House Prices and Foreclosures

Reza Shabani  
shabani@econ.berkeley.edu

Adam Szeidl  
szeidl@econ.berkeley.edu

Project Summary

We strive to answer two important questions regarding the relationship between house prices and foreclosure. The first question is to what extent is negative home equity a sufficient condition for default and to what extent does it also require a ‘trigger event’, such as job loss, illness, or divorce? Using hospital discharge data from the Texas Department of State Health Services, we will examine the role of trigger events in causing foreclosure with a regression discontinuity approach that will measure any discrete increase in the probability of sale or default upon suffering an adverse shock to health.

If we find that health shocks force households to either sell their home or default on their mortgage depending on whether they have a positive or negative amount of equity in their home, then a government imposed moratorium on foreclosures may allow time for households to recover from an exogenous trigger event and avoid foreclosure. If instead we find that households strategically walk away when the equity in their home reaches a sufficiently negative value, then a temporary moratorium may simply delay an inevitable decline in house prices towards an equilibrium determined by housing market fundamentals.

The second question is what is the effect of foreclosure on house price? Previous literature has found that foreclosed properties sell at significant discounts, but has thus far been unable to empirically decompose this discount into a component which captures the effect of an urgent sale in an illiquid housing market and one which captures the effect of the physical condition of the property at the time it is sold. Using hospital discharge data, we will analyze the price discount on forced sales and foreclosures resulting from both expected changes in health—such as those caused by a chronic health condition—and unexpected changes—such as those caused by a motor vehicle accident or other traumatic injury. This identification strategy allows us to decompose the price discount on a foreclosed property into three separate effects: a forced sale in an illiquid housing market, deferred maintenance on the property leading up to the foreclosure process, and physical damage suffered as a result of the foreclosure process.

Our empirical decomposition is important for primarily two reasons. First, it provides an estimate of the marginal effect of foreclosure on house price. If the foreclosure process is costly, banks may be better off adopting Real Estate Owned rental programs similar to those of Fannie Mae and Freddie Mac. Such programs may help avoid the destruction of property and other costly contagion effects, and also keep house prices from overshooting on the downside. If banks’ incentives cannot be aligned in a way such that they will act to reduce the negative externalities associated with foreclosure, then government regulation may be able to prevent a ‘tragedy-of-the-commons’ type scenario in which banks are rushing to offload property before their counterparts do the same. Second, our decomposition exercise will estimate an upper bound on the extent to which the widely cited Case-Shiller house price index may be overstating the current decline in house prices as a result of its repeat-sales methodology using a disproportionately high number of recently foreclosed homes that are in poor physical condition.
House Prices and Foreclosures
Research Proposal

Reza Shabani*  Adam Szeidl†

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Introduction

This proposal outlines a research agenda intended to better understand the relationship between house prices and foreclosure. The wave of foreclosures that followed a precipitous drop in house prices beginning in 2006 has arguably been the single most important cause of the credit crisis that continues to afflict the global economy. Furthermore, the rate of foreclosures shows no signs of slowing as house prices continue to decline. Figure 1 shows the percentage change in the Case-Shiller house price index relative to its peak values in 1989 and 2006. The figure shows that the current decline in house prices has been much steeper and may last much longer than the previous slump that began in the early 1990s. As of October 2008, declining house prices have left an estimated 14 million U.S. homeowners—nearly 1 in every 6—with negative equity in their homes.1 Households that owe more on their mortgage than their home is worth have increased incentive to default and undergo foreclosure, driving house prices down even further.

The analysis outlined here will use a set of empirical methods and data to answer two central questions regarding foreclosure. The first question is to what extent is negative home equity a sufficient condition for default and to what extent does it also require a ‘trigger event’, such as job loss, illness, or divorce? The answer to this question offers predictions for the number of additional foreclosures to come and helps in evaluating which policies may help in mitigating the current crisis. In particular, this analysis will shed light on the likely effects of a temporary moratorium policy.2 If having a sufficiently negative amount of home equity is a sufficient condition for default, then a government policy imposing a temporary moratorium on foreclosures will simply delay additional foreclosures until the moratorium is lifted and house prices continue to decline towards an equilibrium. If instead, income shocks and other trigger events are necessary for default, then a temporary moratorium on foreclosures may allow time for households to recover from adverse shocks and keep many of them from losing their homes.

The second topic that this analysis will examine is the effect of foreclosure on house prices. Foreclosed properties sell at a discount because they are often sold quickly in an inelastic housing market and are likely to be in poor physical condition. Distinguishing between the effect of a forced sale and that of physical condition would help banks assess the costs and benefits of initiating foreclosure, and perhaps compel them to consider Real Estate Owned rental programs similar to those adopted by Fannie Mae and Freddie Mac. Furthermore, our analysis will help determine the extent to which the repeat-sales methodology of the widely cited Case-Shiller house price index may be overly influenced by badly damaged properties and may consequently be overstating the current decline in house prices.

The remainder of this proposal is organized as follows. Section 1 contrasts two extreme views on the cause of foreclosure and explains the empirical methodology used to analyze them. Section 2 discusses the channels through which foreclosures cause house prices to decline further, and details an identification strategy meant to decompose the price discount on a foreclosed property into a forced sale component and a physical condition component. The final section concludes.

*Graduate Student Researcher. Ph.D. Candidate in Economics. University of California, Berkeley. Email: shabani@econ.berkeley.edu.
†Principal Investigator. Department of Economics. University of California, Berkeley. Email: szeidl@econ.berkeley.edu.
1Number of homeowners with negative equity is estimated by Moody’s Economy.com and reported in the Wall Street Journal on October 8, 2008.
2Several moratorium policies are currently being debated or are already in effect. Mortgage lenders Fannie Mae and Freddie Mac imposed internal moratoriums on foreclosure from October and November of 2008 to March 31, 2009. Senate Banking Committee Chairman Chris Dodd recently led an unsuccessful effort to impose a 90-day moratorium as part of the American Recovery and Reinvestment Act of 2009. California is scheduled to implement a 90-day moratorium during Summer 2009.
Figure 1
Change in Case-Shiller House Price Index Relative to Peak Values
This figure shows the percentage change in the Case-Shiller Composite 10 House Price Index relative to its peak values in October 1989 and June 2006. The index is constructed at a monthly frequency using the Case-Shiller repeat sales methodology and house prices from 10 U.S. cities.

1 Negative Equity, Trigger Events and Foreclosure
Understanding the economic motivation for default is crucial both for comprising estimates of how many additional foreclosures may occur should house prices continue to decline and for determining the likely effects of government policies designed to mitigate the ongoing crisis. This section contrasts two extreme view on the effects of house prices and trigger events on default. In the first view, trigger events such as job loss or illness occur at an exogenous frequency and compel a household to either sell its home at a profit or default on its loan depending on whether or not the household owes more on its mortgage than its home is worth. In the second view, households have a sufficient amount of savings or access to credit to buffer against any adverse trigger events and thus exercise strategic default based solely on the amount of equity in their house. Figure 2 illustrates a hypothetical time series of foreclosure for each of these two views.

1.1 Policy Implications
To the extent that the first view of foreclosure holds and negative home equity is a necessary but not sufficient condition for default, the number of new foreclosures is likely to remain relatively high well into the future. The
Effects of House Prices on Foreclosures and Forced Sales

This figure shows the effect of house prices on foreclosures for two different scenarios. Panel A shows a scenario in which house prices increase from time $t_1$ to $t_2$, and decrease thereafter. Panel B shows the resulting effects on foreclosures and forced sales for the case in which households default when they have negative home equity and suffer an exogenous adverse shock. Panel C shows the resulting effects on foreclosures for the case in which households strategically default on their mortgage based solely on the amount of equity held in their home.

A steep decline in house prices over the past couple years is likely to leave many households with negative equity in their home for an extended period of time during which they will be susceptible to income shocks or other events that may trigger foreclosure. In this setting, a temporary moratorium on foreclosures may allow time for households to recover from adverse income shocks or other events and avoid foreclosure.

To the extent that the second view of foreclosure holds and falling house prices alone compel households to strategically default, the number of new foreclosures will significantly drop only when house prices end their decline. At this point, households that will have found it optimal to default will have already done so. In this case, a temporary moratorium would simply delay an inevitable decline in house prices towards an equilibrium determined by housing market fundamentals. In fact, the moratorium may exacerbate the problem by increasing the volatility of house prices, because houses that would have otherwise been foreclosed during the moratorium will instead be placed on the market all at once.

1.2 Adverse Health Shocks as Trigger Events

Our empirical strategy will leverage an adverse shock to health as an exogenous trigger event and evaluate the impact on foreclosure conditional on factors such as negative home equity. We will begin by constructing the time
series of house prices, forced sales and foreclosures shown in Figure 2 using hospital discharge data and house-level transactions data similar to that of Campbell, Giglio and Pathak (2009). To construct Panel B of Figure 2, we will need to identify foreclosures and forced sales that result from adverse shocks to health. To do this we will merge the hospital discharge data into the house transactions data using residential addresses. We will then tag foreclosures and sales as having resulted from health shocks if they occur within three months of a hospital discharge in which the patient either incurred a large amount of costs or suffered from an illness or injury that is likely to curtail income. This time series will allow us to infer the extent to which exogenous trigger events compel households to either sell their home or default on their mortgage depending on the amount of equity held in their home.

Next we will use a Regression Discontinuity (RD) design to measure any discrete increase in a household’s probability of sale or default upon suffering a health shock. In order to measure such an increase we must limit our analysis to health shocks in which the cause of hospitalization was unexpected. Households that anticipate paying costly medical bills in the future may sell their home or default today. In this case, we would fail to classify sales or defaults that occur prior to a hospitalization as having been triggered by an exogenous shock to health.

There are two ways in which we will restrict our sample to hospitalizations that result from unexpected events. First, we restrict the sample to admissions resulting from traumatic injuries that are not self-inflicted, such as motor vehicle accidents. Second, we follow Card, Dobkin and Maestas (2008) and restrict the sample to admissions resulting from ‘non-deferrable’ conditions—diagnoses with the same daily admission rates for weekends and weekdays. Hospital admissions tend to be much lower on weekends than on weekdays due to staffing constraints (Dobkin, 2003). Therefore, admissions that are equally likely to occur on every day of the week, including weekends, are typically serious illnesses that are difficult to anticipate.

We model the probability of sale and of default separately using the reduced-form model

\[ y_i(t) = x_i(t)\beta + f(t) + \theta \text{hlthshock}_{it} + \varepsilon_i \]

where \( y_i(t) \) is the probability of sale or default for household \( i \) at time \( t \), \( x_i \) is a vector of observable characteristics of household \( i \), \( f(t) \) is a smooth function representing the time profile of sale or default, and \( \text{hlthshock}_{it} \) is a dummy variable equal to 1 if household \( i \) has suffered a health shock on or after time \( t \) and equal to 0 otherwise. Using this RD design, modeling \( f(t) \) as a low-order polynomial allows for measurement of any discrete increase in a household’s probability of sale or default upon suffering an adverse shock to health.

Finally, we will create discontinuity figures of the type shown in Figure 3. The figure shown is from Shabani (2008) and shows the discontinuity in hospitalizations for males and females upon reaching age 21 and having legal access to alcohol. We will also use information from house price data to create estimates of home equity similar to those used in Foote, Gerardi and Willen (2008) so that we may create separate discontinuity figures for households with and without negative equity in their homes. To the extent that we find discrete increases in the probability of sale or foreclosure upon suffering from an adverse health shock, the first view of foreclosure is correct and a temporary moratorium policy may help stabilize house prices and keep more households from losing their homes. To the extent that we find no such increases, the second view of foreclosure is correct and a temporary moratorium will simply delay an inevitable decline in house prices towards an equilibrium determined by housing market fundamentals.

This analysis will focus primarily on the state of Texas for two reasons. First, a highly confidential version of hospital discharge data is required and is most easily obtainable from the Texas Department of State Health Services. The discharge data is from 1999 through the second quarter of 2008 and contains roughly 2.8 million observations per year. Second, Texas is the second most populous state in the country and by many estimates has one of the highest delinquency rates as well. Both of these characteristics promise a large number of observations available for analysis.

2 Forced Sales and House Prices

Whereas Section 1 examines the role of negative home equity in causing foreclosure, this section seeks to understand the extent to which foreclosures cause house prices to decline even further. Foreclosures can negatively affect house prices for primarily two reasons. First, financial institutions often seek to sell their foreclosed properties quickly because they are unwilling or unable to fill the role of landlord and property manager in which case the monthly dividend produced by the property is effectively discarded. This type of forced sale will often demand a significant

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3 The inpatient discharge data contains information on medical procedures performed, insurance status, and the amount of out-of-pocket costs incurred by the patient.
price discount due to the illiquid nature of the housing market. Second, the foreclosure process itself may physically damage the house, either by prompting disgruntled tenants to physically damage the property prior to being evicted or by leaving the property unoccupied and susceptible to deterioration or vandalism until it is sold.  

2.1 Policy Implications

A principal concern of policy makers is that foreclosure may have costly spillover effects. Both the large imbalance of supply and demand that a forced sale causes in an illiquid housing market and the physical property damage incurred during the foreclosure process act to decrease the value of nearby homes. These spillover effects could cause additional foreclosures as households with negative equity in their homes have an increased incentive to default. As Campbell, Giglio and Pathak (hereafter CGP) point out, this type of spiral effect is a central concern of the U.S. Treasury Department, as noted in its description of the Obama Administration’s Making Home Affordable Plan: “In the absence of decisive action, we risk an intensifying spiral in which lenders foreclose, pushing area home prices still lower, reducing the value of household savings, and making it harder for all families to refinance. In some studies, foreclosure on a home has been found to reduce the prices of nearby homes by as much as 9%.”

CGP presents evidence suggesting that concerns over the spillover effects of foreclosure are well founded. The authors analyze data on house transactions in Massachusetts between 1987 and 2008 and find that each foreclosure located within 0.05 miles of a house lowers its price by about 1 percent. Though this finding is significant and consistent with other recent work (Harding et. al., 2008; Rossi-Hansberg et. al., 2008), it remains unclear to what extent the decline in the value of nearby homes is driven by the physical appearance of a foreclosed property as opposed to the imbalance in supply and demand resulting from an urgent sale in an illiquid neighborhood housing market. To answer this question we must determine the source of the price discount on the foreclosed property.

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4 The tenants and/or owners of a property are also likely to defer maintenance leading up to the foreclosure in which case foreclosed properties sell at an even greater discount. Yet this is not a direct effect of the foreclosure process as distressed borrowers are likely to defer maintenance regardless of whether or not the bank pursues foreclosure.

5 U.S. Treasury Website 2009, http://www.financialstability.gov/roadtostability/homeowner.html. It is unclear which study the statement is referring to since the website does not provide any additional information. It may be a reference to Immergluck and Smith (2006) though this study finds that nearby foreclosures decrease house values by 0.9 percent, not 9 percent.

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itself. While CGP estimates that foreclosed properties sell at a discount of 28%, they—and the remainder of the existing literature—are unable to empirically decompose this discount into a component which captures the effect of an urgent sale in an illiquid market and one which captures the effect of the physical condition of the property at the time it is sold.

Differentiating between the forced sale and physical condition effects is critical for a number of reasons. First, banks may be failing to maximize profit if they cannot accurately assess the marginal effect of the foreclosure process on the price of a delinquent property. Second, the physical damage and resulting contagion effects triggered by the foreclosure process may amount to a large scale destruction of wealth and cause falling house prices to undershoot an equilibrium price determined by housing market fundamentals. In this scenario there may be an opportunity for banks to cooperate with one another in devising a foreclosure strategy with fewer externalities, or to adopt Real Estate Owned (REO) rental programs similar to those of Fannie Mae and Freddie Mac.6

In the event that banks’ incentives cannot be aligned in a way such that they will act to reduce the negative externalities associated with foreclosure, there may be a role for government to play. A government sponsored rental program or new regulation requiring banks to adopt REO rental programs may prevent a ‘tragedy-of-the-commons’ type scenario in which banks are rushing to offload property before their counterparts do the same, causing property values to continue spiraling downwards.

Finally, an inability to distinguish between the forced sale and physical condition effects may also result in the inaccurate measurement of house prices. In particular, the widely cited Case-Shiller house price index may be overstating the current decline in house prices as its repeat-sales methodology is likely to use a disproportionately high number of recently foreclosed homes that are in poor physical condition. It is important to determine the extent to which the Case-Shiller index may be inaccurate since it is widely used for important analyses ranging from measurement of aggregate household wealth to valuation of new real estate investment projects.

### 2.2 Empirical Decomposition of Price Effects

The empirical methods used to differentiate the effect of a forced sale from that of physical damage are similar to those described in Section 1.2, but with some important differences. The key empirical challenge here is to differentiate between the effects of deferred maintenance on a property, physical damage incurred during the foreclosure process, and the urgency with which the property is sold.

We model the sale price of a property as

$$
\log(\text{price}_i) = \beta'x_i + \delta \text{defmaint}_i + \gamma \text{physdmg}_i + \text{forcedsale}_i + \varepsilon_i
$$

where \(\text{price}_i\) is the sale price of property \(i\), \(x_i\) is a vector of observable characteristics of property \(i\) including square footage and number of rooms, \(\text{defmaint}_i\) is a dummy variable equal to 1 if property \(i\) suffered from deferred maintenance leading up to its sale, \(\text{physdmg}_i\) is a dummy variable equal to 1 if property \(i\) suffered from physical damage as a result of the foreclosure process, and \(\text{forcedsale}_i\) is a dummy variable equal to 1 if property \(i\) was sold in an urgent manner.

Equation 2 decomposes the price discount on a foreclosed home into three separate effects. Unfortunately, sources of variation in one of these variables often affect the others. Thus the foreclosure price discount of 28 percent estimated by CGP is not an estimate of \(\gamma\) but rather an estimate of \(\theta + \delta + \gamma\), since many foreclosed properties were poorly maintained, damaged during the foreclosure process and ultimately sold in an urgent manner. We can use this decomposition approach to estimate the marginal effect of foreclosure on house price and also to determine the extent to which the Case-Shiller index may be overstating the decline in house prices.

#### 2.2.1 Effect of Foreclosure Process

The effect of the foreclosure process on house price can be estimated as \(\delta + \gamma\). This is because the marginal effect of a bank’s decision to pursue foreclosure must be measured against the alternative of adopting a REO rental program. With a REO rental program, a bank may avoid the price discount associated with physical damage since disgruntled tenants will be less likely to damage the house prior to their departure and the property will remain occupied and less susceptible to vandalism. The bank may also avoid the discount associated with a forced sale because tenants will continue to occupy the home and pay rent until the bank finds a suitable buyer. However, the price discount

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6 Real Estate Owned rental programs allow for tenants to pay market rents and remain in a foreclosed property until it is sold. Fannie Mae’s program covers only renters of foreclosed properties while Freddie Mac’s program covers both renters and former owners.
associated with deferred maintenance may be unavoidable as households facing financial difficulties are likely to defer maintenance irrespective of the banks decision to pursue foreclosure.

### 2.2.2 Effect of Physical Condition on Case-Shiller Price Index

An upper bound on the extent to which the Case-Shiller House Price Index may be overstating the decline in house prices can be estimated as $\theta + \delta$. The repeat-sales methodology of the Case-Shiller Index is likely to be overly influenced by foreclosed properties as a disproportionate number of houses sold today are foreclosures. The methodology attempts to create a ‘quality-constant’ measure of changes in house prices by excluding repeat-sales on properties that undergo "substantial physical changes immediately preceding or following the transaction." However, ‘substantial physical changes’ are only identified when they are significant enough to be listed on deed records, and so include changes such as remodeling, rebuilding, or abandonment. Even then, "local deed recorders and property data vendors differ in how often and consistently they collect and record information that can be used to identify properties that have experienced substantial physical changes."\(^7\)

It is therefore likely that many foreclosed properties which were poorly maintained or suffered physical damage as a result of the foreclosure process are not excluded from the data. This could occur if the effects of poor maintenance and physical damage are not substantial enough to be noted on the deed record or if the local deed recorder or data vendor fails to provide information used to identify properties that have experienced substantial physical changes. Yet because the methodology’s controls are likely to exclude a significant number of badly damaged properties, we can interpret our estimate of $\theta + \delta$ as only an upper bound on the extent to which the index may overstate the current decline in house prices. In other words, a household forced to sell its well-maintained home may find that the Case-Shiller index has overstated the price discount it ought to expect by a maximum of $\theta + \delta$.

### 2.2.3 Estimation of Price Effects

To estimate the magnitude of the effects of deferred maintenance, physical damage, and a forced sale, we begin by rewriting Equation 2 as

$$\log (price_i) = x'\beta + \beta_1 unexhlth_i + \beta_2 exhlth_i + \beta_3 foreclosure_i + \epsilon_i$$  \hspace{1cm} (3)

where $unexhlth_i$ is a dummy variable equal to 1 if the owner of property $i$ suffered an adverse health outcome that was unexpected, $exhlth_i$ is a dummy variable equal to 1 if the owner of property $i$ suffered an adverse health outcome that was foreseeable or expected, and $foreclosure_i$ is a dummy variable equal to 1 if property $i$ is a foreclosed property. We then argue that

$$\beta_1 = \gamma$$  \hspace{1cm} (4)

$$\beta_2 = \theta + \gamma$$  \hspace{1cm} (5)

$$\beta_3 = \theta + \delta + \gamma$$  \hspace{1cm} (6)

We reason that households have no reason to defer maintenance or damage their homes in the time immediately preceding an unexpected health outcome such as trauma resulting in serious injury or death. This is in contrast to hospitalization or death resulting from health conditions that are either foreseeable or expected. In these cases, individuals suffer from chronic health conditions and are likely to defer maintenance of their home either because they are unable to work or anticipate having high medical expenses. In either case, houses owned by these individuals are likely to sell at a discount due to both the urgent nature of the sale and the deferred maintenance of the property.\(^8\)

Lastly—as mentioned previously—foreclosed properties are likely to have been poorly maintained, damaged during the foreclosure process and ultimately sold in an urgent manner.

Next we plug Equations 4-6 into Equation 3 and rearrange to get

$$\log (price_i) = x'\beta + \theta (exhlth_i + foreclosure_i) + \delta foreclosure_i + \gamma (unexhlth_i + exhlth_i + foreclosure_i) + \epsilon_i$$  \hspace{1cm} (7)

Creating the three variables shown in Equation 7 will allow us to estimate the coefficients $\theta$, $\delta$ and $\gamma$. This in turn allows us to estimate the marginal effects of foreclosure on house price, $\delta + \gamma$, and an upper bound on the extent to which the Case-Shiller Index may be overestimating the decline in house prices, $\theta + \delta$.

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\(^8\) A large number of cases in which deterioration of health is foreseeable consist of elderlies. We exclude the elderly and focus on individuals between the ages of 25 and 65, because the former differ in important ways from the latter.
To estimate Equation 7, we must create measures of the variables $unexhlth_i$, $exhlth_i$, and $foreclosure_i$. Measuring foreclosure is straightforward as this information is readily available in house-level transactions data. For unexpected health outcomes, $unexhlth_i$, we will use admissions caused by traumatic injuries that are not self-inflicted and result in either death or severe injury. For expected or foreseeable health outcomes, we will use admissions caused by chronic illnesses that result in either death or transfer to an inpatient long-term care facility.

A large number of deaths resulting from either traumatic injury or chronic illness are admitted through hospital emergency departments and are contained in the inpatient discharge files described in Section 1.2. In the event that additional observations are needed, we plan on acquiring Texas mortality detail files which contain information found on state death certificates including the cause of death.

Conclusion

This proposal has outlined a research agenda centered around the topic of house prices and foreclosure. Our research will strive to answer two important questions regarding the relationship between house prices and foreclosure. First we will examine the role of trigger events in causing foreclosure using a regression discontinuity approach that will measure any discrete increase in the probability of sale or default upon suffering an adverse shock to health. If we find that health shocks force households to either sell their home or default on their mortgage depending on whether they have a positive or negative amount of equity in their home, then a government imposed moratorium on foreclosures may allow time for households to recover from an exogenous trigger event and avoid foreclosure. If instead we find that households strategically walk away when the equity in their home reaches a sufficiently negative value, then a temporary moratorium may simply delay an inevitable decline in house prices towards an equilibrium determined by housing market fundamentals.

Second, our research will empirically decompose the price discount on a foreclosed property into three separate effects: a forced sale in an illiquid housing market, deferred maintenance on the property leading up to the foreclosure process, and physical damage suffered as a result of the foreclosure process. This exercise will help determine if banks are engaging in the large scale destruction of wealth via a costly foreclosure process, and whether the adoption of REO rental programs or government regulation may help in mitigating a downward spiral in house prices. Our decomposition exercise will also estimate an upper bound on the extent to which the widely cited Case-Shiller house price index may be overstating the current decline in house prices.
References


Appendix

A.1 Timeline of Proposed Research

We will conduct the proposed research over a one year period extending from July 1, 2009 to June 30, 2010.

**Jul 2009 – Aug 2009** Complete the application process for Texas hospital discharge data.

**Sep 2009 – Oct 2009** Code and clean data. Classify admissions as resulting from expected or unexpected causes.

**Nov 2009 – Dec 2009** Analyze effects of trigger events in causing sale or foreclosure of property.

**Jan 2010 – Feb 2010** Write up findings on role of trigger events in causing foreclosure.

**Mar 2010 – Apr 2010** Conduct decomposition exercise for price discount on foreclosed property.

**May 2010 – Jun 2010** Write up findings on effect of foreclosure on house price.

A.2 Cost of Texas Hospital Discharge Data

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Funding of data expenses may be reduced without prohibiting successful completion of the proposed research. The amount of total funding required and minimum funding required are calculated using the prices currently posted by the Texas Department of State Health Services.\(^\text{10}\) We are actively exploring methods of reducing the amount of funding required for data, as described below.

1. We are inquiring about discounts available to academic researchers.
2. We are looking into purchasing a sample of the discharge data which contains either fewer variables or a smaller number of observations.
3. We will be contacting faculty who are either working with or have access to the Public Use Data Files from 2004-2008Q2.
4. We will also look into using mortality data instead of hospital discharge data. This data is generally cheaper and would not adversely affect the identification strategy outlined in Section 2.2. However, it is likely to complicate the identification strategy described in Section 1.2 and result in estimates of the role of trigger events that are significantly less precise.

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\(^9\)This data will be made available to us by Carlos Dobkin, Associate Professor of Economics, University of California, Santa Cruz.

\(^\text{10}\)See [http://www.dshs.state.tx.us/thecic/hospitals/HospitalData.htm#PUDF](http://www.dshs.state.tx.us/thecic/hospitals/HospitalData.htm#PUDF).
Education:

**University of California, Berkeley**
Ph.D., Economics, expected May 2011  
Coursework (in addition to standard first year courses):
- Finance/Financial Economics: Macroeconomic Finance, Continuous Time Asset Pricing, Corporate Finance
- International Economics: International Trade, Open Economy Macroeconomics, International Finance

Research Interests:
- Household Finance, Asset Pricing, International Finance, Monetary Policy

**University of California, Santa Cruz**
B.A., Economics (with Highest Honors), June 2005

**University of Michigan, Ann Arbor**
Public Policy and International Affairs Junior Summer Institute, 2004

Professional Experience:

**Analysis Group, Menlo Park, CA, 2007 – 2008**  
*Research Associate*
- Conducted original economic research on cases regarding anti-trust litigation and securities fraud.  
- Performed market research and statistical analysis in aid of strategy consulting for major pharmaceutical firm.  
- Constructed a sophisticated case-specific model of optimal shipping routes used by client’s competitors in order to extrapolate the firm’s shipping strategy and associated pricing scheme.

**National Bureau of Economic Research (NBER), 2004 – 2007**  
*Economic Research Assistant for Carlos Dobkin, Assistant Professor at University of California, Santa Cruz*
*Economic Research Assistant for Douglas Almond, Assistant Professor at Columbia University*
- Responsibilities include data analysis and project consulting for faculty conducting research requiring use of particular datasets in which I specialize.  
- Position requires extensive experience with SAS, STATA, and Excel.

**Warren Consulting, Santa Cruz, CA, 2005 – 2006**  
*Economic Consultant*
- Consulting position with a firm hired by the City of Santa Cruz to attract more high tech firms to the area.  
- Responsibilities include conducting independent research on local economic atmosphere as well as meeting with industry leaders, public officials and interest groups in order to coordinate a campaign to attract additional high tech firms to the area.

**Rosen Consulting Group, Berkeley, CA, 2005**  
*Economic Consultant*
- Responsibilities include extensive SAS programming, statistical modeling, economic consulting and compilation of real estate data, all meant to improve performance of the consulting firm’s statistical forecast model during times of unprecedented market conditions.

Publications:

Working Papers:
- “Outstanding Debt and the Household Portfolio,” with Thomas Becker.

Presentations:
- Santa Cruz City Council, joint presentation with Cliff Warren of Warren Consulting on business climate of City of Santa Cruz and initiatives to attract additional high tech firms to the city.

Teaching Experience:
- Graduate Student Instructor for Economics 136 – Intro to Financial Economics
  University of California, Berkeley, Fall 2008
- Teaching Assistant for Economics 113 – Intro to Econometrics
  University of California, Santa Cruz, Fall 2005 and Winter 2006
- Modified Supplemental Instructor for Economics 113 – Intro to Econometrics
  University of California, Santa Cruz, Fall 2003 – Spring 2004

Honors and Awards:
- P&D Soros Fellowship for New Americans
- UCSC Dean’s Award for Social Sciences
- Household Credit Services Award
- Santa Cruz Center for International Economics (SCCIE) Research Award
- Public Policy and International Affairs Fellowship
- Plantronics Scholarship
- UCSC Econ Dept Highest Honors
- UCSC Oakes College Honors
ADAM SZEIDL

Dept. of Economics, UC-Berkeley
517 Evans Hall #3880
Berkeley, CA 94720-3880

Phone: 510 642-2603
E-mail: szeidl@econ.berkeley.edu
http://emlab.berkeley.edu/~szeidl/

ACADEMIC EXPERIENCE

2004-   Assistant Professor, Department of Economics, UC-Berkeley
2008 Spring  Visiting Assistant Professor, Department of Economics, Harvard University
2007 Spring  Visiting Assistant Professor, Stern School of Business, New York University

EDUCATION

Ph.D. in Economics, Harvard University, 2004
M.A. in Economics, Central European University, Budapest, Hungary, 2000
M.A. in Mathematics, Eotvos Lorand University, Budapest, Hungary, 1999

REFEREED PUBLICATIONS

“Trust and Social Collateral” (with Dean Karlan, Markus Mobius and Tanya Rosenblat), Quarterly Journal of Economics, forthcoming.

“Core and Periphery in Networks” (with Daniel Hojman), Journal of Economic Theory, forthcoming.


OTHER PUBLICATIONS


WORKING PAPERS

“Fishing for Fools” (with Ulrike Malmendier), 2008.

“Consumption Risk-sharing in Social Networks” (with Attila Ambrus and Markus Mobius), 2008.

“Imports and Productivity” (with Laszlo Halpern and Miklos Koren), 2006.


“Marriage, Housing, and Portfolio Choice: A Test of Grossman-Laroque” (with Raj Chetty), 2006

“Consumption Commitments: Neoclassical Foundations for Habit Formation” (with Raj Chetty), 2005

RESEARCH GRANTS

2008-11 National Science Foundation grant for “Informal Contract Enforcement in Social Networks” (with Attila Ambrus and Markus Mobius)

2005-08 National Science Foundation grant for “Consumption Commitments and Risk Preferences” (with Raj Chetty)

2004-06 UC-Berkeley, Committee on Research grants

HONORS


TEACHING

2004-08 UC-Berkeley: graduate and undergraduate Financial Economics

2008 Harvard University: graduate Game Theory

SEMINAR AND CONFERENCE PRESENTATIONS

2008: Munich, NYU Stern, Utah Winter Business Economics Conference, Chicago GSB, Boston University, Northwestern, CRES conference at Washington University, SITE, Gerzensee, Networks conference at Northwestern, UC-Berkeley

2006: Penn State, Cornell-Penn State Macro Workshop, University of Chicago, Gerzensee, UC-San Diego, UC-Davis, Stanford University


2004: Northwestern University, University of Minnesota, UC-Berkeley, California Institute of Technology, NYU Stern Economics, NYU Stern Finance, Stanford GSB, Columbia GSB, Wharton, London Business School, Oxford University, Universitat Pompeu Fabra, Humboldt Universitat, Hebrew University, Minneapolis Fed, NBER Summer Institute (Asset Pricing), SED conference, University of Pennsylvania

CONFERENCE ORGANIZATION

2008 SITE Session on Social Networks and Development, co-organizer (with Manuela Angelucci, Giacomo De Giorgi, Aprajit Mahajan, Ted Miguel)
2007 AEA Session on “Risk-sharing in Social Networks,” co-organizer (with Markus Mobius)
2006 AEA Session on “Consumption Commitments,” co-organizer (with Raj Chetty)

INVITED DISCUSSIONS

2007: AEA; 2006: AEA; 2005: NBER ISOM; Structure and Evolution of Institutions, Stanford

REFEREE SERVICE


11/06//2008