might be higher than investments in government bonds.

The sociology of finance has focused on how the various kinds of financial instruments have come to be at the core of this integration (Knorr Cetina and Bruegger, 2004; McKenzie,

2006; Zaloom, 2006; Leyshon and Thrift, 2007). Here, the focus is on the integration of world markets through the production of systems of financial trading. Leyshon and Thrift (2007) argue that the core of the financialization process is the international search for investment opportunities that involve either direct investment or loans for underlying assets that produce a reliable income stream. They view the securitization of assets as the key financial innovation underlying the integration of global finance.

Aalbers (2009; 2010) has used these arguments to suggest that the main cause of the current financial meltdown in the world economy was the discovery of American mortgages as a source of investment opportunity for investors worldwide. Investors (particularly banks) during the 2000s were searching for higher rates on relatively safe assets. Given the low interest rates around the world, government bonds produced very low returns. In Europe in particular, there were few national investment opportunities that seemed to be both safe and paid higher rates of return. The securitization process applied to mortgages provided one such investment. American mortgage backed securities were highly rated by credit agencies and yielded returns 3-5% higher than government bonds.

In this paper, we develop these ideas and test the degree to which American mortgage backed securities were the direct cause of the world wide banking crisis and the recession that ensued. We show using quantitative data that investors from the developed world were indeed loading up on American mortgage backed securities. They not only used their own capital to buy these securities, but they borrowed heavily to support their purchases. When these securities began to decline in price and in some cases suffer outright defaults, banks were unable to cover their losses. This forced them to seek out government protection. We demonstrate that the strongest predictor of a banking crisis in a particular country was the level of holdings of

American mortgage backed securities. We also demonstrate that these banking crises were the most important explanation of pushing countries into recession.

This paper has the following structure. First, we review the literature in both economic and sociology more extensively. Then, we develop a set of hypotheses about potential factors that may explain the origins of banking crises and recession. Next, we discuss our data and methods and provide results. In our conclusion we return to the theoretical issues posed by the literatures of financialization and the sociology of finance.

### Review of the Literature

At the core of this paper is the attempt to understand why the downturn in U.S. housing prices beginning in late 2006 that later caused many U.S. banks to fail, snowballed and spread to other countries. Our purpose is not to explain the rise and fall of the housing market in the U.S. but to treat that event as the catalyst for the worldwide recession. There is now a small mountain of literature on why the U.S. mortgage market got so overheated. Recently, for example, Lounsbury and Hirsch (2010) have collected two volumes of papers that consider various aspects of that crisis in the U.S. from a sociological perspective.

There are literatures that attempt to explain how financial crises spread across countries in economics, sociology, and political science. We would argue that there is actually quite a bit of agreement on the mechanisms by which such contagion is possible. Scholars on all sides agree that fundamental conditions in each country make them more or less susceptible to economic crises. They also agree that the international integration of financial markets plays a role in creating more direct and possibly consequential linkages that can cause contagion.

The disagreements are more in the overall judgments scholars apply to whether or not such linages are a good or bad thing. Economists generally see more trade and more open financial markets as a good thing. Free trade lowers prices for consumers and makes goods and services more widely available. Open financial markets provide capital for people, firms, and governments that might not be provided for in closed national capital markets. They understand there are winners and losers and possible risks in market opening projects. But, they believe those risks can be managed and that in the long run, the benefits outweigh the costs. Economists also believe that governments can regulate such markets in a way that lessens the impact of the bad effects and cushions downturns.

Sociologists and political scientists tend to see the risks as being more substantial. They are worried that governments are losing sovereignty and control over their economies (Strange, 1996; Cerny, 1994). They are also worried that financial integration is too unregulated and that contagion happens both more frequently and with dire consequences for many countries, particularly poor ones. Finally, sociologists and political scientists tend to be more skeptical that the gains from free trade and open finance are both large enough and distributed sufficiently widely that they justify the risks. They tend to see much of financial integration as being akin to legalized gambling and thereby serving no obvious economic function.

In the economics literature, the word “contagion” has been used to describe how crises in one country can spread to other countries (Forbes and Rigobon, 2001; Claessens, Dornbusch, and Park, 2001). There are three ways in which this term can be used to describe the mechanisms by which economic problems in one society can move to other societies. First, countries can be closely linked either by having similar underlying structures to their economy or by virtue of links between their economies. Hence when something happens in one economy it quickly



spreads to those who are similarly placed. Second, economists take global financial integration for granted. They tend to see financial intermediaries as occupying a positive role in providing capital to borrowers around the world who might otherwise have little access to financial markets. In the context of financial crises, financial investors may perceive the risks in one society as high relative to others and therefore they shift their investment strategies by moving funds from one place to another in response to extreme uncertainty. Here, the principal mechanism is that investors disinvest in the local stock, bond, or property markets in order to reinvest in markets where there is less risk. Finally, true contagion implies panicked investors punishing countries that exhibit neither similar underlying conditions, nor particularly strong connections, nor higher forms of risk. This form of contagion is close to our common sense view of the term. Not surprisingly, most economists believe that most of the time, contagion is rational, i.e. motivated by actors who surmise similarities in underlying conditions or riskiness (see the reviews by Moser, 2003; Forbes, 2004).

We now turn to consider the types of factors that might be relevant to discovering how the connections between countries might help explain the spread of the crisis that began in 2007. There are two main factors that economists have identified as similar structural features in real estate markets. The first is the role of financial deregulation in creating a financial sector that is more oriented towards riskier investments. Economists have generally thought that the financial deregulations of the past 30 years have produced a wider availability of credit for all kinds of borrowers, helped create jobs, and by implication, economic growth. But financial deregulation is a two edged sword. Allowing banks to enter into many markets potentially makes them take more risks (Schiller, 2003). In the context of the current crisis, some have argued that banks were unprepared to take on the challenges of the downturn because they were not regulated enough

(Johnson, 2009; Kaufmann, 2010). This suggests that in countries with higher levels of deregulation, we should observe more banking crises and a deeper recession.

The most important factor that economists have focused on is the housing bubble itself (Reinhart and Rogoff, 2008; 2009). The basic argument is that the financial crisis was caused by house prices rising too quickly. This created a speculative bubble that fed on itself. In this version of the story, as the bubble went up, banks had a booming business loaning as much money to as many people as possible. Borrowers in the housing markets where prices were rising dramatically took out ever larger loans. Some of this was that buyers had no choice if they wanted to buy a house in the face of rising prices. But some was also driven by speculation. Many borrowers took out exotic loans that put them in the position of having to re-finance every two or three years or face steadily increasing house payments. They paid for these refinancing out of price increases in the underlying value of the house (Davis, 2009). When housing prices started to slow down, this created a wave of defaults on loans. These defaults affected the entire banking structure of the mortgage market from loan originators, to mortgage banks, commercial banks, and investment banks, and other institutional investors. For economists, countries that shared this rapid appreciation of housing prices were highly susceptible to a bank crisis and the resulting recession.

Two other factors are common in economists' discussion of contagion. The first is the dependence of a country on exports for economic growth. One of the main ways in which countries can experience economic downturn is through a slowdown in economic activity of their principle trading partners. If trading partners experience a recession (here induced by the housing bubble bursting followed by a systemic banking crisis), then they will simply import less. To the degree that any given economy is more dependent on export partners for growth,

they are likely to suffer a recession themselves. So the most likely countries to be affected by economic recession are those that are highly dependent on exports.

Finally, investors in financial markets will be worried about the ability of a given country to continue to avoid a banking crisis or a recession. One of the main measures of the vulnerability of a particular economy to such crises is the current account deficit. Countries that are running a high current account deficit may not be able to raise sufficient funds to keep that deficit funded. If debts cannot continue to be paid, then defaults will happen. Defaults on government bonds, commercial paper, and other loans will weaken a national banking system and may even cause a systemic banking crisis. Such a crisis will also precipitate a recession. From the perspective of foreign holders of debt, the current account deficit is a quick and dirty measure of the riskiness of this happening. Investors who are worried that a given country will not be able to continue to service its debts, will liquidate their holdings and flee to what they view as safer investments. It was this kind of contagion that some have argued caused the Asian financial crisis of the late 1990s (Claussens, et. al., 2004).

Many of these same variables would figure into analyses for sociologists and political scientists interested in political economy. All would agree that the fundamental underlying conditions in a particular economy and its connectedness to other economies ought to play a role in contagion. For example, sociologists and political scientists would agree that deregulated financial markets would increase risk and speculation with possibly disastrous outcomes. Where sociological and political science accounts of financialization and globalization might have something to add, is how the nature of the changes in the linkages in the financial system has increased that susceptibility in the past 30 years. The question that we wish to take up is:

how to understand the ongoing integration of the world financial system as a potential cause of systemic banking crises and recessions during 2007-2010.

Scholars in political science, sociology, and geography have been interested in how global finance has changed and evolved since the mid 1970s. Some approaches in international political economy emphasize how neoliberalism and financialization have transformed the world system (Hellener, 1994; Frieden, 1991; Strange, 1996; Cerny, 1994). From this perspective, the American government in the 1970s gave up on a more coordinated approach to global finance as indexed by the Bretton Woods agreement. Instead, they encouraged the deregulation of worldwide financial markets and the use of market mechanisms to determine exchange rates and the allocation of capital in general. This dramatically increased the size of such markets and the cross border trade of financial products of all kinds. The literature on international financial markets has focused on four kinds of financial markets: currency, credit, and assets (Montgomerie, 2008).

Much of the debate in this literature has centered on how this process has affected the ability of governments to control their economies. It is widely thought that policies that create inflation, encourage current account deficits, and favor consumption over production are likely to result in financial investors removing their capital from a particular country. This can result in a run on the value of the currency that country and create a downward spiral whereby a banking crisis ensues and the economy tips into recession. As noted above, this literature has mostly viewed what goes on in this markets as speculative and not very economically productive (Schiller, 2003; Lipuma and Lee, 2004; Blackburn, 2006; Bookstaber, 2007). Strange goes so far as to call worldwide financial markets “casino capitalism” implying that they serve no useful economic or political function (1998).

The problem with the view that all forms of financial integration only produce speculation is that it ignores the fact that many investors are trying to make money by actually investing in assets of various kinds or cashflows based on underlying assets. They are not just betting on the direction of currency flows or different kinds of financial futures. This raises the question of why investors would seek out investments in other countries. Harvey (1985) has argued that the growth of financial integration in the world economy reflects the fact that after the 1970s, investors in the richest countries could not find good and safe investments in their own countries. As advanced economies matured, the ability to make high returns by investing in manufacturing or new services were limited. This pushed investors to look elsewhere for both riskier but also higher return forms of investment. Put another way, the breakdown of highly regulated international finance led to a set of new opportunities that allowed financial investors to seek out higher returns in other places.

Here is where the issue of financialization comes into play. Since the 1980s, scholars have documented that there is an increasing importance of financial markets, financial motives, financial institutions, and financial elites in the operation of the economy and its governing institutions, both at the national and the international level (Epstein, 2006). For those interested in political economy, the argument was that the “Fordist” form of production had declined and given way to a new set of ways to organize capitalism, what came to be called “financialization” (Boyer, 2000). Sociologists showed that in the U.S., one of the key manifestations of this was the “shareholder value conception of the firm”. This set of ideas and practices argued that managers should only pay attention to shareholders and in doing so concentrate on making profit and raising the share price for the stock of the firm. This set of ideas came to restructure the relationships between boards of directors, top level managers, and financial markets (Fligstein,

2001; Davis and Stout, 1994; Useem, 1996; Zorn, et. al., 2004). Krippner (2005) has shown that the financial sector of the economy has increased its prominence in the economy by increasing its share of profits over this period. It also pushed managers of nonfinancial firms to increase their use of financial tools to produce profits.

Leyshon and Thrift (2007) have argued that the one big financial innovation in all of this was securitization. Securitization is the process whereby one takes a given asset that generates a cashflow and one sells the rights on that cashflow to an investor in a standardized product that looks like a bond. The technology of securitization can be applied to a wide variety of financial assets. The riskiness of these assets and the likelihood of default can be rated by credit rating agencies. These ratings can then be turned into prices for bonds. The riskier the investment is, the higher rate of return. Securitization emerged in the U.S. for the first time in 1969 when the American government issued the first mortgage backed security (Fligstein and Goldstein, 2010). By the mid 1980s, the ability to create the tools to engage in securitization were well known in the mortgage market and had spread to credit cards, new car loans, manufactured housing, and industrial loans. Not surprisingly, securitization strategies did not just work in the U.S. but quickly spread across the world. Banks in most of the advanced industrial countries used securitization to raise money, to buy assets, to create securities based on those assets and to both hold onto those securities and sell those securities to others. Markets for securitized products are amongst the largest financial investments worldwide. ABA Alert.com reported that in 2010, there were over \$93.5 trillion in asset backed securities worldwide.

Aalbers (2008; 2009) has argued that the U.S. mortgage market played an important role in the expansion of international finance in this period. He suggests that this worked in two ways. First, some countries in the world adopted U.S. practices around using securitization to fund

mortgages. But, even more important, U.S. mortgage backed securities and related financial products became a huge source of investment for banks around the world particularly after 2000.

During the period 2000-2008, interest rates were low in many countries. This meant that investors got low returns for holding government bonds. What they were seeking out was higher return investments that were relatively low risk. What they found was products based on American mortgages. These products frequently had high credit ratings (AAA) and were regarded as safe. Banks used some of their capital to make what appeared to be safe investments that returned 3-5% more than investing in government bonds. They also borrowed money at 1-2% and then invested that money in mortgage backed securities (Brunnermeier, 2009). The main reason these investments were so consequential is because they were quite large. The mortgage market in the U.S. fluctuated between \$2-4 trillion a year from 2001-2007. This meant there was a tremendous amount of mortgage backed securities for sale.

Many of these investments required the holders of bonds to raise their capital in the bonds in the event that bond prices fell. This proved to be a big problem when housing prices in the U.S. stopped rising and foreclosures began to happen. Banks found themselves with large amounts of mortgage backed securities that were losing value and they had to quickly raise funds to cover their borrowings. It was this crisis that spread across U.S. banks, but also to financial investors around the world. To the degree that key banks and investors in many countries had purchased such securities, the banking systems in those countries plunged into a systemic banking crisis. That crisis brought that country's economy into recession.

To sum up, we have identified a set of possible causes of the banking crisis that swept across the world economy in 2007-2010. We have argued that this crisis had two sorts of causes. The first reflected the fundamentals of a given economy. We identified features that suggested a

similar real estate bubble, features related to export dependence, and features related to the overall financial position of the country. We know from previous research that these causes were not strong predictors of the spread of the financial crisis and recessions after 2007. We turned to the more sociological literature on worldwide financial integration to develop an alternative hypothesis as to the cause of the spread of the crisis. We argued that in the past 20 years, the increasing integration of financial markets pushed banks and other investors to seek out products with higher rates of return. Products based on securitization provided much of this new market. After 2000, banks and financial investors around the world discovered American mortgage backed securities as a lucrative investment. Our main hypothesis is that it was this exposure to these products that caused the financial crisis that began in the U.S. is the main way that the crisis spread to the rest of the world.

#### Who held U.S. mortgage backed securities?

It is useful to consider what we know about the foreign ownership of U.S. mortgage backed securities in the period just before the crash. As we have already noted, one of the key features of the financial crisis and the recession of the 2008-2010 period is its spread across the richest countries in the world. If the hypothesis about the role of American mortgage backed securities is right, then it follows that we ought to observe that the foreign holdings of those securities should have increased dramatically after 2000 and that these holdings were disproportionately held by investors in the richest countries. In this section, we provide evidence for both of these assertions. We show a dramatic increase in foreign purchase of mortgage backed securities from 2001-2008. We also show that most of the purchases were by banks and



investors in the most advanced industrial countries. We then turn to multivariate analysis to see if ownership of American mortgage backed was related to bank crises and recession.

Figure 1 presents data on the largest holders of U.S. mortgage backed securities from 2002-2008. This data was collected by Inside Mortgage Finance (2009), a company that specializes in gathering data on the U.S. mortgage industry. We can see from the graph that during the real estate bubble, large investors increased their holdings of American mortgage backed securities dramatically. U.S. commercial banks increased their holdings from about \$700 billion to almost \$1.1 trillion, an increase of over 50%. Mutual fund holding more than doubled from about \$425 billion to almost \$850 billion. But the category that showed the most dramatic increase was foreign holdings of mortgage backed securities. Holdings grew from about \$200 billion to over \$1.2 trillion at the peak. In the space of five years, foreigners increased their holdings of U.S. mortgage backed securities by \$1 trillion, an increase of nearly 600%. This is direct evidence that at during the most dramatic growth in the real estate bubble, the main purchasers of mortgage backed securities, particularly those based on subprime mortgages, were foreign buyers. This figure is a kind of smoking gun that shows the strong linkage between world financial markets and the American mortgage backed security market. This confirms our hypothesis that foreign holders became big players in the market for mortgage backed securities.

(Figure 1 about here)

The Inside Mortgage Finance data does not allow one to decompose the holders of those bonds by country. The U.S. Treasury, however, gathers this data on a yearly basis (2009: table 11, p. 15, table 24, p. 51-55). The ten countries who were the largest holders of American mortgage backed securities in 2008 were the Cayman Islands, United Kingdom, Belgium,

Luxembourg, Ireland, Japan, Germany, Bermuda, Netherlands and France. All of the largest holders of American mortgage backed securities were advanced industrial societies.

It is useful to consider why the Cayman Islands and Bermuda appear on this list. Both places are offshore banking sites. Forty of the world's fifty largest banks have offices in the Cayman Islands. Bermuda has offices from nearly as many of these banks. Forty six of the world's fifty largest banks are headquartered in the advanced industrial countries (the rest are located in China). Bermuda specializes in helping to create what are called "special purpose vehicles", the financial instruments which are used to create pools of assets that are packaged into asset backed securities like mortgage backed securities. The large amount of American mortgage backed securities located in these locales is owned by these foreign banks and private investors who use these banks as places to park their assets. Given that most of the banks in these locales are American or European owned, it follows that these holdings are really part of the concentration of such holdings in the advanced industrial world.

There are two other ways to figure out who the foreign holders of American mortgage backed securities are (were). During the financial crisis, the Federal Reserve Bank allowed banks to sell them American mortgage backed securities that had been issued by one of Fannie Mae or Freddie Mac as part of their effort to stabilize the financial markets. The Federal Reserve bought about \$1.25 trillion worth of these securities from 14 banks. Bank of America, Citigroup, Goldman Saks, JP Morgan, Merrill Lynch, and Morgan Stanley sold about \$600 billion to the Federal Reserve in 2008-2009. Barclays (UK), BNP Paribas (France), Credit Suisse (Switzerland), Deutsche Bank (Germany), Mizoho (Japan), Normura (Japan), RBS (UK), and UBS (Switzerland) sold almost \$625 billion to the Federal Reserve during the same period. This list of banks includes some of the largest banks in the world. Again, of the foreign banks, all

were in advanced industrial countries and most were in Europe. Finally, the Federal Reserve also expanded its short term loan activities for banks. These were loans that were made to banks to help them through a “liquidity crisis. During the period 2008-2009, the Federal Reserve lent money to 438 banks of which 156 were branches of foreign owned banks. Most of the banks (138) were branches of European banks.

It is clear that the largest banks in the world financial system became players in the American mortgage backed securities market during the peak of the housing bubble from 2001-2008. They increased their holdings 600% in a six year period and came to own almost \$1.2 trillion in American mortgage backed securities. The bulk of these banks were located in Europe and the other industrialized countries. The largest holders of American mortgage backed securities were residents of advanced industrial countries. This implies that global financial integration in the period 2000-2008 followed two lines. First, the main product being bought and sold for investment was American mortgage backed securities and second, the largest banks and financial investors in the most developed countries purchased these bonds. U.S. mortgage backed securities were huge investment vehicles for the largest banks and investors in the world. Now we turn to considering whether or not their presence on the balance sheets on banks and investors around the world caused bank crises and recessions.

## Data and Methods

It is useful to begin our discussion of data and methods by discussing our research design. Figure 2 portrays our basic underlying model of the process. Our argument has two elements. First, we try and predict whether or not a country had a systemic banking crisis. Our argument is

that two sorts of conditions might predict why this has occurred. There may be similar regulatory or economic processes in each country that affect the likelihood of a systemic banking crisis. We have also argued that the main predictor of such a crisis will be the mortgage backed securities holdings in that country. The second element of our argument is to examine how these underlying conditions predicted the depth of a recession in any given country. Here, we use the underlying conditions in the country plus a variable indexing whether or not a country had a systemic banking crisis.

(Figure 2 about here)

There are several serious data problems in trying to use this model. First, much of our theorizing has been about economic contagion. This implies a model whereby we are able to predict the time ordering of banking crises and entry into recession. Unfortunately, the systemic banking crises and the recession occurred very close in time and it is impossible to untangle exactly the order in which countries entered into each of them sequentially. This is compounded by the fact that the date for declaring a systemic banking crisis is arbitrary. In the U.S., for example, does the crisis begin with the collapse of Bear Stearns, the government takeover of Fannie and Freddie, the government support for AIG, or the collapse of Lehman Brothers? The official definition of a recession as two straight quarters of GDP decline makes it hard to exactly date the beginning of a recession. Moreover, these events moved very fast and in the space of less than a year many countries experienced both a systemic banking crisis and a recession.

So, we are not able to study contagion as it is usually studied. Instead, we are going to have to treat our variables as initial conditions that might be useful to predict whether or not a country had a systemic banking crisis or a recession. This implies a cross sectional data design of

events that did or did not occur in a particular time frame. From the point of view of “causation”, all of our variables refer to measurements that occurred before 2007, the beginning of the crisis.

Finally, is the problem of sample selection. Ideally, we would like to have data on as many countries as we can. We are limited by data availability. We have relatively complete data for 77 countries. These are listed in Table 1. They include countries that are both very rich and very poor. They also include countries from many parts of the world. But, they tend to exclude the poorest parts of Africa, the Middle East, and Latin American. One of the biggest problems is missing data on house price appreciation. We were only able to find comparable data on this variable for 45 countries. We tried several strategies to deal with this problem. We ran three sorts of models to deal with this. First, we ran models without this variable on the whole sample of 77 cases and the reduced sample of 45 cases. We then ran models where we treat the missing data as a variable in the 77 cases and compare it to the results from the 45 cases. We do this by creating a variable coded “0” if the data is not present and “1” if it is present. Then we create a second variable coded “0” if there is no presence of house price data and coded the percentage change in house price appreciation from 2000-2006 if there is data. This allows us to examine the effect of having or not having data on whether or not countries are more likely to have a financial crisis. Finally, we created models of sample selection which we do not report here. The model that corrects for censoring does not change the substance of the results.

(Table 1 about here)

The two dependent variables refer to 2008 and 2009. All of the independent variables refer to conditions that existed in the country in 2006. Systemic banking crisis is measured with a dichotomous variable coded “1” if there was a systemic banking crisis in 2008-2009 and “0” if there was not such a crisis (source: Laeven and Valencia,2010). Laeven and Valencia use five

criteria to determine whether or not a systemic banking crisis has occurred in any given country. These include: banks required extensive injections of liquidity, banks were required to significantly re-structure their activities, governments engaged in significant asset purchases from banks in order to provide them with liquidity, governments provided significant guarantees on liabilities, and governments nationalize some banks.

Table 2 presents the list of these countries. 23 countries had two or more of these conditions and were classified as having a banking crisis. One can see from the list the predominance of developed countries in general and European countries in particular. We note that the U.S. and Great Britain are both on the list. We also note that Iceland, Ireland, Greece, and Spain are on the list as well. Less well known is the fact that both France and Germany experienced systemic banking crises as well. Given the events of the past five years, the list suggests a kind of face validity to the measure of systemic banking crisis.

(Table 2 about here)

The second dependent variable in the analysis is the percent change in real GDP over 2008 and 2009 (source: Economist Intelligence Unit, 2010). This measure can take on both negative and positive values. So, a positive effect of a given independent variable indicates an increase in GDP while a negative effect of an independent variable indicates a decrease in GDP.

It is useful to describe the measures of our independent variables. We have created a measure that codes mortgage backed securities holdings in each country in 2006. We have standardized this measure by logging it and making it a percentage of GDP. This creates adjustments for size of country and outliers. Most of our outliers were small countries that house large banking centers like Bermuda and Luxembourg. The source for this data was the U.S. Treasury (2007).

The measure of credit market deregulation was based on the 2006 Credit Market Freedom Score, from the Fraser Institute's Economic Freedom of the World Index. The score is scaled from one to ten. The higher the score, the more deregulated the country's credit market. This is a score that many scholars who study deregulation have found useful as a metric to measure the degree to which societies have taken government intervention out of their financial sector.

We created a variable measuring the current account balance in 2006 as a percentage of GDP. The source for this measure was the World Bank's "World Development Indicators". We measured export dependence by creating a measure that reflected exports in 2006 as a percent of real GDP. The source was also the World Bank's Development Indicators.

Our measure of house prices was the percent change in the price of the median residence from 2000-2006. The sources for this variable included: Claessens et al. (2010), Bank of International Settlements, and European Mortgage Federation. We note that this measure is tricky to interpret. The underlying way in which median house price was determined varied across countries. Therefore, the measure may not be measured the same across different countries.

We included two control variables in the analysis that indexed the degree to which countries were in the developed or developing world. As we have noted, one of the main results in the literature is that rich countries appear to have suffered from more banking crises and more severe recessions. By controlling for level of development, we can assess the degree to which the other factors we have theoretically discussed matter for these events. Real GDP per capita refers to 2006 and comes from the World Bank's World Development Indicators. We also created a

dichotomous variable coded “0” if a country was not a member of the OECD and “1” if the country was a member of the OECD. The source for this is the OECD.

We ran two kinds of models. First, we ran a logit model using whether or not a bank crisis occurred during the period 2008-2009. Then, we ran an ordinary least squares regression modeling the percentage change in GDP from 2008-2009. We will discuss the specification of the model in the results section.

## Results

We begin by considering the causes of systemic banking crises. Table 3 presents the results of a logistic regression analysis where the dependent variable is whether or not a country has a systemic banking crisis in 2008-2009. The first column of the table presents results for our sample of 77 countries and the second column adds the variable for house price appreciation. . The strongest predictor of whether or not a country has a systemic banking crisis is the size of the U.S. mortgage backed securities as a percentage of GDP. This confirms the hypothesis that the main mechanism by which banking crises spread was American mortgage backed securities. Exposure to those securities undermined the banking systems of countries around the world. There is no evidence that the wealth of the country, the level of credit market regulation, or exports affected the chances that a country would have a systemic banking crisis. There was a little evidence that countries running a current account deficit were more likely to have a crisis, but this effect disappeared once housing price appreciation was added to the equation. There is also evidence that being a member of the OECD (i.e. the rich country club) was positively associated with a crisis.



(Table 3 about here)

The housing price appreciation variable's effect on a systemic banking crisis is worth discussing more extensively. Generally, we have no data suggesting that housing price appreciation was the cause of a systemic banking crisis anywhere. This runs counter to many claims in the literature and in the press. But, our result is consistent with the results of other empirical studies. We modeled this effect two different ways. First, for the equation with 77 cases, we created a dummy variable coded "0" if the housing price was not reported and "1" if it was. We then also created a variable coded for the house price appreciation where present. This produces a spline function. In column 2 of table 3, one can observe that the change in housing prices has no effect on the 77 cases. But, there is a huge effect such that if a housing price is reported, then the country is likely to have had a systemic banking crisis. When we only include the 45 cases where we have complete data, the results are virtually identical to the results for the 77 cases without the house price variable.

The results, taken together, provide strong evidence for the view that the main driver of systemic banking crises was the level of holdings of mortgage backed securities in a country. There is no evidence that these crises were induced by economic or regulatory conditions within the country. Instead, the worldwide banking crises that did occur were the direct outcome of the spread of U.S. mortgage backed securities as an investment vehicle. There is one puzzling result in the analysis. It does appear as if being an OECD member and reporting house price appreciation was related to having a systemic bank crisis. This implies that we have not entirely captured whatever it is about the rich club of countries who have better data reporting systems that makes them more likely to have a bank crisis in 2008-2009.

Table 4 presents the results for the equations predicting GDP change in 2008-2009. The first three columns present specifications that include 77 cases and the last column presents a specification only on the 45 cases with data on the house price appreciation measure. Overall, the change in sample did not have much effect on which variables were statistically significant. It is useful to review what does and does not predict change in GDP across model specifications and samples.

First, there is no statistically significant effect of holding mortgage securities on the change in GDP. However, there is a large statistically significant negative effect of the presence of a banking crisis on change in GDP in both samples. Having a systemic banking crisis reduces GDP by 5-6% in 2008-2009. This is a very large effect. Our interpretation of these two results is that one of the main causes of problems for many countries was their exposure to American mortgage backed securities. This exposure caused larger economic problems by precipitating a systemic banking crisis and that crisis triggered a substantial drop in GDP. Taken together, these results support our sociological version of the story which focuses on the particular way in which mortgage backed securities became implicated in the global financial system.

There is some evidence for other effects as well. There is a consistent statistically significant negative effect of having a higher level of GDP per capita on having a negative change in GDP. This means that even net of other economic and political factors, richer countries had substantially deeper recessions than poorer countries. Second, running a current account deficit is sometimes statistically significantly related to a deeper recession. There is also a pretty consistent statistically significant effect of credit market deregulation on GDP change as well. This implies the countries with less credit market regulation also suffered deeper recessions. This is also a factor that some scholars and certainly the popular press thought was

responsible for some of the recession. Taken together, these factors imply that richer countries with higher levels of financial deregulation, and higher current account deficits experienced a deeper recession than other countries. The country that this describes most clearly is the United States.

There are two variables that did not show any real effects, but have been consistently mentioned in both the scholarly literature and the popular press as causes of the recession. First, there is no evidence that the level of exports affected the depth of the recession. Indeed, exports showed no relationship to GDP growth or decline. At least in this recession, being an exporter was not part of what explained economic decline. Second, and even more interesting, there is no evidence that rapid house price appreciation caused any change in GDP in 2008-2009. This is surprising as many analysts have focused their explanation of the recession on housing bubbles in other parts of the world. It is clear from our results that the only housing bubble that mattered for this crisis was the one that occurred in the U.S. It mattered because American mortgages were the basis financial investments from banks and investors around the developed world.

Finally, it is worth noting that our results are very close to those reported in other studies (Rose and Spiegel, 2010; Laeven and Valencia, 2010). Both of those studies found little evidence that exports or current account deficits were hugely responsible for changes in GDP. They also both found consistent evidence that richer countries performed more poorly in this period net of other factors.

## Conclusions

We began by pointing out that the “Great Recession” of 2008-2010 originated in the U.S. and spread mostly to the more industrialized world. Our empirical results offer a consistent story as to how this worked. The main path to the crisis was through the American housing market. The housing price bubble in the U.S. fuelled the production of mortgage backed securities. These securities were extensively sold and marketed around the world to banks and investors in the richest countries. During the run up in the U.S. housing market from 2000-2008, foreign investors increased their holdings of these securities by \$1 trillion. As those securities began to lose their value, banks in the U.S. and in foreign countries began to fail. It was these failures which spurred systemic banking crises in many countries around the world. These crises forced governments in the rich world to intervene aggressively into their banking systems to stabilize them. But, the damage was so extensive that a deep recession followed. This recession was made worse in countries that were richer, had more deregulated systems of finance, and were running current account deficits more directly. In this instance, there is little evidence of conventional forms of financial contagion. Instead, it was the global character of the financial system that brought the economy to its knees in the richest countries.

Our study raises a number of provocative issues for subsequent research. One of the most fascinating issues to explore is the link between the demand for mortgage backed securities and the housing bubble itself. In the low interest rate environment of the 2000s, investors in the U.S. and abroad were looking for safe investments that were returning more than 1-2%. American mortgage backed securities became the vehicle that made a lot of sense for those investors. But in 2003, the market for conventional mortgages to package into securities began to dry up. Beginning in 2004, the subprime market began to replace the prime market as the main source of

mortgages to be securitized (Fligstein and Goldstein, 2010). Investors generally liked subprime mortgages because they could attain high credit ratings and they tended to have higher returns.

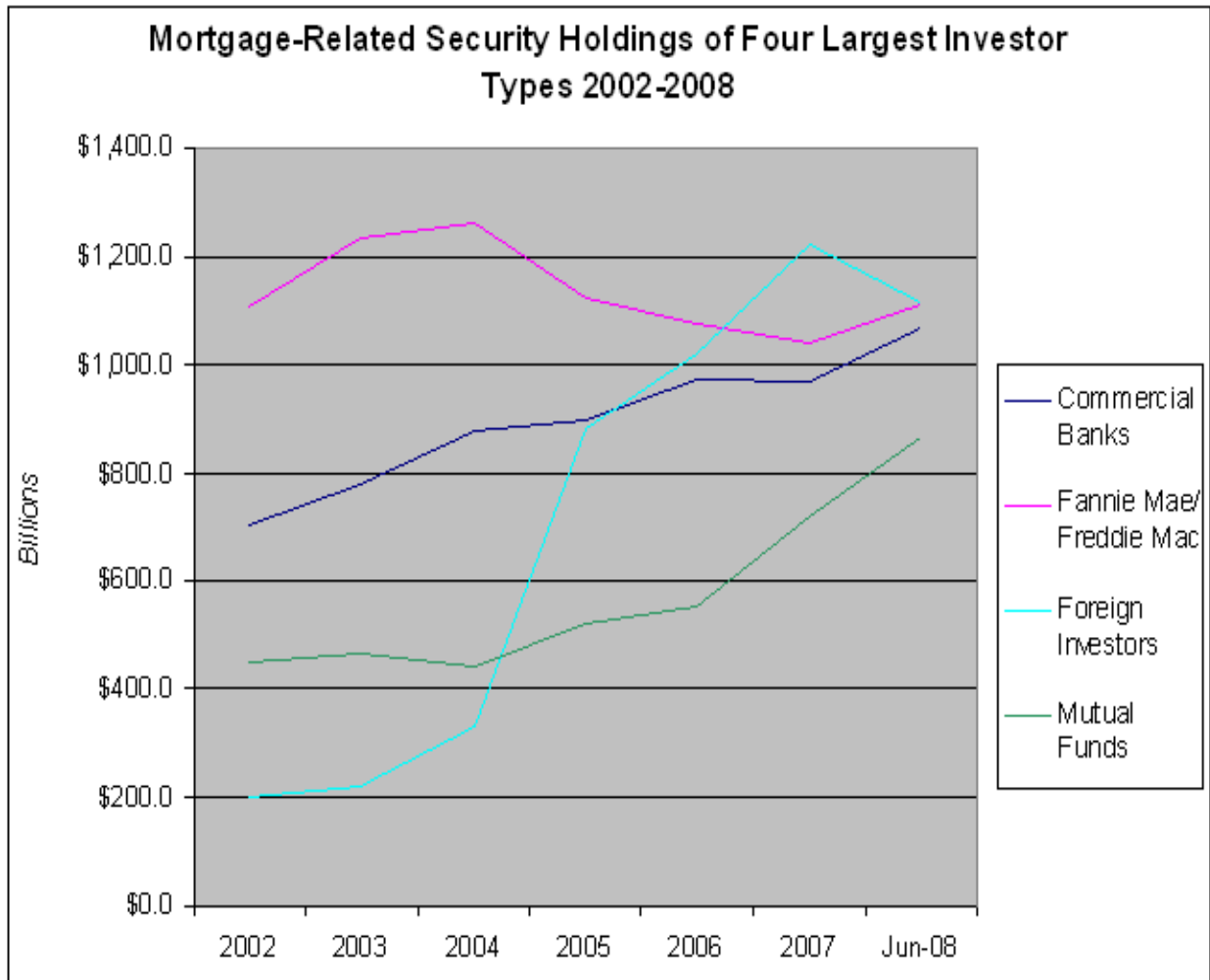
This implies that the demand for mortgage backed securities may have outstripped the supply of mortgages that could be used to construct them. One way to read what happened is that the demand for mortgage backed securities from American and foreign investors pushed forward the housing bubble in the U.S. In order to find people to take out new loans, banks needed to go to the markets with the fastest growing prices. They needed to entice people in those markets to take out large loans with unconventional terms. The whole business of selling mortgage backed securities was obviously a big part of what banks were doing. But in order to keep that business going, they needed a steady supply of those loans. We think future research should try and explore the links between the supply of mortgages for securities and the demand for those securities. There is certainly *prima facie* evidence consistent with the bubble being driven at least partially by the high demand for those securities.

Our study has implications for the study of financialization, global financial markets, and the sociology of finance. The literature generally does not do a good job of figuring out which markets are going to be important for financial integration. Our study suggests that scholars ought to be figuring out not just global flows of transactions or watching the construction of particular financial products, but instead focusing more attention on exactly what banks and other investors are investing in. This requires studying who the players are and what their tactics are. While a few scholars have recognized that housing was being used as a securitized asset on the world market (i.e. Aalbers, 2008, 2009; Leyshon and Thrift, 2007), few of those involved in the literature on financialization, global finance, or the sociology of finance saw the importance of the housing market in this period. Banks and financial investors have moved on from

mortgage backed securities as their main growth product. But, without understanding where they have gone, why, and with what force, it is difficult to understand the consequences of their actions.

This crisis was caused by the peculiar interconnectedness of the world financial system. Hardly anyone saw that American mortgages were the hottest commodity being traded across this system. We have shown that it was the appetite for these mortgages as cashflows that brought the rich world's investors to seize this opportunity. But when the underlying assets turned down, their exposure caused systemic banking crises in the richest countries and these crises set off the deepest recession since the 1930s. The next crisis will certainly not be caused by a mortgage securitization bubble originating in the U.S. But it will require some of the same conditions: a hugely large market of underlying assets that can be traded as securities and securities that can be rated for risk.

Figure 1: Mortgage related security holdings of four largest investor types. Source: Inside Mortgage Finance, 2009.



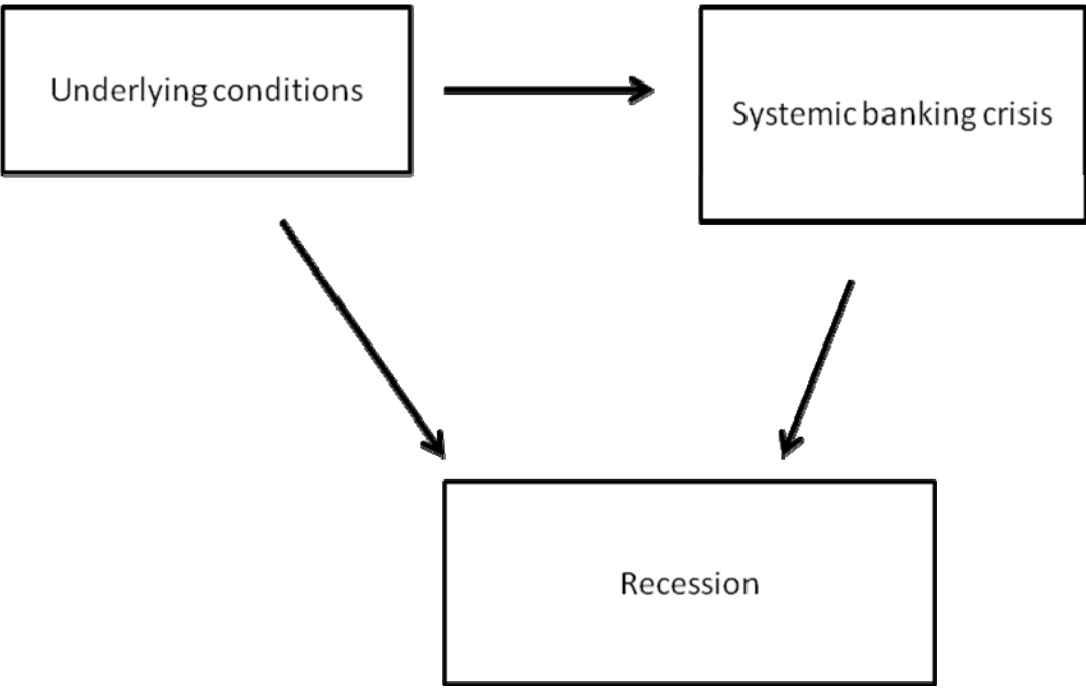


Figure 2: Model of underlying process of causes of the crisis



Table 1: First year of negative change in GDP

2008	2009	Never
Bahamas	Antigua & Barbuda	Macau Albania
Denmark	Armenia	Macedonia (FYR)
Estonia	Austria	Malaysia
Ireland	Barbados	Malta
Italy	Belgium	Mexico
Jamaica	Bermuda	Namibia
Japan	Botswana	Netherlands
Latvia	Brazil	Norway
Luxembourg	Bulgaria	Paraguay
New Zealand	Canada	Romania
Portugal	Chile	Russia
Puerto Rico	Costa Rica	Singapore
Seychelles	Croatia	Slovakia
Sweden	Cyprus	Slovenia
	Czech Rep	South Africa
	Ecuador	Spain
	El Salvador	St. Kitts & Nevis
	Finland	Switzerland
	France	Taiwan
	Gabon	Thailand
	Georgia	Trinidad & Tobago
	Germany	Turkey
	Greece	Turkmenistan
	Guyana	UK
	Hong Kong	Ukraine
	Hungary	United Arab Emirates
	Iceland	United States
	Kuwait	Venezuela
	Lithuania	
		Kyrgyz Republic
		Lebanon
		Libya
		Mauritius
		Morocco
		Netherlands
		Antilles
		Oman
		Panama
		Papua New Guinea
		Peru
		Poland
		Qatar
		Saudi Arabia
		Sri Lanka
		Swaziland
		Tunisia
		Uruguay

Table 2: Countries that experienced a systemic banking crisis, 2007-2009.  
Source: Laeven and Valencia, 2010.

Austria  
Belgium  
Denmark  
Germany  
Iceland  
Ireland  
Latvia  
Luxembourg  
Mongolia  
Netherlands  
Ukraine  
United Kingdom  
United States  
France  
Greece  
Hungary  
Kazakhstan  
Portugal  
Russia  
Slovenia  
Spain  
Sweden  
Switzerland



Table 3: Logistic regression models of systemic banking crisis

Model	1	2	3
Log 2006 Total Corp. MBS % GDP	1.462* (0.649)	2.664* (1.255)	2.576* (1.270)
2006 Credit Market Deregulation	0.214 (0.538)	-0.414 (0.682)	-0.326 (0.708)
2006 Current Account % GDP	-0.078+ (0.047)	-0.087 (0.056)	-0.086 (0.057)
2006 Exports / GDP	0.005 (0.009)	0.005 (0.009)	0.002 (0.009)
Log Real GDP p / c, 2006	0.623 (1.144)	-0.390 (1.598)	-0.401 (1.569)
OECD Member	1.790+ (1.028)	2.063* (0.998)	1.852+ (1.016)
Real Housing Price (no misses)		0.013 (0.009)	
Housing Price Reported?		4.443* (2.263)	
Real Housing Price Appreciation, 2000-06			0.012 (0.009)
Constant	-12.014 (10.254)	-1.792 (14.269)	2.383 (14.737)
N	77	77	45
ll	-20.438	-16.868	-16.728
Chi-square	11.622	21.286	13.858
d.f.	6	8	7

Notes: Robust standard errors are in parentheses.

† p < 0.1; \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

Table 4: OLS Regression models of change in GDP, 2008-2009

Model	1	2	3	4
Log 2006 Total Corp. MBS % GDP	0.460 (1.063)	1.931 (1.271)	1.715 (1.400)	1.408 (1.087)
2006 Credit Market Deregulation	-2.353*** (0.679)	-2.291*** (0.654)	-1.838* (0.710)	-1.618 (1.298)
2006 Current Account % GDP	0.155* (0.072)	0.123+ (0.065)	0.089 (0.061)	0.182+ (0.105)
2006 Exports / GDP	-0.001 (0.014)	-0.003 (0.014)	-0.010 (0.017)	-0.010 (0.022)
Log Real GDP p / c, 2006	-3.131* (1.396)	-2.938* (1.339)	-2.699+ (1.551)	-4.563+ (2.553)
OECD Member	-0.139 (2.095)	0.676 (2.080)	-0.329 (2.049)	2.831 (2.689)
Systemic Banking Crisis		-6.219* (2.607)	-5.092* (2.121)	-4.937* (2.208)
Real Housing Price (no misses)			-0.035+ (0.019)	
Housing Price Reported?			1.248 (2.076)	
Real Housing Price Appreciation, 2000-06				-0.027 (0.021)
Constant	50.328*** (12.828)	48.229*** (12.412)	43.017** (14.483)	58.740* (28.852)
N	77	77	77	45
ll	-238.898	-234.248	-231.762	-131.852
R-square	0.404	0.472	0.505	0.509
d.f.	6	7	9	8

Notes: Robust standard errors are in parentheses.

† p &lt; 0.1; \* p &lt; 0.05; \*\* p &lt; 0.01; \*\*\* p &lt; 0.001

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