

Homework 1

While most American families may not hold large portfolios of stocks and bonds, most do own a home. For the typical American family, the family home is its principal financial asset. Thus, when the value of a house declines, its owner loses his principle source of economic security. While houses do drop in value due to disrepair and poor upkeep, often housing price declines are driven by macroeconomic factors not under the control of the average household. When a factory in an industrial city closes down and workers leave town, real estate values drop, and local homeowners are devastated. Even a small, temporary macroeconomically-induced decline in housing prices can be devastating. An initial decline in prices can create a downward price spiral as potential homebuyers forego buying a house due to concerns about further housing price decline. Thus, fears of impending price drops can become self-fulfilling prophecies of doom. When renters forego buying a home, they invest less in the community where they live and the community suffers. When potential homebuyers move away from a city due to fears of impending economic decline, the city's economic base is devastated.

Just as the Federal Deposit Insurance Corporation uses bank account insurance to prevent bank runs, economists have sought to use house price insurance to stave off downward real estate price spirals. However, insuring a house exposes the insurer to moral hazard. By purchasing insurance the homeowner becomes insulated from the costs of price decline and thus may decide to forego costly home maintenance and upkeep.

Thus, moral hazard can remove the incentive for homeowners to take care of their homes, potentially exposing insurers to huge losses. To avoid moral hazard economists have developed statistical techniques to isolate macroeconomically-driven housing price declines. Economists have developed models to estimate the price of a house using the prices of the neighboring properties. The rise or fall in the neighborhood-estimated price of a house over time is then used as the measure of the macroeconomically-driven change in a home's price. An insurance policy that pays its holder based solely upon declines in the neighborhood-estimated price of his house would leave the insured party exposed to the costs of insufficient maintenance of his own home, undercutting moral hazard. At the same time, the insurance policy would credibly insure homeowners from economy-driven price declines, preventing a downward price spiral.

To estimate the value of a house from that of its neighbors, economists use repeat-sales data to calculate an index of the average price within the house's vicinity. This methodology was pioneered by Bailey, Muth, and Nourse (1963) and then extended by Case and Shiller (1987). Case and Shiller developed an estimator called weighted repeat-sales (WRS) that used all the sales transactions in a prespecified neighborhood to estimate the value of the typical house in said neighborhood. Thus, the value of every neighborhood house was estimated identically as the average value of a house in the neighborhood. While generally powerful, this methodology did not allow for the estimation of house prices for small or sparsely populated neighborhoods. In their important 1997 paper Spiegel and Goetzmann developed a new procedure, called distance-weighted repeat-sales (DWRS) estimation that allowed the estimation of housing price indices even for small, thinly populated neighborhoods. When estimating

the value of a house DWRS weights the statistical influence of nearby houses by their distance to the house whose price is being estimated. Thus, when estimating the value of a home, DWRS allows for the inclusion of many properties far away from the house whose price being estimated. Using DWRS allows the statistician to correctly discount the influence of far-away homes instead of just discarding them as useless data. Therefore, DWRS allows for the estimation of any house, in almost any neighborhood, no matter how thinly populated. Between 2003 and 2005 I worked on a pilot study that attempted to use DWRS estimation to establish a real-estate insurance program for the city of Syracuse, New York (which has been in decline). Between the years 1990 and 2000 Syracuse lost 10 percent of its total population. The pilot study proved promising and is likely to be followed by additional research in the near future. Hopefully, the city of Syracuse will soon come to be covered by a housing price insurance program, so that its economy can begin the process of revitalization.

References

- Bailey, M. J., R. F. Muth, and H. O. Nourse. "A Regression Method for Real Estate Price Index Construction," *Journal of the American Statistical Association* 58 (1963), 933 – 942.
- Caplin, A. et. al. "Home Equity Insurance: A Pilot Project," Yale International Center for Finance Working Paper, No. 03-12 (2003).
- Case, K., and R. Shiller. "Prices of Single Family Homes Since 1970: New Indexes for Four Cities," *New England Economic Review* (1987), 45–56.
- Goetzmann, W. N. and M. Spiegel. "A Spatial Model of Housing Returns and Neighborhood Substitutability," *Journal of Real Estate Finance and Economics* 14 (1997), 11-31.