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Additional submitted attachment is included below.

April 9, 2018

TO: California Energy Commissioner McAllister and The Commission Staff

FROM: William Yu and Jerry Nickelsburg, UCLA Anderson Forecast

RE: NAHB/Natalia SIniavskaia' Comments on Report of Building Energy Efficiency Standards Rulemaking

Dear Commissioner McAllister,

Please find the response of The UCLA Anderson Forecast to the comments from the National Association of Home Builders (NAHB) on our report entitled "An Analysis of the Relationship Between Construction Costs and Home Prices for Metropolitan Areas in California and the United States."

1. The rationale of our report's conclusions is that in California high home price appreciation is driven by the combination of a high demand for homes (due to income, job growth, and scarce natural amenities) and the relatively low supply of housing (due to zoning, community externalities and other constraints). Construction cost growth, in particular that portion attributable to changes in energy code, has been too small relative to increases in housing demand to influence home price growth in a statistically significant way.

2. A caveat is in order. The results of our study should not be interpreted as a suggestion that no government regulations impact construction costs and through that, housing affordability. Indeed, in non-land/housing constrained markets, such as many markets in the U.S. that NAHB members build in, it is the case that new home prices are a direct function of the cost of construction. In California, the demand for housing is sufficiently high that prices have historically been bid up to the point where they have broken this linkage. This is what our statistical analysis shows.

3. The interpretation in the comments on Figure 4 on page 6 draw too much inference from the shown correlation. It is a well-known principle in statistics that correlations are not *prima facie* evidence of a causal relationship. They simply represent the co-movement of two series, not that one causes the other. As mentioned in the report, one possible co-movement is that expensive metros with high home prices such as San Francisco and San Jose require a higher wage for construction workers, and that leads to higher construction costs. Indeed, there is statistical evidence to support this.

4. Our report was criticized for not having complete structural general equilibrium equations. To estimate such a system of equations ultimately requires estimating what econometricians call "reduced form" equations. The regressions conducted in our analysis and shown in the report are reduced form equations (which include lagged variables to capture the dynamics in

the market) plus other exogenous variables of interest including construction costs and in particular, additional costs derived from new energy building codes enacted in California. It was never meant to be a complete structural/fundamental model to cover all the possible demand and supply factors found in every market across the nation.

Comments about missing variables such as income, mortgage rates, household formations are in fact considered by the lagged variables of home price growths because those demand factors are characterized by persistence. Moreover, the variables in the equations are growth rates, transformations which mitigate many concerns about spurious correlations. The models used in the report indeed are a tool which may test Granger-causality (G-cause), a relationship which while it is not a sufficient condition to prove a true causality, is a necessary condition for true casualty. In the analysis we do not find evidence that construction costs and California Energy Code updates G-cause higher home price growth rates. Therefore, the data do not display evidence of fundamental causation.

5. Regarding our use of repeat-sale home prices rather than new home prices, three reasons have been clearly explained in the report. First, houses are a product with various qualities, (*e.g.* square footage, amenities and land size) which vary across regions and over time. It is reasonable and necessary to control the quality in order to understand the price dynamics and differences across regions and over time. If we used new home price data, we would not have controlled the quality difference of homes. For instance, over the years, contractors have been building bigger and bigger houses. Thus, the new home price increase might either come from the increase in size or from the increase of price per square foot. In other words, using repeat sale home price is a correct way to analyze the housing market research.

   Second, it stretches credulity to think that new home prices and existing home prices are not closely tied one to another as they both offer the same home services to the buyers and they are both homes, with different vintages to be sure, that are sold in the same market. Thus, the carefully constructed repeat-sale home prices which take into account the individuality of each home is the appropriate metric for the analysis. Third, there is much more data in quality-controlled housing prices than in new home prices. That permits a more in depth analysis of the topic.

   Furthermore, our use of Lincoln Institute's structure cost indeed is the average replacement cost of the housing structure, after depreciating the structure based on its age. The cost is computed consistently with the concept of repeat-sale home prices by Lincoln Institute. It will be improper to analyze construction cost of new homes on home prices of repeat-sale homes.

6. We have two comments on the NAHB's referred report, "Government Regulation in the Price of a New Home," by Dr. Emrath in 2016. First, the data used in the report is survey data of NAHB members and not of the universe of home builders. The use of non-random samples, median home prices and average sample reporting prices without adjustments for non-regulatory quality changes, of which there have been many over the period analyzed, does not fairly represent the market being considered here; that of the California housing market analyzed with standard statistical methodology.

Second, regulatory induced costs discussed in their report are of a very general nature and they include a variety of regulations from all levels of governments. In contrast, our analysis is very specific focusing on a particular regulation: The California Energy Code. We specifically point out that some regulatory costs matter in the cost of housing, but those associated with changes to the California Energy Code have not been statistically significant for California home prices.

Respectfully submitted,

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