An Assessment of the California Natural Hazard Disclosure Law (AB 1195)

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Introduction

California faces some of the most severe challenges in natural hazard management in the nation. High population densities and development pressures combine with the near ubiquity of natural hazard zones (Figures 1 and 2). From sprawling floodplain cities in the Central Valley to exclusive suburbs in wildfire zones on the fringes of Los Angeles, hazard and development are inseparable. Recent high-value flood and fire disasters are illustrative: the 1991 Oakland Fire, $1.9 billion in damages; the 1993 Southern California firestorms, $1 billion; the 1997 Central Valley floods, $2 billion; the 1999 statewide firestorms, 1376 structures destroyed. Insurance providers have raised premiums or stopped offering fire insurance altogether in many areas of California with a recent wildfire history (Irby *et al.* 1999). Urban ratepayers in the state subsidize rural and fringe ratepayers, who pay $1.00 in fire insurance premiums for every $1.09 in costs incurred by the insurance provider (CDF 1995). As damage from natural disasters increases, the burden of government disaster assistance and hazard mitigation increases at state and federal levels.

While reliance on structural protections (e.g. levees), emergency responses, public insurance and disaster aid may suffice in parts of the nation with lower density populations, lower development values or less frequent or fewer kinds of natural catastrophes, problems arising from California's combination of high development pressures and prevalent hazard zones seem beyond the reach of public modes of action alone. In the face of inadequate policy mechanisms to deal with natural hazards, the state has begun to harness market processes to transmit information about and internalize the costs and risks of residing in hazardous locations.

The California Natural Hazards Disclosure Law of 1998 (AB 1195) required seller disclosure of property location in publicly mapped wildfire, flood and seismic hazard zones. In theory, such information should enhance the efficiency of market allocations of land in hazardous areas. Better

information about the presence of hazards is expected to reduce the relative price of hazard zone properties by increasing buyers' knowledge of the risks and additional expenses associated with living in them. The negative premium due to disclosure consists of the capitalized value of the added expenses, such as insurance and flood and fire proofing costs, plus an "option price" (see MacDonald *et al.* 1987), or risk aversion premium that compensates for the uncertainty of potential damages and injuries in excess of insurance coverage. While one can calculate how much less the "rational" consumer will be willing to pay for a property based on added expenses, the price effect of risk aversion is far more difficult to predict because of various biases in the way that consumers translate perceived risks into financial terms (Kask and Maani 1992).

Does natural hazard disclosure reduce the price of hazard zone properties relative to comparable non-hazard zone properties? If so, might this redistribute settlement in and away from hazardous areas, reduce the cost of structural, emergency and regulatory forms of protection, or contain levels of public compensation for damages? Is reliable market information a policy substitute for other public forms of response to the potential impacts of natural hazards on property owners and public expenditures? If disclosure's effects are capitalized negatively into property markets, are these effects realized equally across different populations? Experience with implementation of AB 1195 offers basis for answering these questions.

This study examines the effects of AB 1195 on property values in wildfire and flood hazard zones throughout California. Through a survey of recent homebuyers, it evaluates the extent to which AB 1195 provisions have actually been put into practice. Using spatially and temporally explicit hedonic analysis[i], it isolates sales price differentials in statutory flood and fire zones before and after AB 1195 to determine how disclosure has affected prices. It explores whether income class, race or local experience affect these differentials.

We find that disclosure under AB 1195 has reduced property values in some hazardous areas, but not all. Our results indicate that flood disclosure under AB 1195 has had a negative price effect. This shows that disclosure was inadequate under the previously existing National Flood Insurance Program (NFIP) and that AB 1195 better informs consumers. However, the negative price effect of flood disclosure under AB 1195 is mostly accounted for by Hispanic communities. This suggests that the mechanisms of disclosure under the previously existing NFIP (which was triggered through the mortgage origination process) were biased against Hispanic homebuyers and that AB 1195 helped correct this bias. We hypothesize that this difference in disclosure rates under NFIP might be due to overall different patterns of home financing among Hispanics in California. Wildfire disclosure, on the other hand, has had little effect except in areas that have experienced wildfire in the recent past. We hypothesize that this result may be related to the increased difficulty of getting adequate fire insurance coverage in recent fire areas combined with increased homebuyer awareness of the fire risk, as facilitated by the disclosure form. These results suggest that the price effects of disclosure may be mediated by government policies that regulate availability and pricing of hazard insurance.

Previous Hazard Disclosure Requirements

While there is a common law obligation to disclose material fact in real estate transactions[ii], statutory hazard disclosure requirements previous to AB 1195 were few and weak. This is important because among the multitudinous facts that are material under common law, disclosure of potential hazards is frequently ignored, primarily because the seller, the buyer and their agents are unlikely to know a location's status without a professional opinion. Without statutory backing, the only way that non-disclosure can be addressed is through litigation.

The National Flood Insurance Program (NFIP)[iii] requires transfer disclosure for houses in Special Flood Hazard Areas (SFHA's)[iv] that are required to purchase NFIP insurance, but disclosure is inconsistent because the program is designed less to protect consumers than to protect the federal government's financial interests. Under the NFIP, disclosure is merely a byproduct; the primary objective is to get as many homeowners as possible paying into the system so as to offset the costs of disaster assistance. When Congress amended the National Flood Insurance Act in 1974, flood insurance became mandatory for SFHA properties with federally regulated mortgages and mortgages that were sold on the secondary market to the Federal National Mortgage Association (FNMA, or Fannie Mae) and the Federal Home Loan Mortgage Corporation (FHMC, or Freddie Mac). This arrangement left many homebuyers and some sectors of the mortgage industry unregulated by the NFIP, and hence not subject to disclosure. In addition to those who self-financed, this includes those who finance through non-federally regulated mortgage companies, including "subprime lenders." Those entities often only conduct flood hazard designations when they resell their investment grade mortgage portfolios on the secondary market to FNMA and FMHC or to a federally regulated bank or S&L, all of which require a federally compliant mortgage contract that calls for flood determinations and mandatory insurance purchase for designated flood zone properties.

When FMHC and FNMA started returning investment grade mortgage portfolios to mortgage companies if one property in them had been damaged in a flood, many mortgage companies responded by conducting determinations and requiring mortgage holders to buy insurance. However, this was frequently done in the middle of the term of a mortgage.[v] According to Jack Eldridge, Community Mitigation Program Branch Chief for FEMA Region IX, many unaware homeowners were told by the lender that they were in an SFHA, *and* that they had to buy flood insurance, frequently long after they bought their house (personal communication, 2000). From the perspective of market efficiency, disclosure after the transaction is of little utility, neither protecting consumers

nor allowing them to set a lowered market price for hazard zone homes that signals the expenses and risks associated with living there. Moreover, with the rise of subprime lending, there is increasing concern for the consistency of NFIP flood disclosures since these institutions, on average, resell mortgages much less often to federally regulated sources, and so undergo much less regulation. As discussed below, under "Race and Hazard," Hispanics are far more likely than whites to originate with this type of lender.

California State Disclosure Requirements

Since 1985, state law (Civil Code 1102.6) has required a seller and his or her agent to disclose all "material facts" about the condition of a property. The Seymour-Petris Act created a transfer disclosure statement (TDS) that focuses mainly on structural factors, such as the condition of the plumbing and the roof. As for hazards, it only asks the seller or agent to disclose whether the property has undergone a natural event, such as flooding, not whether the property is located in a hazard zone, *i.e.* is subject to *potential* natural hazards.[vi]

Previous to AB 1195, several statutes did call for certain types of natural hazard disclosure. In addition to two seismic hazard disclosure laws, the Alquist-Priolo Special Studies Zones Bill and the Seismic Hazard Mapping Act[vii], AB 1812, passed in 1989, required residential transfer disclosure for houses in State Responsibility (SRA) fire zones (Public Resources Code 4125). SRAs are fire hazard zones located where no local fire department exists, and where the California Department of Forestry has responsibility for fire protection. The disclosure provision informed buyers that they must maintain 30 feet of vegetative clearance around their homes and install spark arresters. None of the disclosure laws created their own form; all called for real estate agents or sellers to disclose in the "Other" section of the TDS form.

Confusion and non-compliance disabled these early disclosure laws. According to Peter Detwiler, Staff Director of the California Senate Local Government Committee and former Staff Director of the Senate Committee on Housing and Land Use, natural hazard disclosure requirements supposedly were not well known among REALTORS® because they were located in the Resources Section of California Code. Real estate advisors typically overlooked this code section because so little of it pertained to their industry (personal communication, 1999). The dispersion of disclosure requirements among three different sections of code exacerbated this neglect. Most agents and brokers likely did not know about these requirements. Where they did, there was little threat of enforcement and few incentives, such as transference of liability, to encourage disclosure.

AB 1195 emerged in a context where disclosure was haphazard, poorly publicized, and infrequently done. Legislators realized that for disclosure to affect markets, the law needed to be publicized, incentives and disincentives had to be included for sellers and the real estate industry, and the various, confusing natural hazard disclosure requirements had to be combined into a single entity.

The California Natural Hazard Disclosure Law of 1998

AB 1195[viii] requires home sellers of properties within designated natural hazard zones to show prospective buyers a Natural Hazard Disclosure (NHD) Statement prior to escrow. The statement informs buyers that the property is potentially subject to these hazards. The hazard zones include:

- Areas of potential flooding in the event of dam failure, designated by the State Office of Emergency Services
- Special Flood Hazard Areas (SFHAs), corresponding with the 100 year flood plain, designated by the Federal Emergency Management Agency (FEMA)
- Very High Fire Hazard Severity Zones (VHFHSZs), designated by the California Department of Forestry (CDF) in conjunction with local governments
- Wildland fire areas, or State Responsibility Areas (SRAs), designated by CDF
- Earthquake fault zones, designated by the State Geologist; and
- Seismic hazard zones, designated by the State Geologist.

The Statement warns buyers "these hazards may limit your ability to develop the real property, to obtain insurance, or to receive assistance after a disaster." The NHD form is available from numerous companies in a variety of languages, by request. Once a local agency makes available maps showing parcels affected by the hazard zones, the seller and his or her agent are responsible for disclosing that information. The law additionally requires that homeowners in a flood zone purchase flood insurance, in accordance with the NFIP regulations, and that homeowners in both categories of fire hazard zones undertake prescribed vegetative fuel reduction within and around their property, in accordance with local fire regulations. These are critical inclusions. By informing potential buyers that living in a hazardous location requires actual expenses as well as abstract risks, the negative consequences of living there are made more concrete and tangible.

AB 1195 consolidated previous state and federal hazard disclosure requirements into one Natural Hazard Disclosure (NHD) form and added requirements for several new zones. The statute placed that code section in the Civil Code. It granted a three-day rescission period during which buyers have the right to terminate a transfer after signing a contract if proper disclosure was not made. This provision gave sellers and their agents incentive to disclose early in the process rather than at the last minute, as was commonly the case when disclosure did occur in the past. Finally, in contrast to previous hazard disclosure laws, AB 1195 clearly articulated where real estate agents were liable for disclosure and where they were not. It makes clear which hazards the agent is responsible for disclosing, and it allows transfer of liability to a third party contractor conducting the hazard report. Since the third party report generally costs only $50 to $100 and frees the agent from direct and indirect liability, this change alone may drive most agents to get their clients to disclose. Mail surveys from this study indicate that a large majority of homebuyers are seeing the Natural Hazard Disclosure Form and that this form is intelligible and easy for people to understand but it appears

that many consumers are not aware of the three day rescission clause. If this clause were better publicized, it is likely that disclosure would occur in a more timely fashion.

AB 1195 has one serious problem relating to VHFHSZ designation. While flood hazards are uniformly mapped across the country, and SRA wildland fire zones are mapped uniformly across the state, VHFHSZs, are mapped inconsistently across local jurisdictions. The 1992 Bates Bill (AB 337) required the mapping of fire hazard zones, known as VHFHSZ's, within Local Responsibility Areas (LRA), or jurisdictions where a local fire department existed. However, the bill was not designed with disclosure in mind. The bill instructed CDF to identify VHFHSZs "in cooperation with" local agencies. Local governments could exempt land within their borders from designation as VHFHSZ under the Bates Bill by declaring "functional equivalence" of local fire zoning regulations to the state model ordinance, by rejecting the CDF-recommended maps, by redrawing the maps themselves, or by refusing to comply with the Bates Bill entirely. The state submitted the maps to the locality, and then the local government had 120 days to either accept those maps or amend them; they could redraw or eliminate them if they wanted. CDF has neither the authority nor the resources to verify that a local government has "functional equivalence" in their ordinances, or that a local government's re-mapping was based on good science. According to Melissa Frago, Fire Safe Planning Coordinator for the Office of the State Fire Marshal, once a locality made such claims, CDF was unable to contest them (personal communication, 1999). [ix]

Many localities have successfully exempted themselves from the zoning ordinances under the Bates Bill (e.g. vegetative clearance around structures) by rejecting the state's mapping. The question of where disclosure is needed for LRA fire zones has not yet been fully resolved. In the Civil Code created by AB 1195, disclosure is required for VHFHSZs pursuant to either Section 51178 (based on state designation) *or* Section 51179 (based on local designation). The state has yet to resolve which

legally takes precedence, but due to the wording of the Civil Code section and to avoid potential liability to sellers and disclosure firms, the state recommends that properties in zones identified pursuant to both Sections 51178 and 51179 should be disclosed (Melissa Frago, personal communications, 1999 and 2001). Whether disclosure is generally occurring by the more conservative state standard when the two conflict is unknown. The state has made public its digital maps for this purpose. The common reasoning is that disclosure should be carried out if an agency with a VHFHSZ identified pursuant to Section 51178 has not designated the zone pursuant to Section 51179, but since local agencies are responsible for supplying the maps upon which hazard disclosure is made, many localities may simply provide their own map. While those responsible for disclosure (the seller, the agent, or a third party) should take the most conservative approach towards disclosure, those parties may technically be within the law if they use the maps the locality provided, even if those maps are not in accord with the state's VHFHSZ designations.

The number of local governments not in compliance with the Bates Bill highlights the magnitude of the problem. According to Irby *et al.* (1999), of 209 jurisdictions with VHFHSZs mapped by CDF, 99 did not challenge the designation (group 1), 52 claimed that they "meet or exceed" the Bates Bill minimums (group 2), and 58 "exempted" themselves (group 3), meaning they declined to participate either due to political reasons or local findings that the state mandate was not necessary for effective fire protection in their area. In the two latter cases, jurisdictions were free to reject state VHFHSZ mapping if they chose and were under no obligation to provide their own mapping. Of the 99 jurisdictions in group 1, only 54 formally "adopted" the state designated VHFHSZ. Of the 52 in group 2, and the 58 in group 3, 10 and 6 respectively adopted some kind of fire hazard zone, although in most cases not the state designated VHFHSZ. All jurisdictions in groups 2 and 3 are technically exempt from any LRA fire hazard disclosure requirements, even though many of them contain extremely flammable landscapes. Without an official VHFHSZ in the jurisdiction, most

subsequent fire laws do not apply to the jurisdictions. The reasons why certain municipalities embraced these regulations while other did not are beyond the scope of this paper, but merit more research.

The overall effect of this problem is that many people who live in hazardous areas are misled into a false sense of security when purchasing a home because the NHD form claims that no known hazard exists. Moreover, disclosure could be highly inconsistent within a contested VHFHSZ. Sellers using the state maps might disclose, while sellers using local maps might not.

Methods

This study uses hedonic analysis to isolate the price effects of disclosure under AB 1195. Economists including Rosen (1974), Quigley and Kain (1970) and Griliches (1971) developed the concept of hedonic price analysis, in which the observed price of a good is econometrically disaggregated into a schedule of implicit marginal attribute prices. Hedonic pricing is particularly suited for studying housing prices, because the value of a property is determined by many quantifiable attributes, such as number of bedrooms, distance to amenities and square footage. In this study, sales price was regressed on a vector of neighborhood, locational and structural attributes, in addition to variables for flood zone and fire zone location, and transaction before or after the law. The partial derivatives of the coefficients on the interaction terms between hazard zone location and disclosure after the law represent the hedonic price of hazard disclosure under AB 1195.[x]

A two-tier cluster sample method was used to get a representative sample of housing transactions from across the state. In the first tier, zip codes from across the state were sampled by stratifying all California zip codes by population density, median 1999 housing price and percentage of land area occupied by flood and fire zones.[xi] The resulting sampling matrix is given in Appendix 1. Zip codes

with very low population densities were discarded because they lacked sufficient transactions. One of every 9 observations was sampled from each cell, yielding 63 sample zip codes. Figure 3 shows the location of sample zip codes. The method ensured that there would be enough samples in hazard zones (even with this oversampling of hazardous zip codes, only roughly 1 in 5 properties was located in a statutory hazard zone) and that a variety of neighborhoods would be included, across the spectrum of housing values and population density.

Once sample zip codes were chosen, individual property transaction records were obtained for the period starting 18 months before the implementation of the law to 19 months after it. Both vacant and developed parcel transactions were obtained[xii], but the vacant parcel records were separated into a different database for separate regression. These property points were address geocoded using GIS software. A variety of control variables (Table 1) were coded for each property point.[xiii] Control variables, chosen based on the extensive hedonic literature, can be roughly broken down into property characteristics (structure and lot), locational characteristics (access to employment and distances to certain amenities/ or disamenities) and neighborhood socio-economic characteristics (race, income, school quality, housing market segment). Some variables that were expected to be significant based on the literature were found not to add any explanatory power to the model due to collinearity with other variables, and so were excluded from the model in the interests of parsimony. While the control variable set is roughly the same for the fire and flood models, there are slight differences, noted in Table 1. Where a control variable was used in one model and not another, it was because it was not significant in one of those models. This is likely due to the different geography of the two samples.

The key variables were location in FEMA SFHA flood zones, SRA fire zones and VHFHSZs.[xiv] No distinction was made between properties in SRA zones and VHFHSZs. In order to determine how the effects of disclosure are affected by a neighborhood's recent experience with hazards, CDF GIS data

on wildfire perimeters were obtained. The distance of each household point to the nearest fire of greater than 300 acres in the last 10 years before the date of sale was coded using three month lags so that a house would not be coded with a fire occurring after the time of transaction. Similar data on flood locations were unobtainable at the time.

After all variables were coded, tier two sampling began.[xv] Property records were stratified by zip code and by hazard (or no-hazard) zone.[xvi] A sampling algorithm was created that oversampled strata with low populations and undersampled strata with high populations. This served to increase the proportions of hazard zone properties and properties in zip codes with relatively low numbers of observations. Each stratum was assigned a sampling weight, for use in weighted least square estimation, equal to the inverse of the sampling rate. The algorithm was designed so that the total number of hazard zone properties sampled could be set equal to a specified proportion of the total number of non-hazard zone properties sampled. The tier two flood sample included 2,840 records in flood zones (about 62% of all flood zone records) and 14,478 non-flood records (38%), all of which were randomly sampled from the strata and assigned weights. The tier two fire sample, which was taken out of a smaller population, included 5779 fire records (76%) and 18712 non-fire records (45%).

Weighted least squares regressions were run on the data using a semi-log functional form.[xvii] One property of this functional form is ease of interpretation; coefficients can be interpreted as percentage changes in the response due to a marginal increase in an attribute. Both weighted and unweighted least squares regressions were run and results were found to be robust to inclusion or exclusion of weights. Only weighted results are given here.

Five regression models were used (Table 2). Model 1 regresses the samples from the flood data set without demographic interaction terms, but includes an interaction term for AB 1195 disclosure (FLOOD:AFTER). Model 2 looks at the effects of flood zone location and disclosure accounting for interaction with median household income. In addition to FLOOD and FLOOD:AFTER, it includes FLOOD:MHHINC (interaction between median household income and pre-AB 1195 flood zone location) and FLOOD:AFTER:MHHINC (additive interaction effect for post-AB 1195 flood zone location). The latter term was dropped from the model because it was not significant at the 90% confidence level. [xviii] Model 3 looks at the effects of flood zone location and disclosure accounting for interaction with the percentage of Hispanics by census tract. In addition to FLOOD and FLOOD:AFTER, this model includes FLOOD:PHISP (interaction between percent Hispanic and pre-AB 1195 flood zone location), and FLOOD:AFTER:PHISP (additive interaction effect for percent Hispanic and post-AB 1195 flood zone location). FLOOD:AFTER and FLOOD:PHISP were dropped from this model because they were not significant at the 90% confidence level. Model 4 regresses samples from the fire data set without interaction for recent burning while and Model 5 regresses them with that term. Demographic interaction effects are not included in the fire regression results because no socio-economic variable interacted significantly with flood disclosure.[xix] R-squared values for models ranged between .765 and .773 and all variables had expected sign and significance. Regression results are given in Appendix 2.

In addition to the hedonic analysis, mail surveys were sent out as a means of getting a preliminary understanding of the extent of disclosure and homeowner attitudes towards it. Surveys were sent to 1200 households located in designated hazard zones that were sold since June of 1998. Surveys were sent to a sample of households within the 63 sample zip codes. Surveys were designed to determine (1) if the law is being complied with, and when disclosure is happening in the home buying process; (2) how important this knowledge is to homebuyers, whether it gave them second thoughts about

buying and whether it made them bid less on the property; (3) whether disclosure is encouraging homeowners to take more precautionary measures than they otherwise would have taken, including buying insurance, floodproofing and cutting back vegetation; and (4) how important people would consider hazard location to be in some hypothetical future house purchase. Of 1200 surveys sent out, 197 were returned and were complete, for a response rate of 16.3%. While the low number of responses reduces the statistical significance of any results and introduces a potential selection bias, they still yielded information that was useful enough to include. Selected results are given in Appendix 3.

Impacts of Flood Disclosure on Housing Prices

Disclosure under AB1195 has lowered consumer willingness to pay and reduced property values in the flood zone. The results indicate that before AB 1195, floodplain properties were worth roughly the same as comparable non-hazard zone houses, holding other attributes constant, but after AB 1195 floodplain properties were worth 4.3% less than comparable non-floodplain properties. When plugged into the Model 1 equation and solved, AB 1195 results in a loss in value of $8,150 dollars for the average floodplain home (Table 3).

The effects of flood disclosure are strongly conditioned upon the racial composition of a neighborhood. Inclusion of an interaction term between flood disclosure and a variable for percentage of Hispanics in a tract indicates that the significant negative capitalization caused by flood disclosure is mainly accounted for by neighborhoods with a higher than average proportion of Hispanic residents. Before AB 1195, there is no statistically significant interaction between flood zone location and the percentage of Hispanics (FLOOD:PHISP). However, after AB 1195, there is a significant interaction (FLOOD:PHISP:AFTER), with a coefficient of -.0011. In other words, for each 10% increase in Hispanic population there is a 1.14% reduction in the price of a floodplain home relative to the same floodplain home selling before the law in the same neighborhood. Hence,

holding all else constant (including overall price appreciation), a floodplain home in a neighborhood with 50% Hispanic residents sells for roughly 5.5 % less than a comparable non-floodplain home, after AB 1195, *ceteris parabus,* while before, it would have sold for the same amount. When plugged into the regression equation for the mean percentage of Hispanics (19%) and mean income (values were normalized by the mean, so 1 was used), disclosure results in a $4,220 drop in value for the average floodplain home (Table 4). However, Table 5, shows how this reduction gets significantly larger as the percentage of Hispanics per tract increases. A tract with 50% Hispanic population sees a reduction in value in excess of $11,000 due to disclosure. When this interaction term is included, the coefficient on the term for overall flood disclosure (FLOOD:AFTER) became insignificant, indicating that most of the negative price effects of flood disclosure are accounted for by communities with relatively high percentages of Hispanic residents.

Median household income (MHHINC) was also tested for interaction with both flood location (FLOOD: MHHINC) and AB 1195 disclosure (FLOOD:MHHINC:AFTER). Income did interact positively and significantly with flood location. The positive coefficient indicates that in low-income neighborhoods floodplain properties are worth less than comparable non-floodplain properties (independent of transaction before or after AB 1195), while in high-income neighborhoods, it is the opposite.[xx] When the interaction effect between income and flood location is included (Model 2) and the model is solved, the magnitude of the price reduction due to disclosure (FLOOD:AFTER) is increased to $20,456 for the mean income level (Table 6).[xxi] This indicates that poorer communities see more of a negative price effect due to flood location but AB 1195 made no change in this.

While income does interact with flood location, it does not interact substantially with flood disclosure. That is, the price effect relationship between flood zone location and income is little different before the law than after (FLOOD:AFTER:MHHINC is not significant). What slight

difference that arises is due to the non linear functional form of the model,. This indicates that whatever mechanism that confines the negative floodplain price premium to poor areas does not change after the law. Instead of low income neighborhoods, it is Hispanic neighborhoods that appear to experience the most intense price effect due to the law.

Impacts of Fire Disclosure on Housing Prices

Model 4 results indicate a positive premium of between 3% for fire zone location prior to AB 1195, which does not change after the law (FIRE:AFTER is not significant). These results suggest the omission of a variable accounting for high levels of demand for housing in the urban-wildland fringe areas where fire hazards are found. Lacking such a variable, that positive variance in price has been accounted for by the FIRE variable. Based on these results it appears that fire disclosure had no effect for the overall population of fire zone houses. However, Model 5 results indicate that the combination of proximity to a recent fire and disclosure is capitalized negatively into housing prices. A house selling in a statutory fire hazard zone after the law that was also within 5 km of a major and recent fire sold for 5.1% less than a comparable home selling after the law in a statutory fire zone that is not within 5 km of a recent fire. When this effect is controlled for (FIRE:AFTER:BURN5K), the effect of fire disclosure (FIRE:AFTER) actually becomes positive and significant, but at the same magnitude as FIRE:AFTER:BURN5K. In other words, prices actually went up in fire hazard zones after the law except in locations near a recent fire but, because these effects are additive, a home in a statutory fire zone near a recent fire selling after disclosure sold for the same as a home selling after the law outside of a statutory fire zone. Plugging mean values into the regression equation and solving indicates that a statutory fire zone home near the site of a recent fire sold for than $10,600 less than a comparable home selling after the law in a statutory fire zone near which a fire did not recently occur. Adding an income interaction term in Model 6 indicates that income interacts negatively with fire zone location but not fire disclosure (FIRE:MHHINC is significant, but

FIRE:MHHINC:AFTER) is not. That is, homes in wealthier areas are the only ones that see a negative price effect from fire zone location (starting at 150% of median household income), but disclosure does not alter that negative price effect.

Although the fact that the fire disclosure term (FIRE:AFTER) had a positive coefficient might suggest at first glance that disclosure had no effect, the negative price effect in fire disclosure zones that are near a recent fire is an indication that disclosure is having an effect in at least certain areas. Prices in fire zones went up after AB 1195 not because of fire disclosure, but because of increases in demand for urban fringe properties not captured in this model whose variance was assumed by the fire term. If that effect could have been controlled for, we likely would have seen no effect or an overall negative effect due to fire disclosure that would have appeared more negative in fire hazard zones near the site of a recent fire.

The availability and/or cost of fire insurance may help explain the results of Model 5. Prior to disclosure, many potential homebuyers in these areas may not have realized that their prospective home was in a fire zone and that they would either have difficulty getting adequate insurance coverage, or would need to pay more for that coverage. After the law, people were likely more aware that they lived in such a zone and potential buyers probably were more concerned about the availability and affordability of insurance. [xxii] In other words, disclosure served as a cue to homebuyers to do more research about the availability and pricing of insurance. In areas where a recent fire had occurred, there was a good probably that insurance would have been either unavailable through the private markets, very expensive, or inadequate, any of which would have been capitalized negatively into selling price. This is discussed further, under "Policy Implications."

Analysis of vacant land transactions

This study was unable to derive any significant results about how hazard disclosure is affecting vacant parcels. Various regressions were run, but model fits were unacceptably low and no significant results were found. This is due to a number of reasons. First, the data set of vacant parcel transactions was too poor and too small, with few hazard zone observations and not enough records from both before and after the law. Not only were there too few observations to parameterize enough control variables, but there were not nearly enough observations in the flood zone or the fire zone to get meaningful parameter estimates for differences before and after the law. Also, visual analysis of map layers indicated that many vacant properties (most of them being very large) might be partially in and partially out of hazard zones. Hence the process used here of address geocoding points and determining whether they fell within hazard zones, while adequate for smaller developed properties, likely resulted in serious designation biases for vacant properties. One of the findings in this study was that to adequately analyze vacant property for this purpose, digital parcel boundaries are needed. Unfortunately, at the time of this study, these did not exist for most of the study area.

Another contributing reason for the low model fit was the large number of records with seemingly anomalous transaction prices. This relates to the fact that vacant land transactions tend to be rife with confounding factors that distort the market transaction, such as speculation, tax considerations, absentee corporate ownership, land swaps, local politics, land use regulation and non-market transfers, all of which are difficult to control for because of the inconsistency of property data. In other words, the transacted price given in the data for many of these properties is not reflective of the market's bid-rent for vacant land in that location. To address this problem would require an extremely in depth collection, inspection and analysis of vacant property transaction records. Nevertheless, the results of the analyses of developed property in this study do have salience to the

question of how disclosure affects development in hazard zones, which are discussed below under "Policy Implications."

Race and Hazard

AB 1195 appears to have caused floodplain homes in highly Hispanic neighborhoods to be worth less than they otherwise would be, while having relatively little effect on floodplain properties in neighborhoods where the percentage of Hispanics is low. Two hypotheses for this result are postulated here, neither of which are mutually exclusive. The first contends that AB 1195 is correcting discrepancies in disclosure between races that existed under the NFIP and that those discrepancies existed because disclosure was regulated through the mortgage process, and because Hispanics are more likely to originate their mortgage through the subprime sector. The effect is only seen in Hispanic communities because, of all minority groups, Hispanics have by far the greatest presence in floodplains. The second contends that the Hispanic variable may not just be measuring percentage of Hispanics in a neighborhood, but some other unmeasured factor with which the real interaction is occurring, such as housing demand.

First, and most empirically supported, is the possibility that flood disclosure was occurring less often in Hispanic neighborhoods than in non-Hispanic neighborhoods previous to AB 1195 because of biases in the previously existing flood disclosure mechanism under the NFIP. AB 1195 would then disproportionately affect Hispanic neighborhoods by correcting this discrepancy in disclosure. However, if AB 1195 was correcting information discrepancies caused by NFIP, that would suggest that the price of floodplain homes in largely white neighborhoods should have been lower than comparable non-floodplain homes prior to AB 1195, which results did not indicate (i.e. FLOOD is insignificant in models 1 or 3)[xxiii]. Instead, results suggest that nobody was disclosed to prior to AB 1195, and after the law only Hispanics were disclosed to, which is clearly unrealistic.

We suggest that disclosure actually was occurring in largely white neighborhoods prior to AB 1195 and that the lack of a statistically significant effect in the time period was the result of two things. First, it relates to the fact that Hispanics have such a large presence within the floodplain, relative to both whites and other minority groups. If, prior to AB 1195, there was no floodplain differential for Hispanic neighborhoods, that effect might have been so great as to "swamp out" the negative effect from existing price differentials in predominantly white neighborhoods, for which there were fewer floodplain observations. The histograms in Figures 4-5 show that the distributions for the percent Hispanic variable are skewed to the left for the non-flood group, but considerably less so for the flood group, suggesting that the sample populations of flood zone properties are disproportionately in Hispanic neighborhoods. Moreover, the average non-floodzone property in the data set belongs to a census tract that is 17.5% Hispanic, while the average floodzone property belongs to a tract that is 31% Hispanic.

Second, there might have been an unmeasured positive amenity value associated with location in certain types of floodplains, which cancelled out the negative effect of pre-AB 1195 floodplain location. It is a strong possibility that the aesthetic beauty of living in a canyon bottom, on a riverside or by a dry creek bed positively impacted prices. The amenity value, stemming only from certain observations, was strong enough, and the floodplain premium weak enough that the two cancelled each other out. In other words, there was an unmeasured negative premium before the law, but it was small enough that it was masked by this omitted effect. If either, or both of these are the case, then the results of this study are consistent with the hypothesis of AB 1195 is correcting discrepancies in disclosure. Before AB 1195, properties in highly white floodplain neighborhoods did capitalize the negative price effect, but that effect was masked by the omitted aesthetic effect and by the extremely large number of floodplain observations in Hispanic neighborhoods. AB 1195

increased disclosure and reduced prices slightly in these low-Hispanic neighborhoods, as table 5 shows, but the fact that it reduced prices significantly in highly Hispanic neighborhoods suggests that it did correct a disclosure discrepancy.

What, then, were the mechanisms behind this disclosure discrepancy under NFIP, and what did AB 1195 do to correct them? Our analysis of the Federal Financial Institutions Examination Council's (FFIEC) Home Mortgage Disclosure Act (HMDA) data, as well sub-prime mortgage origination data from the Department of Housing and Urban Development (HUD) suggest that Hispanic homebuyers disproportionately obtain financing from unregulated sources, including federally unregulated mortgage companies. FEMA requires regulated lenders (banks, S&Ls, credit unions, etc.) to make flood determinations. While many mortgage companies do perform flood designations prior to transaction, their requirements to do so are much less clear cut, and they are subject to much less regulatory oversight. Hence, many mortgage companies only make that designation when they sell investment grade mortgage portfolios to Government Sponsored Enterprises (GSE's), such as FNMA or FHMC, or to federally regulated banks, all of whom require a federally compliant mortgage contract. Hence, many home purchases in Hispanic neighborhoods likely were not subject to disclosure ever or were subject to disclosure after transaction. It may also be that mortgage companies that originate loans to a largely Hispanic clientele do not sell mortgage portfolios as often on the secondary market.

This argument is backed up by the fact that Hispanic homebuyers are far more likely to originate their mortgage with a "subprime" lender than whites. Subprime lenders specialize in originating high-interest loans to homebuyers with impaired credit histories. Because of the higher risk involved, GSEs have traditionally not been involved in purchasing them (Temkin and Johnson 2002), and hence these companies have been subject to very little regulatory oversight (Canner and

Passmore 1999). These companies are less likely to resell their loans to an institution requiring the federally compliant mortgage contract and are also notorious for pressuring homebuyers and not adequately explaining the terms or conditions of the loans. Therefore, it would not be surprising if these institutions also were lax in requiring designations and disclosure of flood hazard. Using a list of subprime lenders from HUD, in conjunction with the FFIEC's Home Mortgage Disclosure Act (HMDA) database from 1998, we found that, in 8 sample Metropolitan Statistical Areas (MSA) in California, Hispanics were nearly twice as likely as whites to originate their mortgage with a subprime lender. Results, broken down by county are given in Table 7. These results are consistent with a recent study (Bradford 2002) which found a great disparity between white a Hispanic rates of subprime borrowing and found that some of the MSAs of highest disparity were in California, including Fresno (included in this study), which was in the top three for the nation.

The combination of Hispanics not getting disclosed to prior to AB 1195 and their large share of the population of floodplain properties may then help explain why AB 1195 appears to have reduced prices in floodplains when interaction is excluded. Other minority groups that finance with subprime lenders do not appear to be affected by AB 1195 because their population shares within floodplains are so small.[xxiv] Hence, Hispanics are the only group that is both heavily located in floodplains and that disproportionately finances their home through less-regulated sources

An alternate hypothesis that is by no means mutually exclusive with the mortgage origination theory is that the PHISP variable may proxy some other important quality that is not included in the model. For example, PHISP may be inversely correlated with housing demand or rates of change in demand in the areas sampled. Many of the highly Hispanic neighborhoods sampled in this study are very low demand housing markets. The causality of this correlation is unclear though. It may be that poor, migrant Hispanic communities are living in low demand, flood-prone areas because other, less marginalized communities do not wish to live there. It may also be that some of these neighborhoods

had experienced bad floods, encroaching urban problems, or both. On the heels of the flight of white middle class households, demand and prices went down and poorer, possibly migrant Hispanic households moved into these now more affordable neighborhoods. If most of the Hispanic neighborhoods included here are low demand areas, then lacking any other variable for demand-supply balance (a notoriously difficult variable to parameterize), the Hispanic variable may be explaining that variance; in areas of high demand, residents are willing to accept and overlook the flood problem in order to get the house they want, while in low demand areas, prospective buyers will adjust for the location by bidding less.

The Hispanic variable may also proxy housing quality, another attribute for which no data were available. According to Milgram (1988) and Krivo (1995) Hispanics, especially recent immigrants, tend to get lower quality housing for a given amount of money relative to whites because of factors including real estate steering practices (Ondrich 1998) and language barriers that give sellers a distinct advantage over Hispanic buyers. Hispanic immigrant households frequently choose to cluster densely in the same neighborhood, which also makes Hispanic buyers willing to pay more for what is often substandard housing and gives non-Hispanic sellers another advantage. If this is the case in general, then the Hispanic variable may actually be a proxy for housing quality, since price, in these neighborhoods does not adequately reflect quality. In this case, the negative interaction between flood disclosure and Hispanic population indicates that disclosure's effects are particularly felt for low quality houses; it may be that lower quality houses are more expensive to insure adequately, perhaps because they tend to endure more damage in the event of flooding.

Buyers Perceptions of Hazard Disclosure

Not enough mail surveys were returned (196 of 1200) to yield statistically significant results about hazard disclosure at the state level. Nonetheless, at the minimum these results anecdotally suggest

some trends. Firstly, a large majority (75%) of respondents remember seeing the hazard disclosure form. Second, the disclosure form is being seen at a variety of points in the transaction process, but usually long after the open house (or at least according to buyers' memories). This is an important point, because if the form were seen earlier in the home buying process, it would likely affect home prices more because prospective homebuyers would have a greater opportunity to adjust their bids. Most respondents said that the form did not make them bid less on the house, but enough did to have, if representative, a significant effect on housing prices in hazard zones across the state. More people consider the hazardous location important, and nearly half said it gave them at least a few second thoughts. It also appears that of the hazard zone types, flood elicits the most concern.

Respondents seemed more concerned about avoiding hazardous properties when asked about a hypothetical future home purchase than in regards to their current home, with more than a third considering such avoidance "very important." This begs the question of how hazard perception is psychologically constructed. If people are not concerned about hazards in their immediate decisions but are about some future hypothetical hazard, this may indicate that consumers see avoiding environmental risk as an abstract concern that is divorced from the practicalities of home buying. Only when practical ramifications, like mandatory insurance or floodproofing costs are added in do these concerns express themselves as factors of consideration in the housing bid. This is consistent with Perry et al.'s (1981) position that individuals may be irrational in planning for environmental threats because they are appraised in terms of certainty, severity, and immediacy, while the alternative or mitigating action is weighted in terms of efficacy, cost, time needed and barriers to implementation. It is also in accord with Simon's (1957) notion of bounded rationality, which posits that human actors underestimate negative future consequences of actions when those consequences are outside of their experience or understanding.

The survey also indicated that people are incurring many expenses associated with natural hazards, from mandatory insurance purchase, to vegetative clearance to seismic retrofitting. One result of interest was the fact that more people claimed they are buying flood insurance than claimed to be living in an SFHA flood zone. This suggests that the vast majority of those who were disclosed to for flood hazard are buying the required flood insurance mentioned on the NHD form. Based on this result, it is likely that the negative premium associated with flood disclosure is a reflection of at least the discounted stream of future insurance payments. [xxv]

Discussion

Before AB 1195 there appeared to be no significant difference in price between comparable floodplain and non-floodplain properties, while afterwards a negative differential was found. This indicates that the costs and risks associated with floodplain location are better internalized under AB 1195 than under the previously existing National Flood Insurance Program. This is consistent with the finding of Chivers and Flores (2003), who found considerable information asymmetries under the NFIP in their study area in Colorado. While the amount of the negative floodplain premium under AB 1195 varies from $4,220 to $20,456, depending on the interaction model used, Model 1, which is the most parsimonious, and hence is probably the most trustworthy model, indicates a plausible negative capitalization of $8,150. The fact that there is no negative floodplain premium under the NFIP in this study area is at odds with much of the literature on the price effects of floodplains. Studies including MacDonald et al. (1990), Shilling et al. (1985, 1989), Donnelly (1989), Harrison et al. (2001) and Frigden and Schultz (1999), among others, all found considerable negative price effects from floodplain location under the NFIP. However, all these studies were done in the American Southeast or Midwest. Our results, which represent one of the first such studies in the American West[xxvi], suggest that the different nature of hydrology and climate in the West (i.e. intermittent watercourses, seasonal precipitation patterns, "flashy" hydrology) may result in lessened

consumer perceptiveness to flood risk that disclosure mechanisms under the NFIP may be inadequate to address.

When interaction is accounted for, these price effects appear to be largely accounted for by heavily Hispanic communities. Tracts with low Hispanic populations (<5%) see a very minor price effect, while that effect grows to -$13,644 for a tract with 60% Hispanic population. In other words, AB 1195 appears to have caused floodplain homes in highly Hispanic neighborhoods to be worth less than they otherwise would be, while having relatively little effect on floodplain properties in neighborhoods where the percentage of Hispanics is low. The fact that the population of Hispanics in floodplains is so high means that the effects of flood disclosure under AB 1195 are extensive and significant. Under AB 1195, property prices should better reflect the costs and risks associated with living in a flood zone. While this negative premium may not sound like an equity-promoting mechanism, in fact it is. The results suggest that before the law, many Hispanics were bidding too much on homes because they did not have complete information on the true costs and risks of living in that location—particularly the fact that flood insurance would be a necessary purchase. Bidding too high based on lack of information and then paying for flood insurance and other expenses is like paying for the same thing twice. It is likely that many learned after transaction that they were in a floodplain and had to purchase insurance. While lower prices in floodplains after the law relative to before may be inequitable to those who bought under the asymmetric conditions, they are good for all future Hispanic homebuyers (or all those floodplain residents using subprime lenders, if that is the mechanism), because the prices they pay reflect the added costs and risks of floodplain living.

As for income, we find that in low-income neighborhoods flood zone homes are worth less than comparable non floodzone homes, while in wealthy neighborhoods, it is the opposite. However, this

effect was the same before and after AB 1195, indicating that disclosure had no effect on how income conditions floodplain price differentials.

Disclosure of fire hazard appears to have had no negative effect on prices in general. Rather, there appears to be a positive premium associated with location in fire zones and with fire disclosure. This is likely because the urban-wildland fringe areas in which these statutory zones are found are among the most desirable places to live, both because of their proximity to natural amenities and because of their distance from the problems associated with urban cores, characteristics that apparently were not controlled for in this model. It is only when fire disclosure occurs for a property near the site of a recent fire that prices are reduced[xxvii]. While there was a negative effect from proximity to a recent fire before the law, the magnitude is much greater after the law. This result suggests that it is that experience in combination with disclosure that has the greatest effect on consumer behavior in the case of fires.

Policy Implications

This study shows the success of AB 1195 in addressing the problem of imperfect information in flood zone transactions. Across the state, hazard disclosure is happening with more frequency and with more effectiveness than prior to AB 1195, although the level of success is greater in flood zones than in fire zones. A possible reason for the success of this law relative to previous disclosure requirements is that AB 1195 relies upon incentives, and not potential penalties. There is no enforcement agency that polices the hundreds of thousands of home transactions. Rather the transference of liability from sellers and agents to third parties appears to be the driving incentive behind compliance with this law. Given the importance of housing transactions, and the gravity of potential liability, it is not surprising that this mechanism for encouraging disclosure would work

well. This approach to disclosure could serve as a useful template for other states that wish to enact similar legislation.

This study also shows the shortcomings of existing federal policy in addressing the issue of hazard disclosure. By demonstrating the extent to which AB 1195 affected property values, the results of this study show that disclosure of flood hazard was inadequate under FEMA's National Flood Insurance Program (NFIP). If, as many federal policy makers claim, disclosure under the NFIP is adequate, then there should have been no effect from AB 1195 in flood zones. The fact that there was a negative price effect, and the fact that this effect selectively occurred in Hispanic areas, is not only an indication that California's approach is more effective than the federal approach, but also that there are biases in the disclosure and designation mechanisms of the NFIP that leave Hispanic homebuyers, on average, with less information. The most likely hypothesis for why AB 1195 closed the gap on disclosure rates between Hispanics and non-Hispanics relates to the fact that disclosure under the NFIP was triggered through mortgage origination process. This study found differences in methods of home financing among Hispanics —namely higher rates of origination from subprime lenders—that might, in combination with their high rates of occupancy in floodplains, explain why flood disclosure under AB 1195 appeared to affect Hispanics only.

Addressing this problem on a national level will require that Congress amend the National Flood Insurance Act so that disclosure nationwide occurs through mechanisms similar to those of AB 1195—namely written disclosure by the seller and their agent prior to transaction—rather than through the mortgage origination process, under which many homebuyers originating with federally unregulated institutions often are not disclosed to until long after the time of transaction. Given that such a major change in policy is unlikely any time soon, a more realistic policy recommendation is that FEMA conduct studies in other parts of the country to determine if disclosure under the NFIP is

occurring with equal frequency across groups or if certain groups are more likely not to be disclosed to, or disclosed to after transaction. Meanwhile, it is recommended that the government conduct independent audits to determine the extent to which Hispanics are disproportionately served by subprime lenders and to determine whether these lenders do, in fact, have lower rates of conducting flood hazard designations prior to transaction than other types of lenders.

While AB 1195 does not appear to have lowered willingness to pay for property in fire hazard zones at an overall level, it has reduced prices somewhat in statutory hazard zones near where a major fire recently occurred. It is not disclosure, nor being near a fire, but the combination of the two that capitalizes negatively into housing prices. This is an extremely important result because so much of California's land area, and much more of its new development (especially in Southern California, the Coast Range and the Sierra foothills) is in statutory fire hazard zones and is near recent fires. The market effects of fire hazard disclosure could have an impact on development patterns in such places. The fact that previous experience with wildfires combined with disclosure reduces property values may be due to or compounded by the fact that after a fire, certain insurance coverage becomes more expensive or impossible to obtain, and disclosure makes potential homebuyers more aware of that concern. It may be that prior to disclosure under AB 1195, many homeowners did not realize during the home buying process that they might have trouble obtaining adequate or affordable insurance coverage in an area with a recent fire history. While most homeowners have some homeowner's insurance, according to the Insurance Information Network of California, many homeowners do not know how much coverage they have and consequently have insufficient coverage. Hearing about a recent fire, combined with seeing the disclosure form might spur new homebuyers to do more research on what coverage they need, what is available, and what it costs to get the desired level of coverage. Better information about the difficulties of adequately insuring a structure should capitalize negatively into property values.

The effect of fires on home values and real estate markets is likely only get worse over time. As more homes are built in these flammable environments, more structures are exposed to risk, more fire suppression and fuel buildup occurs and catastrophic vegetation and structure fires become more likely. Casualty insurance companies will be exposed to increasing levels of risk and will stop underwriting fire policies for increasing numbers of urban-wildland interface areas, further driving up the risk associated with living in these areas. Over time, it is not out of the question that this vicious cycle of fire risk could significantly alter peoples' preferences for living in fringe, urban-wildland settings and redirect development away from the current outward sprawl pattern and back in towards central cities, or to less hazardous land. If the increasing destructiveness of conflagrations makes people more aware and attuned to the hazards of wildfire, disclosure will play an extremely important role.

The effects of wildfire disclosure in recent-fire environments underscore the need for state government to enact policies that increase information of these hazards and that decrease subsidies and incentives to overdevelop these areas. However, current state policy might actually be incentivizing such development. In 1968 the state created the Fair Plan (Fair Access to Insurance Requirements Plan), which is a statutory insurance industry association, regulated through the state (Pursuant to Insurance Code Section 10091(c)), that provides basic property insurance to property owners who are unable to obtain it in the private market. It was designed to insure risks of wildfire and riot, but soon came to cover other uninsurable risks. Essentially, it forces insurance companies to pool their risk on high-risk properties. In 1996 State Insurance Commissioner Chuck Quackenbush limited Fair Plan brush fire coverage to just a few areas in Los Angeles, Santa Barbara, Ventura, San Bernardino and Orange Counties, given the increasing burden on insurance companies. However, in June of 2001, Commissioner Harry Low expanded Fair Plan brush fire coverage to all parts of the

state for properties where privately underwritten coverage was not available. Because private markets are not willing to underwrite these risks, Fair Plan policy premiums distort the pricing of these risks and in effect subsidize continued development in hazardous wildfire zones by spreading out the risks over the population of all insurance ratepayers. Expanding the geographic coverage of the Fair Plan increased the level of this subsidy, providing a perverse incentive to develop in some of the more hazardous, and ecologically sensitive lands in the state, furthering the cycle of fire suppression and catastrophic conflagration. This could be addressed by offering Fair Plan coverage to existing structures throughout the state, but reinstating geographic limits on Fair Plan for new development. Using careful planning to decide where coverage should be allowed, insurance availability could be used as a tool to direct and focus new development within defined urban-wildland fire hazard zones in which that risk could be better managed. Applying geographic limits to only new structures avoids an inequitable outcome by making coverage available to all those currently unable to get insurance through private markets.

Unfortunately, this outcome is not possible if information on fire hazards is inconsistent and incomplete, as it currently is. While AB 1195 is a good step forward in conveying the importance of fire hazards in property transactions, currently, many homebuyers receive imperfect or misleading information about fire hazard because of inconsistencies in the designation of VHFHSZs. The VHFHSZs apply to some of the most heavily populated and developed parts of the state, where a major fire could be catastrophic. While FEMA has a national mapping standard for floods that does not vary across the whole country, and CDF maps SRA zones consistently throughout the state, the mapping of VHFHSZs, although in theory coordinated through the state, is under the control of various, uncoordinated local governments, each with their own agenda. Moreover, localities have an interest in understating hazards in order draw residents and boost the tax base. [xxviii] The drafters of AB 1195 introduced the potential for inconsistencies when they chose to rely on the mapping

designations carried out under the Bates Bill, which allowed many jurisdictions to exempt their lands from fire hazard designation arbitrarily and without any justification or review from the state. Hence, some of the most fire prone local responsibility areas, including the Oakland Hills, where the 1991 fire caused over $1 billion in damage (and ironically led to the passage of the Bates Bill), are not officially classified as VHFHSZ, and the legal obligation for sellers in those places to disclose is far from clear. It is recommended that either the AB 1195 legislation be amended to clarify that disclosure should occur for all properties in VHFHSZs, as designated pursuant to the original state VHFHSZ mapping that was conducted prior to the local review of those maps; or that it be amended to allow for local revision of state VHFHSZ maps if the state has the authority to review and reject those revisions where they lack sufficient justification.

There is an additional problem with the NHD resulting in a false sense of security in some cases. Many home buyers might not realize that other types of hazardous areas are not subject to disclosure under AB 1195. A Natural Hazard Disclosure (NHD) form indicating that a house is not in a designated statutory hazard zone might mislead some consumers to believe that the property is free from all potential natural hazards, when in fact the NHD form only includes a subset of all possible hazards. NHD forms should contain far more explicit and prominent wording about the fact that other types of hazards not included on the form may affect the property. It is also highly recommended that landslide hazard zones—a notable omission—be mapped and added to the NHD form, given the prevalence of this type of hazard throughout the state.

This study shows that a market-based approach can influence prices. But can it meet policy goals as effectively as regulatory approaches? Hazard disclosure has changed the amount consumers are willing to pay for hazard zone properties to a certain extent. Does this reduce disaster losses to individuals and governments? Clearly it contributes, in the form of raising awareness, reducing

unpleasant surprises, and possibly subtly restructuring peoples' living preferences in a way that may be expressed as lowered costs of disaster in the long-term. More fundamentally, it changes the locus of responsibility. Disclosure appears an ideal fix for a society obsessed with personal responsibility, for it gives the individual economic actor information—a critical tool that is needed for that actor to make a "responsible choice." This is a laudable goal, but the effectiveness of disclosure in reaching this goal is contingent upon the level of rationality of individual economic actors when faced with risk. Correcting information asymmetries may not be enough to resolve problems like development in hazardous areas and mounting government disaster aid payments. Disclosure is an important first step towards personally responsible management of risk from natural hazards, but it is insufficient on its own, both because of an inability of all consumers to achieve "pure rationality," in assessing uncertainty and risk (Kask and Maani 1992), and because government provides a safety net to all individuals. This safety net serves a very important social purpose. As a side effect, people rely on it when cast into worst-case scenarios, making a pure free-market approach to hazard mitigation unworkable. Belief that disclosure is a step towards fostering a pure self-responsibility approach to government constitutes a delusion, because the goal is unattainable. The involvement of government in natural hazard mitigation and disaster assistance is inevitable.

Therefore, while disclosure is critical to correcting major gaps in the information that is needed to make good decisions and protect consumers, government regulation and planning are still needed to limit and direct development in hazard zones and ultimately to reduce the burden of disaster aid (Burby 1998, Burby *et al*. 1988, Faber 1996, Holway and Burby 1993, National Review Committee 1989). As development increasingly moves into hazardous areas over the next decades, the involvement of governments in all aspects of hazard mitigation must increase. Because local governments do not bear most of the financial burdens caused by major disasters, leadership will have to come from the state and federal levels.

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FIGURE 1. CALIFORNIA FIRE ZONES

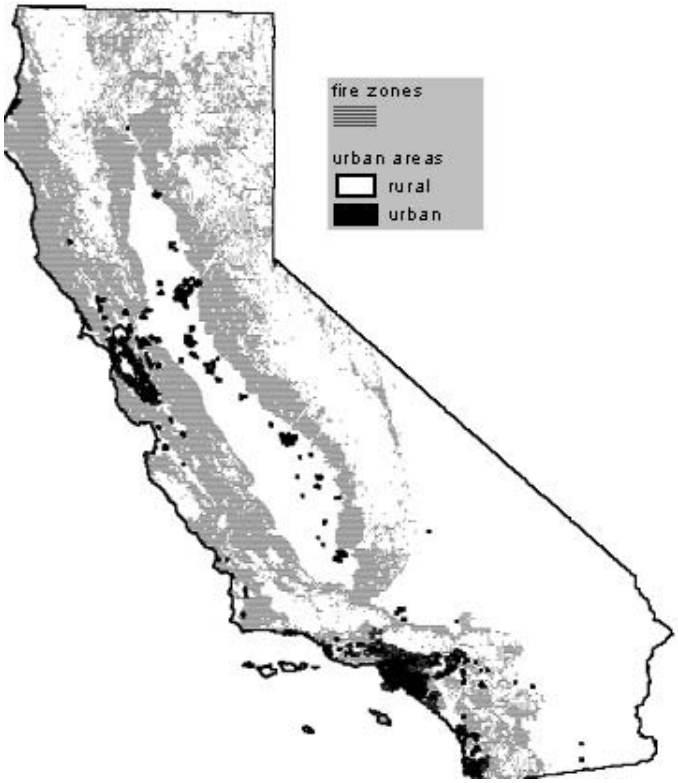


FIGURE 2. CALIFORNIA FLOOD ZONES

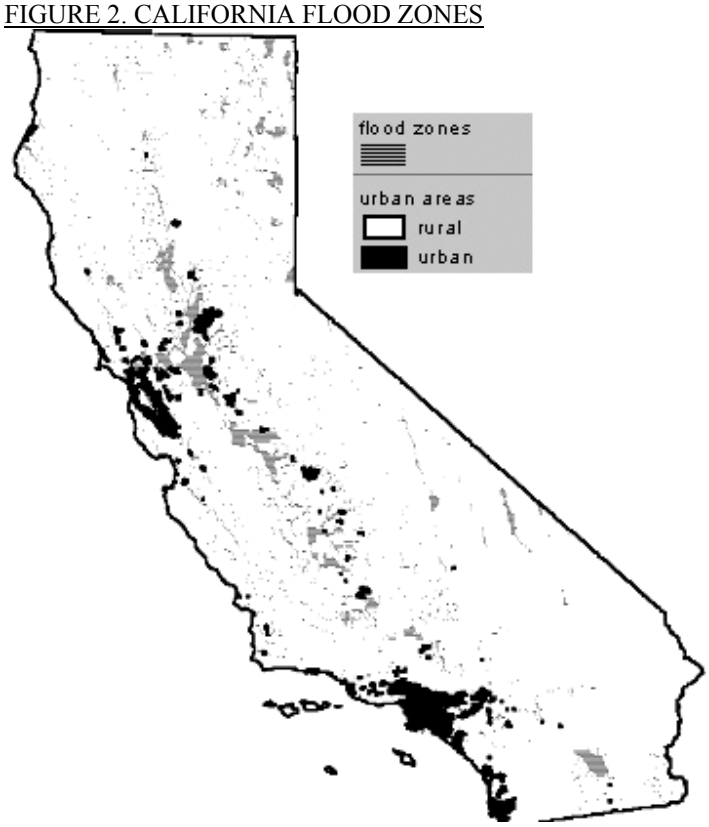


FIGURE 3. SAMPLE ZIP CODES SELECTED FOR FIRST STAGE SAMPLING

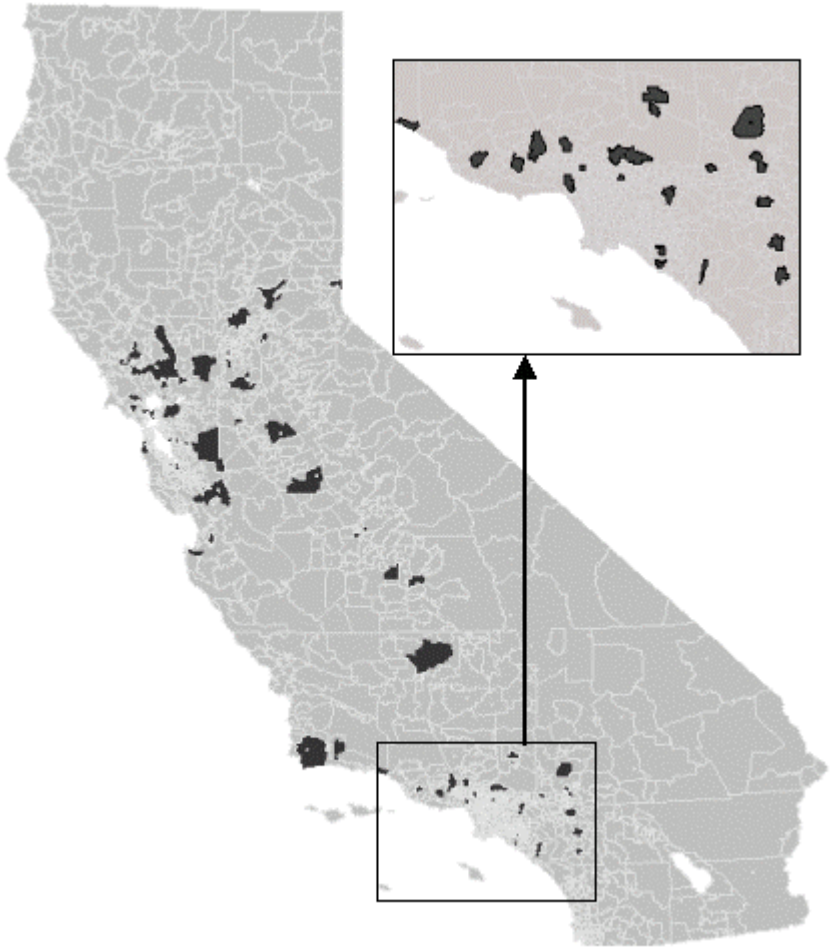


TABLE 1. REGRESSION VARIABLES

Variable	Description	Mean*	count proportions
PRICE	Transacted selling price of property	$234,474	
FLOOD	1= in the FEMA Class A Flood Zone; 0= not in that zone		0.133
AFTER	1= transacted after June 1998; 0= Jan 1997 to June 1998		0.543
PHISP	Projected 1997 percentage Hispanic population by tract, based on 1990 census	19%	
ASSDSTCT	Assessed value of structure, normalized by mean	1.00 ($115,393)	
BATH	Number of bathrooms	2.10	
BED	Number of bedrooms	3.11	
SIZE	Total structure square meters	151.89	
LOT	Lot size, hectares	0.16	
NEW	1=house less than 10 years old		0.081
OLD	1=house older than 75 years		.03
D2STAR	Distance (km) to nearest Starbucks ™ coffee shop	10.00	
AVG.RANK	Ranking of district schools by statewide 1-10 standard, normalized by mean	1.00 (6.36)	
AGE	Projected 1997 median age by tract	35.00	
PUNEMP	Projected 1997 percentage unemployment by tract	5.05%	
MHHINC	Projected 1997 median household income by tract, normalized by mean	1.00 ($56,366)	
CBDIND2	logged Central Business District Index**	1.65	
D2HIWAY	Distance (km) to nearest highway or major arterial road	1.82	
SDIND1	Number of transaction by zip code over the population by year	0.02	
PRRATIO	Ratio of median zip code price to median state price	1.13	
PADJ	Percentage change in MEDPRCTY by quarter from first quarter price	1.15	
NRCOAST	1=Within 1 km of coast	0.02	
COAST5K	1=Between 1 and 5 km of coast	0.075	
COAST15K	1=Between 10 and 15 km of coast	0.125	
WEIGHT	Regression weights	3.35	
FLOOD:AFTER	Homes in floodplain that transacted after AB 1195		0.073
Quadratic terms used: LOTSQFT, TOTALSF, BEDROOMS, D2HIWAY, D2STAR and BATHTOT			
TOTAL SAMPLES: 21693			

*Non-normalized means of normalized variables are given in parentheses.
**The Central Business District Index was derived by dividing up the business districts within commuting distance of the sample zip codes into A, B, and C districts, based on density of employment and amount of revenue produced by companies in those districts, with A districts representing the highest density relative to revenue. CBDIND2= log(Ra/Da+Rb/Db+Rc/Dc), where Ra = revenue of nearest A district and Da= distance to the nearest A district, Rb= revenue of nearest B district, etc.

TABLE 2. REGRESSION MODELS

Model	Data sample	***Interaction terms***
1	Flood	No interaction terms except for overall disclosure effect (FLOOD:AFTER)
2	Flood	Disclosure effect (FLOOD:AFTER) and interaction between income and flood location (FLOOD:MHHINC). Interaction between median household income and AB 1195 disclosure (FLOOD:MHHINC:AFTER) was insignificant at the 90% level and dropped
3	Flood	Disclosure effect (FLOOD:AFTER), interaction between percent Hispanic and flood location (FLOOD:PHISP) and interaction between percent Hispanic and flood disclosure (FLOOD:PHISP:AFTER); FLOOD:AFTER dropped because not significant at the 10% confidence level.
4	Fire	No interaction except FIRE:AFTER
5	Fire	interaction for recent experience and disclosure (FIRE:AFTER:BURN5K); FIRE:AFTER excluded due to insignificance.

TABLE 3. PRICE DIFFERENTIALS BETWEEN COMPARABLE FLOOD ZONE AND NON-FLOODZONE PROPERTIES BEFORE AND AFTER AB 1195 (MODEL 1)

time	**zone**	**price**	**floodplain differential-before**
before	flood	$ 182,125	$ -
before	no-flood	$ 182,125	
			floodplain differential-after
after	flood	$185,004	($8,150)
after	no-flood	$193,154	
Reduction in differentials due to AB 1195:			**($8,150)**

TABLE 4. MEAN PRICE DIFFERENTIALS BEFORE AND AFTER AB 1195 BETWEEN COMPARABLE FLOOD ZONE AND NON-FLOODZONE PROPERTIES CONTROLLING FOR THE INTERACTION BETWEEN PERCENT HISPANIC AND FLOOD DISCLOSURE (MODEL 3)

time	**zone**	**price**	**floodplain differential-before**
before	flood	$ 185,519	$ -
before	no-flood	$ 185,519	
			floodplain differential-after
after	flood	$192,410	($4,220)
after	no-flood	$196,629	
Reduction in differentials due to AB 1195:			**($4,220)**

Parentheses = negative values

TABLE 5. CHANGES IN PRICE REDUCTION DUE TO DISCLOSURE AS A FUNCTION OF PERCENTAGE HISPANICS BY TRACT

Percent Hispanic by Tract	**1%**	**5%**	**10%**	**19%**	**25%**	**30%**	**40%**	**50%**	**60%**
Negative Capitalization	**($200)**	**($1,102)**	**($2,210)**	**($4,220)**	**($5,572)**	**($6,705)**	**($8,992)**	**($11,305)**	**($13,644)**

(parentheses mean negative values)

TABLE 6. PRICE DIFFERENTIALS BETWEEN COMPARABLE FLOOD ZONE AND NON-FLOODZONE PROPERTIES WHEN CONTROLLING FOR THE INTERACTION BETWEEN MEDIAN HOUSEDHOLD INCOME AND FLOOD LOCATION (MODEL 2)

time	**zone**	**price**	**floodplain differential-before**
before	flood	$ 194,678	$ 9,278
before	no-flood	$ 185,400	
			floodplain differential-after
after	flood	$185,229	($11,178)
after	no-flood	$196,408	
Reduction in differentials due to AB 1195:			**($20,456)**

TABLE 7. PERCENTAGE OF SUBPRIME MORTGAGES ORIGINATED BY RACE IN SELECTED CALIFORNIA METRO AREAS FOR 1998

		Bakers-field	Fresno	Modesto-Merced	Sacra-mento*	Solano County	Salinas	Santa Cruz-Watsonville	Santa Barbara	TOTAL
Hispanic mortgage originations	**% subprime**	24%	28%	27%	12%	18%	33%	27%	17%	**25%**
	# subprime	1944	3103	1945	430	417	1720	487	584	10630
	total #	8161	11097	7281	3664	2372	5210	1833	3396	43014
White mortgage originations	**% subprime**	20%	17%	20%	7%	12%	15%	13%	9%	**14%**
	# subprime	4311	4126	4134	2558	1913	1974	2359	1699	23074
	total #	21043	24071	20718	35109	16251	13140	17593	18001	165926

*partial sample of mortgage originations for MSA

FIGURE 4. HISTOGRAM BY PERCENT HISPANIC FOR NON-FLOOD PROPERTIES

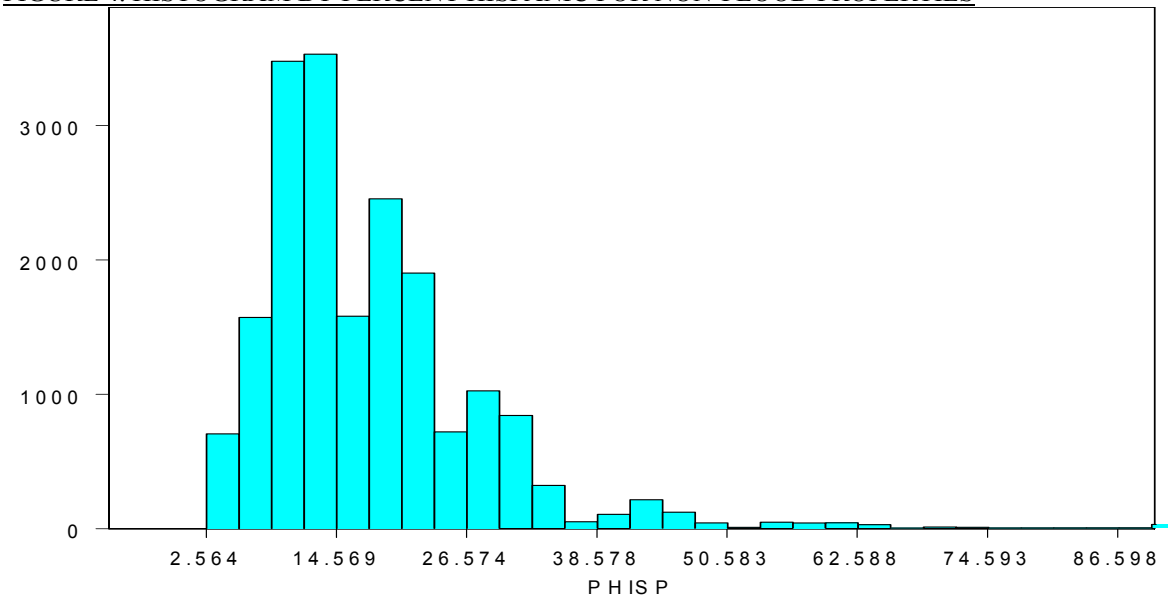
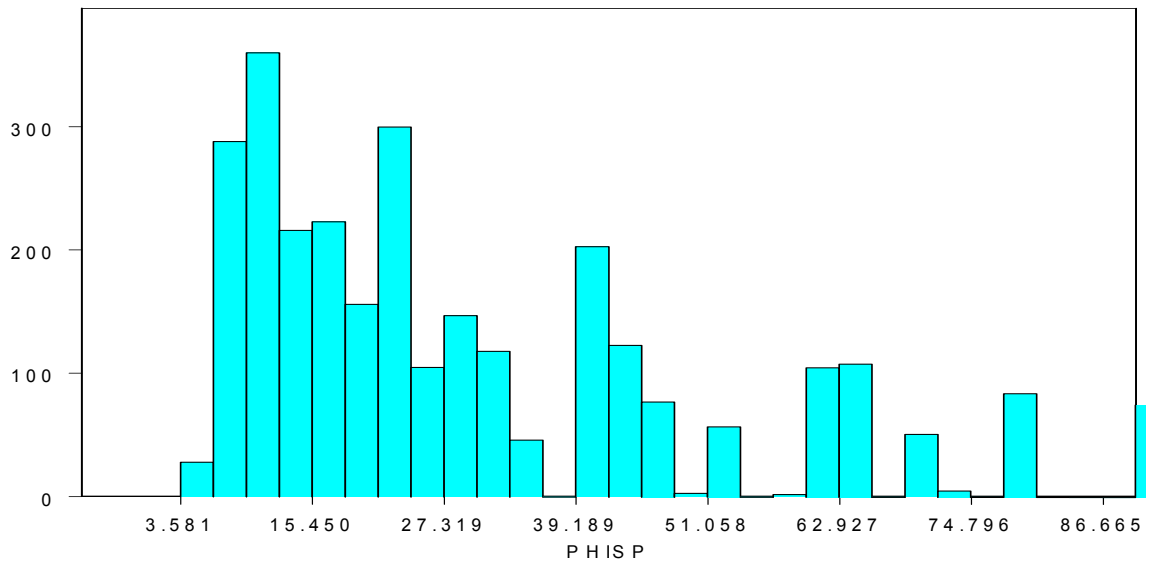


FIGURE 5. HISTOGRAM BY PERCENT HISPANIC FOR FLOOD ZONE PROPERTIES


300
200
100
0
3.581
15.450
27.319
39.189
51.058
62.927
74.796
86.665
PHISP

Appendix 1: Tier 1 Sampling

APPENDIX TABLE 1. NUMBER OF ZIP CODES CATEGORIZED BY POPULATION DENSITY AND PRICE

		hazard=just flood						hazard= just fire				
		population density						**population density**				
		60-1000	1000-500(	5000+				60-1000	1000-500(	5000+		
House	<150K	49	50	20	total		**House**	<150K	48	14	6	total
price	150-250k	13	28	24	239		**price**	150-250k	55	32	17	303
1999	250k+	4	22	29			**1999**	250k+	49	63	19	
		hazard=both						**hazard=none**				
		population density						**population density**				
		60-1000	1000-500(	5000+				60-1000	1000-500(	5000+		
House	<150K	43	10	0	total		**House**	<150K	35	22	80	total
price	150-250k	16	15	1	120		**price**	150-250k	3	36	98	403
1999	250k+	15	20	0			**1999**	250k+	3	43	83	

Appendix 2 Selected Regression Result Tables

APPENDIX TABLE 2: SUMMARY REGRESSION RESULTS FOR FLOOD MODELS

	Model 1			Model 2			Model 3		
	Value	t value		Value	t value		Value	t value	
(Intercept)	9.598	237.81	**	9.642894	238.84	**	9.5944349	237.53	**
FLOOD	0.013	1.0411		-0.228659	-6.778	**	0.0047449	0.4762	
AFTER	0.059	10.619	**	0.057675	10.447	**	0.0581625	10.649	**
ASSDSTC	0.284	57.405	**	0.282227	57.109	**	0.2845625	57.424	**
BATH	0.025	5.308	**	0.024652	5.3026	**	0.0248699	5.3304	**
BED	0.051	13.837	**	0.049745	13.522	**	0.0508732	13.786	**
SIZE	0.002	26.71	**	0.001688	27.345	**	0.0016522	26.696	**
LOT	0.019	10.493	**	0.019348	10.449	**	0.019501	10.494	**
NEW	0.043	5.417	**	0.037309	4.727	**	0.0429053	5.4253	**
OLD	-0.095	-7.221	**	-0.086373	-6.588	**	-0.094633	-7.2013	**
D2STAR	-0.005	-10.09	**	-0.004855	-10.6	**	-0.004615	-10.042	**
AVG.RANK	0.205	18.257	**	0.202254	18.105	**	0.2050554	18.291	**
AGE	0.019	26.361	**	0.01897	25.949	**	0.0193354	26.373	**
PHISP	9E-04	3.1234	**	0.00108	3.6934	**	0.0011427	3.7599	**
PUNEMP	-0.018	-18.62	**	-0.018436	-19.57	**	-0.017692	-18.734	**
MHHINC	0.082	7.6473	**	0.05565	5.1246	**	0.0824516	7.7096	**
CBDIND2	0.029	13.548	**	0.026083	12.027	**	0.0294762	13.631	**
D2HIWAY	0.007	2.3664	*	0.006864	2.3875	**	0.0071101	2.4632	**
SDIND1	-4.937	-11.77	**	-4.878857	-11.68	**	-5.009647	-11.933	*
PRRATIO	0.266	38.139	**	0.272908	39.136	**	0.2660421	38.129	**
PADJ	0.549	25.183	**	0.54843	25.203	**	0.5492306	25.188	**
NRCOAST	0.118	7.1319	**	0.121208	7.3358	**	0.1186117	7.1532	**
COAST5K	0.095	9.9941	**	0.093968	9.9364	**	0.094588	9.9664	**
COAST15K	0.071	9.1346	**	0.064318	8.2452	**	0.0731222	9.3373	**
I(SIZE^2)	-2E-07	-35.89	**	-2E-07	-36.47	**	-2E-07	-35.888	**
I(BATH^2)	-0.003	-8.686	**	-0.002537	-8.804	**	-0.002514	-8.6918	**
I(BED^2)	-1E-03	-6.073	**	-0.000946	-5.91	**	-0.000973	-6.056	**
I(D2STAR^2)	6E-05	8.1905	**	5.85E-05	8.3151	**	0.0000576	8.1457	**
I(D2HIWAY^2)	-0.002	-5.644	**	-0.001755	-5.712	**	-0.001763	-5.7163	**
FLOOD:AFTER	-0.043	-2.738	**	-0.107429	-2.447	*	X		
FLOOD:MHHINC	NA			0.2774895	7.55635	**	NA		
FLOOD:MHHINC: AFTER	NA			0.085656	1.7523		NA		
FLOOD:PHISP	NA			NA			X		
FLOOD:PHISP: AFTER	NA			NA			-0.001142	-3.0407	**
R^2	.765			.765			.765		

* significant at the 95% confidence level
** significant at the 99% confidence level
NA: Not applicable; terms that were not included in the given model
X: terms that were tested in the model and dropped because they were insignificant at the 90% confidence level

APPENDIX TABLE 3: SUMMARY REGRESSION RESULTS FOR FIRE MODELS

Model 4			Model 5		
	Value	t value		Value	t value
(Intercept)	9.9740535	299.31041 **	(Intercept)	9.9726856	299.16687 **
FIRE	**0.031661**	**3.87413 ** **	BURN5K	-0.0000331	-0.0068156
ASSDSTCT	0.2409275	54.786468 **	**FIRE**	0.0309045	3.7265604 **
TOTALRMS	0.0079963	4.6694398 **	ASSDSTCT	0.2409829	54.713201 **
BEDROOMS	0.0326795	9.3635317 **	TOTALRMS	0.0081977	4.7815568 **
CBDIND2	0.0061685	3.2936069 **	BEDROOMS	0.0327097	9.3737835 **
SQMET	0.0019898	33.651618 **	CBDIND2	0.0067536	3.5539609 **
LOTSQMET	0.0571093	18.293131 **	SQMET	0.0019868	33.594129 **
MHHINC	0.2184905	24.395979 **	LOTSQMET	0.0567231	18.157979 **
RANK.AVG	0.0073551	9.415633 **	MHHINC	0.2238421	24.013206 **
PRATIO	0.5360562	66.331633 **	RANK.AVG	0.0070267	8.9345832 **
SDI1	-0.7078452	-2.1300546 *	PRATIO	0.5343048	66.011196 **
AFTER	0.0452083	8.911416 **	SDI1	-0.8378772	-2.5007784 *
AGE	0.0119135	18.87049 **	AFTER	0.0451362	8.8984381 **
PADJ	0.2599922	14.389515 **	AGE	0.0118235	18.550503 **
PHISP	0.0015819	6.8392109 **	PADJ	0.2626178	14.504319 **
PUNEMP	-0.0140232	-16.909176 **	PHISP	0.0015624	6.7547269 **
D2HIWAY	0.0190399	7.5171003 **	PUNEMP	-0.0138891	-16.734316 **
I(BEDROOMS^2)	-0.0010695	-15.480845 **	D2HIWAY	0.0187772	7.4049262 **
I(LOTSQMET^2)	-0.0004945	-13.736885 **	I(BEDROOMS^2)	-0.0010719	-15.516831 **
I(SQMET^2)	-0.0000003	-28.853137 **	I(LOTSQMET^2)	-0.0004898	-13.599738 **
I(D2HIWAY^2)	-0.0028669	-10.228081 **	I(SQMET^2)	-0.0000003	-28.833157 **
FIRE:AFTER	**0.019207**	**1.849423**	I(D2HIWAY^2)	-0.002853	-10.157297 **
			FIRE:AFTER	**0.051203**	**3.705952 ** **
			FIRE:BURN5K:AFTER	**-0.05117**	**-3.49918 ** **
R-Squared: 0.7736297			R-Squared: 0.7737552		
F-statistic: 3754.789			F-statistic: 3444.073		

* Significant at the 95% confidence level; **Significant at the 99% confidence level

Appendix 3: Selected Mail Survey Results

Mail surveys yielded important information about the implementation of the law and people's attitudes towards natural hazards in regards to their property. The survey responses yielded valuable information, but the 16.3% response rate was too low to reveal statistically significant trends for the state of California. The low response also pointed to the possibility of a selection bias, something that frequently appears when response rates are low and follow-up mailings are not undertaken. Still, enough of a representative response was garnered across the spectra of geography, income and education (although not race) that the results are of use and should not be discounted.

The most important result that came from mail surveys was strong evidence that homebuyers are seeing the NHD form. Of 197 respondents, 173 of whom purchased since implementation of the law, 129 recalled seeing the form, even though about 16 of them claimed that the form said they were not in a hazard zone. The fact that 75% of respondents who purchased after the law remembered seeing the form implies that disclosure is occurring in the vast majority of transactions, since it is likely that many of the 25% who do not remember seeing the form did receive one but do not remember.

Another important result was that very few people remember seeing the NHD early in the home buying process, with only three respondents seeing it at an open house. Of the 126 who answered this question, the largest group, 57, saw it while signing the final papers, 16 saw it during the offer process and 14 saw it during escrow. Many respondents did not recall when they saw it. This result suggests that disclosure might not be having as big an effect on sales price as it could, because the later this information comes to light during the process, the less likely it is to affect the bid or the sale price negotiation.

TABLE 1. SURVEY RESPONSE: WHEN WAS NHD SEEN IN BUYING PROCESS

When Saw NHD	Count
After offer	1
Before closing	2
Before final papers	1
Disclosure	2
Don't recall	24
During inspection	2
During offer	16
Escrow	14
Final papers	57
Final walk through	1
Inspection	1
Open house	3
Other	2

As far as disclosure's effects on buyers' behavior or thinking, the results are more equivocal, perhaps because there are not enough observations relative to the number of categorical groupings. Of the 95 households who saw the NHD, knew they lived in a hazard zone, and answered the question, 57, or 60%, said that knowing the house was in a hazard zone did not give them second thoughts about buying at all. Only one said it gave them second thoughts "a lot" and 37, or 39%, said that it gave them second thoughts either "a little" or "somewhat." Of 96 respondents who fit the criteria and answered the next question, 80 said it did not make them bid less, 2 said it made them bid "much less" and 14 said it made them bid either "somewhat less" or "a little less." In other words, it had no

effect on the bidding for 83% of the transactions, and some effect on 17%. However, of the 96, only 25, or 26% said that they did not consider the property's hazard zone location as important when buying. 39 considered it "slightly important," 24 "somewhat" important, and 8 "very " important. That means 74% considered it of at least some importance. When broken down by hazard though, flood seems to elicit more concern. In response to the question about how important hazard zone location was as a consideration, 73% of fire zone owners considered it to be not important or only slightly important, while that percentage was only 51% for flood zone owners, with 49% believing flood zone location to be "somewhat" or "very" important.

These results are in response to questions about respondents' *own* homes; they partially conflict with the results that respondents gave about the importance of avoiding hazards in a hypothetical future housing transaction. Of 195 who answered the question, only 4% said it was not important, 24% said it was "slightly" important, 38% said it was "somewhat" important and 33% said it was "very" important. In other words, it appears that many people are aware of hazards and wish to avoid them in the abstract, but do not consider their current hazardous location to be a significant problem.

The results for added expenses were somewhat inconsistent. Many more people marked that they had bought flood insurance than claimed to be located in the flood zone, which is not impossible, because many people in the 500 year floodplain buy flood insurance although they are not required to do so and are not subject to disclosure. About the same number that claimed to be in a statutory fire zone also said they were undertaking vegetative clearance or defensible space maintenance, although some of those in the fire zone answered negatively to this question, while some outside of it answered it affirmatively.

Finally, respondents were asked to rank hazards from one to eight in relation to seven other housing concerns, including crime, commute distance, air pollution, view, house age, proximity to open space, and school quality, with one being the highest score. The results are given in Table 21. As the table shows, the median rank for hazard is 4. Of 187 respondents to the question, only 14% ranked hazards in the top two categories, while 18% ranked it in the bottom two categories. However, the fact that natural hazards were generally ranked somewhere in the middle indicates that they are a serious consideration of most homebuyers.

TABLE 2. COUNTS OF RANKS FOR THE IMPORTANCE OF CONSIDERING HAZARDS WHEN BUYING A HOME

Rank for hazard	Count
1	6
2	20
3	34
4	36
5	27
6	30
7	26
8	8

1 is most important, 8 is least

Questions were also asked about the education, income, race, zip code and previous hazard experience of respondents. However, there were not enough responses to allow for meaningful cross tabulations of important survey questions by these categorical groups.

Endnotes

[i] In hedonic analysis, the observed price of a good, in this case housing, is regressed against a series of quantifiable attributes to deliver a schedule of marginal implicit prices.

[ii] Under common law, disclosure of "material fact" in any transaction is required. In 1984, the California Court of Appeals clarified and affirmed the common law duty of real estate brokers to research and disclose material facts, stating that "a real estate broker is under a duty to disclose facts materially affecting the value or desirability of the property that are known to him or which through reasonable diligence should be known to him" (Easton v. Strassburger, 152 Cal. App. 3d 90, 98). Courts have found in numerous cases that location in any natural hazard zone that could be associated with future property damage is material.

[iii] To participate in the NFIP, communities agree to adopt and enforce certain floodplain management ordinances to reduce the probability of future flood damage to new buildings in the SFHA. In return, the community becomes eligible for federal disaster assistance and homeowners become eligible for flood insurance as a financial protection against flood losses.

[iv] The SFHA is defined as an area that has a one percent or greater chance in any given year of flooding. The 100 year floodplain, or class A zone, falls under this designation.

[v] They could do this because of the often-ignored, but still legally binding insurance requirement clause in the standard contract.

[vi] According to Stan Wieg of the California Association of REALTORS®, the "Other" blank on the TDS became by default the primary location where REALTORS® disclosed natural hazards requiring written disclosure, since a specific form for disclosing multiple natural hazards was lacking prior to AB 1195 (personal communications, 1999 and 2001). The extent to which REALTORS® were disclosing on that form is difficult to ascertain. However, prior to AB 1195 it is likely that many REALTORS® were not aware of their obligation to disclose for some natural hazards (especially fire), a situation which was probably exacerbated by the lack of mention of natural hazards on the form.

[vii] The 1972 Alquist-Priolo Special Studies Zones Bill (Section 2621-30 of the Public Resources Code) called for transfer disclosure of a property's location in potential earthquake fault rupture zones in certain “special study” areas along the San Andreas, Calaveras, Hayward, and San Jacinto Faults. The Seismic Hazards Mapping Act of 1990 (Sections 2690-2699 of Public Resource Code) called for disclosure in mapped areas of seismically induced ground shaking, liquifaction and landslide zones (more specific zones than the designation under Alquist Priolo).

[viii] Information given here on AB 1195 was obtained from personal communications in 1998 and 1999 with Peter Detwiler (Staff Director CA Senate local government committee and former Staff Director of CA Senate Committee on Housing and Land Use), and communications in 1999 with Julie Snyder (aid to state representative Hannah Beth Jackson), both of whom who were involved in drafting the law. Information also came from Detwiler’s 1998 article.

[ix] California Government Code gives the local agencies the final word by stating, in section 51197.d, that "changes made by a local agency to the recommendations made by the director (of CDF) shall be final and shall not be rebuttable by the director."

[x] Two approaches were tried for the hedonic analysis. In the first, data were stratified into groups of transactions from before and after the law. The coefficients on the floodplain and fire zone variables could then be interpreted as the hedonic prices for location in one of those zones prior to AB 1195 for the Before group and following AB 1195 for the After group. The change in the magnitude of the hedonic prices theoretically represented the effect of hazard disclosure. The difference in the hedonic prices indicates the effect of disclosure under AB 1195. In a second approach, all data were regressed and dummy variables (a “1” or “0”) were included to represent location in floodplains and fire zones, as well as for transaction before or after the law. The coefficient on interaction terms between a hazard dummy and the dummy for transaction after AB 1195 (FLOOD:AFTER and FIRE:AFTER) could then be interpreted as representing the effect of hazard disclosure. When these interaction terms were included, the coefficient on the hazard terms could be interpreted as representing the effect of hazard location previous to the law. Both approaches were utilized and results were found to be consistent.

[xi] Three categories of population density and housing price were used. The zip codes were also stratified by four hazard categories: only flood zones present, only fire zones present, both present and neither present. In this way, all categories were mutually exclusive. The “presence” of a hazard in a zip code was assigned based on whether the percent of hazardous land in the zip code exceeded a given threshold. For floods and urban fire zones, this threshold was 5% and for wildland fire areas it was 25%. Because of the low number of hazard zone properties relative to non-hazard zone properties, zip codes belonging to the nine cells of the “no-hazard” group were dropped, leaving 27 cells in the matrix.

[xii] Property transaction records were downloaded from Metroscan, an online property transaction database.

[xiii] Demographic data was obtained from the 1990 Census and 1995 projections of that data, while market data came from a variety of sources, included the California Association REALTORS® and the Rand Corporation. Demographic data was at the tract level, while market data were at both the zip code and city level.
[xiv] SFHA data came from the FEMA Q3 digital data set and fire hazard zones were obtained as digital files from CDF. Location in seismic hazard areas was also coded, but for inclusion as a control, not a main effects variable.
[xv] Tier two sampling occurred separately for flood and fire properties because flood and fire effects were being estimated separately. To obtain data for the flood regressions, all 63 zip codes were used in tier two sampling while in the fire sampling only 40 zip codes were used, accounting for only those zip codes with fire hazard zones were present. Flood zones, on the other hand, are present in almost all zip codes, even including those that did not meet the threshold levels designated for flood classification under tier one sampling. Therefore, tier two sampling was done twice, with overlapping data, but in one case oversampling for fire records and in one case oversampling for flood records.
[xvi] They were not stratified by transaction after the law because of the extreme complexity of adding a third stratification factor and because roughly 54% of transactions were from after the law and 46% from before.
[xvii] The semi-log functional was determined to be appropriate through use of a Box-Cox transformation as well as through plotting of the residuals.
[xviii] Inclusion of too many insignificant terms with the FLOOD variable made the parameter estimates on the significant ones somewhat unstable, due to the finite number of observations in the flood zone, and hence they were dropped.

[xix] Fire hazard location (independent of AB 1195 did interact significantly with income, however that result is not given here since it detract from the main focus of this paper, which is the effects of AB 1195.
[xx] As the regression results indicate, with FLOOD:MHHINC included, the coefficient on FLOOD becomes highly negative (-.23), but the coefficient on the interaction terms becomes even more positive (.28).
[xxi] FLOOD:AFTER's magnitude is slightly reduced in this model, while FLOOD becomes highly significant and negative and the interaction term FLOOD:MHHINC becomes highly significant and positive.
[xxii] California coordinates the Fair Plan (Fair Access to Insurance Requirements Plan), described further under the "Policy Implications Section," which offers fire insurance to homeowners who were unable to obtain fire insurance through the private markets. Rates are subsidized, but still high. Additionally, until June of 2001 (and hence for the time of this study) Fair Plan insurance was only available in a few select areas in Southern California. Most of the fire hazard properties in this study were not located in Fair Plan zones and so it is likely that many property owners in these areas were unable to get fire insurance or could only get it at extremely high rates.
[xxiii] While Model 2 does yield a positive and highly negative coefficient for FLOOD, it should be noted that FLOOD:MHHINC is positive and has greater magnitude (MHHINC has a mean value of 1, so the two are comparable), effectively canceling out the effect of FLOOD.

[xxiv] A variable for the percent of African Americans was initially included in the models but had no interaction with the flood term. It was dropped because of colinearity problems.
[xxv] Verifying how much of the negative premium in flood zones is a reflection of added insurance costs and how much is an option price (risk aversion premium) is difficult for two reasons. First homeowners pay varying rates depending on various factors and the data set includes such a very wide variety of homes in terms of value and structure type, plus important rate-determining factors, like structure elevation and basement type, are missing from the dataset. Second, this study is simply showing the additional premium due to disclosure under AB 1195. Determining the extent to which insurance premiums are capitalized and whether an option price exists would require isolating the negative premium due to all flood disclosure (before and after AB 1195). Without information on the extent of flood disclosure before AB 1195, this is hard to answer.
[xxvi] Muckleston (1983) was one of the only western studies, taking place in Oregon, and its results were also at odds with the rest of the literature.
[xxvii] The same thing could not be verified for floods because reliable records of flooding were not available
[xxviii] There are many reasons why many communities with VHFHSZs would be against having fire hazard zones designated within their borders. In a lengthy review of the fire regulations of all the California communities containing designated VHFHSZ' s, the University of California Forest Products Lab and CDF found that most communities simply do not want the stigma of having a "high fire hazard" area within their borders, especially in areas that have significant and upscale residential development (Irby *et al.* 1999). Because of this, only about half of the 100 jurisdictions with CDF-

recognized VHFHSZs have acknowledged this designation. Of this group, only a few have actually formally adopted it, the rest using the maps for their own hazard mitigation efforts. Such avoidance makes sense to local governments when analyzed in Charles Tiebout's (1956) framework of inter-jursidictional competition, which states that residents "shop" for jurisdictions to live in based on service bundles and tax burdens, and that local governments compete for those residents who will maximize tax revenue relative to service consumption—namely wealthy people. To local governments, the imposition of onerous hazard zoning regulations, including the negative designation in itself, could clearly be perceived as a way of detracting from the attractiveness of the locality's "service bundle, " and adding to the "bundle price" in the form of greater homeowner costs. Oates (1994) takes the Tiebout model a step further by including varying levels of environmental regulation as a way that jurisdictions compete, sometimes increasing them and sometimes relaxing them depending on the groups they are trying to attract. The Oakland fire offers an example of the Tiebout process at work with wealthy homeowners. The Claremont Hills areas constituted a large proportion of the wealthy housing of the city of Oakland. Following the fire, a large proportion of Oakland's wealthy residents found themselves without homes, but generally with large insurance settlements. In the context of the Tiebout model, these people's transaction costs for moving had been reduced significantly, and the city feared that it would lose those residents and their property tax dollars to other nearby affluent jurisdictions (Topping 1996). To encourage local residents to stay, the local government claimed "functional equivalent" to the Bates Bill, which exempted any of its lands from being mapped as VHFHSZs, and they rescinded previous local fire zoning ordinances for the neighborhood, allowing residents to rebuild new houses with no setbacks and no design requirements. This not only shows that residents do not like negative designations and land use regulations, but cities are responsive to wealthy constituencies. Where a potential loophole is offered to avoid designation, many cities will exploit that opportunity, with the result that LRA fire maps used for disclosure purposes now greatly understate the extent of fire risk for the purposes of disclosure. Later amendments to the legislation or court cases could resolve this by giving precedence in disclosure requirements to designations pursuant to Civil Code section 51178.