Parcel Early Warning Systems: Monitoring, Analyzing, and Responding to Economic Conditions

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The symptoms of the 2008 mortgage crisis can be seen in the foreclosures, failing mortgages, and decreasing real estate values across the United States. The recently completed National Research Council (NRC) report on land parcels (2007) and subsequent work on the findings of this report have suggested that parcel-level information from across the country could be used in the solutions to the mortgage crisis. However, questions remain about how parcel data participate in these solutions.

This article describes how a parcel early warning system could be used in monitoring, analyzing, and responding to problems in mortgages and real estate values. Because real estate values and home mortgages are such a vital component of personal credit in the United States, monitoring their health is important to determining the nation's overall economic condition.

The Public Health Analogy

Parcel data, including the value and transaction attributes, provide an indication of the health of the nation's economy similar to the ways in which reports of medical activities are used to monitor public health. The Centers for Disease Control and Prevention (CDC) may not be able to prevent a hepatitis or salmonella outbreak, but the incident reports are essential to limiting the spread of the outbreak and controlling its progress. Similarly, parcel data and its associated attributes could be used to monitor the health of the economy. Detecting *outbreaks* of foreclosures or underwater mortgages could allow for early intervention.

Having the CDC in place does not ensure the fitness of individuals nor does it prevent health problems from occurring in the population, but it does serve an important function in checking the spread of disease, identifying the effectiveness of preventive measures, and providing a measurable indicator of the public health. A parcel early warning system, built on a national digital parcel data system, would have similar functions.

In the response stage, the CDC closes in on geographic areas where outbreaks have been identified, looking for the underlying causes, gathering more detailed information, and coordinating with local public health officials the drilldown to individual cases and needs. Similarly if parcel data were monitored nationally, irregularities or patterns in lending, foreclosures, valuations, and sales outbreaks could be examined. More information on individual transactions could be audited to determine root causes and prevent further spread or deeper damage to the local economy, lending institutions, and individual mortgage holders.

Parcel Epidemiology

In a manner similar to the way in which epidemiologists track patterns in disease, parcel epidemiology could be applied to identify economic hot spots in mortgages, lending, valuation, and foreclosures. As an example, compare the maps shown in figures 1 and 2: figure 1 is a map of the clusters of cholera in the 1854 outbreak in London by Dr. John Snow (Wikipedia contributors 2009), and figure 2 is a map of foreclosures in Longmont, Colorado, with a strikingly similar pattern.

The following excerpt from the Wikipedia article describes Snow's work:

Snow was a skeptic of the then-dominant miasma theory that stated that diseases such as cholera or the Black Death were caused by pollution or a noxious form of "bad air." By talking to local residents he identified the source of the outbreak as the public water pump on Broad Street (now Broadwick Street). Snow later used a spot map to illustrate how cases of cholera were centered around the pump. He also made a solid use of statistics to illustrate the connection between the quality of the source of water and cholera cases. He showed that companies taking water from sewage-polluted sections of the Thames delivered water to homes with an increased incidence of cholera. Snow's study was a major event in the history of public health, and can be regarded as the founding event of the science of epidemiology. (Wikipedia contributors 2009)

Where is the public water pump for parcels? Finding it will not be as simple as removing the handle from the public water pump. What is needed is a national digital parcel data system to monitor and observe the trends so the root causes can be found.

Another recent development in disease detection is the mapping of searches through Google. This type of mapping is outside the more formal CDC emergency room, physician visits, and school absenteeism reporting, yet it has been effective at finding the earliest occurrence. Writes Elizabeth Landau on CNN.com,

Google's new public health initiative, Google Flu Trends [http://www.google. org/flutrends] looks at the relative popularity of a slew of flu-related search terms to determine where in the U.S. flu outbreaks may be occurring.

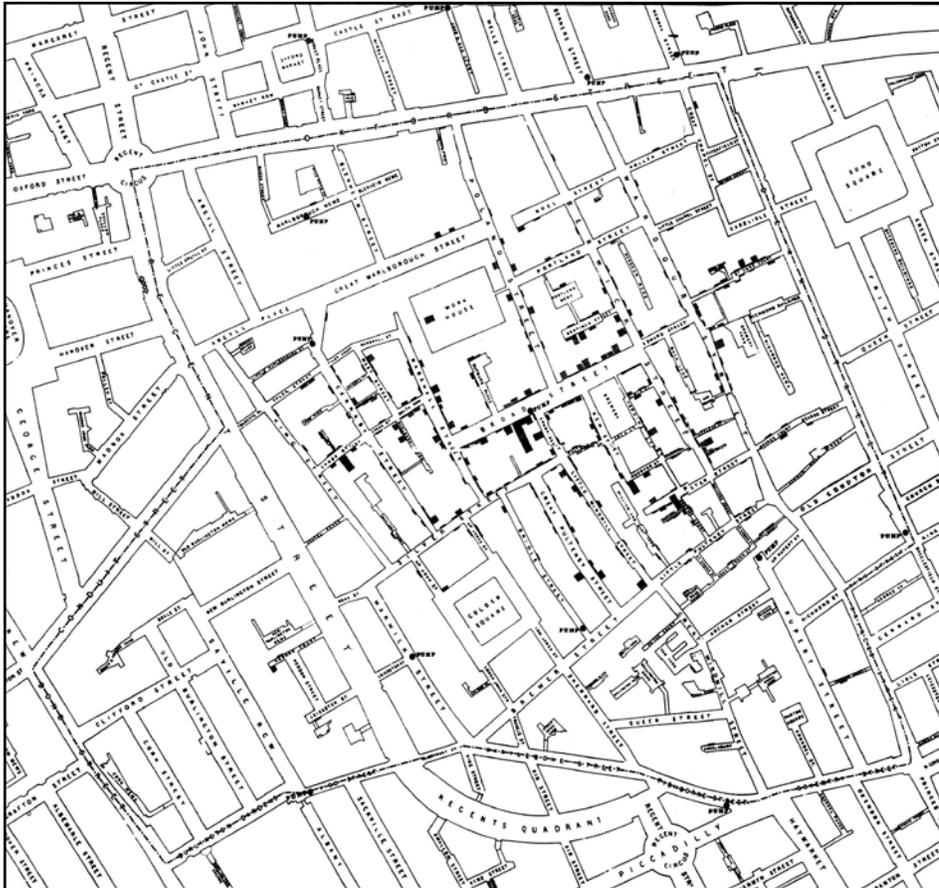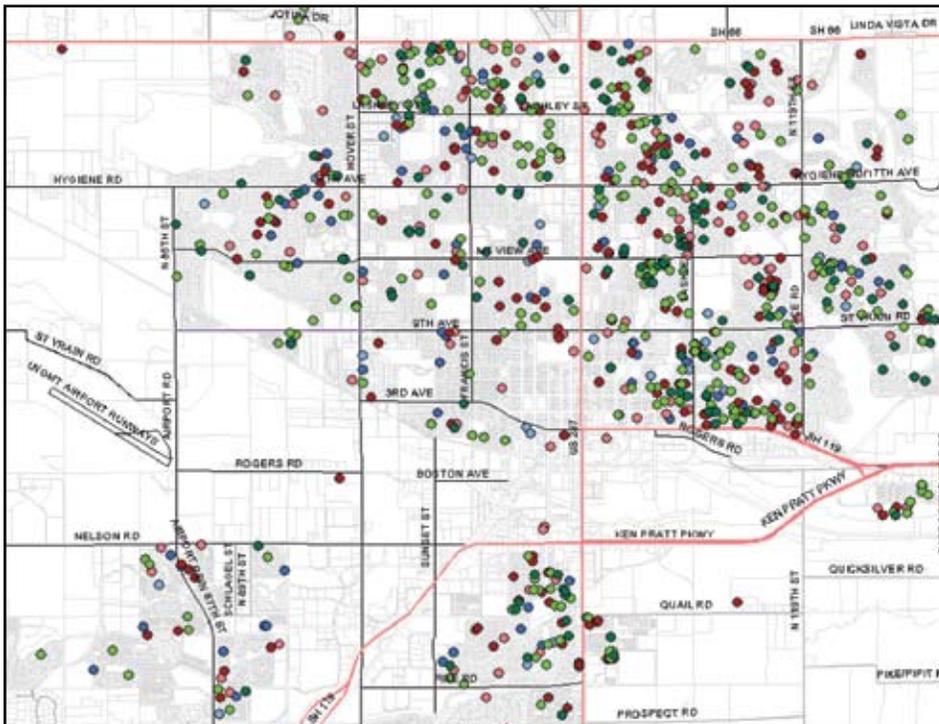**Figure 1. Original map by Dr. John Snow showing the clusters of cholera cases in the London epidemic of 1854**

Figure 2. Map of Foreclosures in Longmont, CO, July 1, 2002–December 31, 2007

Map provided courtesy of Boulder County (CO) Assessor's Office

"What's exciting about Flu Trends is that it lets anybody—epidemiologists, health officials, moms with sick children—learn about the current flu activity level in their own state based on data that's coming in this week," said Jeremy Ginsberg, the lead engineer who developed the site. (Landau 2008)

Google has found a close relationship between how many people search for flu-related topics and how many people actually have flu symptoms. Of course, not every person who searches for "flu" is actually sick, but a pattern emerges when all the flu-related search queries from each state and region are added together. Google compared the query counts with data from a surveillance system managed by the CDC and found that some search queries tend to be popular during flu season. By counting how often these search queries are used, Google can estimate how much flu is circulating in various regions of the United States (Landau 2008). Coupling the searches with over-the-counter sales of flu remedies can further refine the identification of potential flu outbreaks.

Economic health could similarly be estimated by using problems in land values or real financing, found in parcel data, as early indicators of looming problems in the larger economy. If parcel health were as transparent as the Google map, the eyes of the public could be the best preventive measure.

A report by a joint HUD-Treasury task force, "Curbing Predatory Home Mortgage Lending," discussed preventive measures that FHA uses to identify perpetrators of fraud and predatory practices, in particular,

Early Warning Indicators. FHA will customize data from its Neighborhood Watch system to develop early warning indicators of emerging foreclosure "Hot Zones." This data will enable local officials and HUD approved counseling organizations to better target outreach to families at risk of foreclosure. FHA will also make available summaries of the appraised values of FHA properties to help local officials better assess real estate trends and spot possible patterns of appraisal abuse. This public information will include performance

data on individual appraisers generated by the Credit Watch for Appraisers system and posted on the HUD Web site. (HUD-Treasury 2000, 117)

For health issues, protecting the privacy of the individual while tracking potential public health risk is a delicate balance. Can the identity of the individual on the airplane with the rare contagious disease be protected? With parcel transactions (sales, loans, foreclosures, property tax payments, assessments), however, there are no issues of privacy protection, these are public records.

The Spread of the Disease
Just as the CDC tries to localize and quarantine disease outbreaks, there needs to be some means to localize the spread of failing mortgages and failing real estate values, which go beyond individual financial tragedy. Because so much of local government funding is based on the health of the real estate sector, failures there ripple through county budgets up to state budgets. See, for example, figure 3, which shows the rise in foreclosures and sheriff's deeds sales over a 10-year period.

The impact of these foreclosures is a loss of expected real estate tax income to the county. Even more importantly, the current economic crisis has driven down the value of real estate, thus reducing the assessed value base. This, in turn, decreases real estate tax collections, especially if the state has controls or caps on millage rates such as those that came out of the property tax reform movement in the 1990s.

Immunization and Prevention
In public health, vaccinations are used as a preventive measure, immunizing the public against the most contagious diseases. Parcel economic *vaccination* could take the form of citizen education, protection from predatory lending, or regulation of lending practices. The type of immunization cannot be determined until the root cause and effect are better known.

The recommendations from the "Curbing Predatory Home Mortgage Lending" report also identified the need for immunization and prevention and recognized the importance of local parcel data, as follows:

• *Consumer Literacy and Disclosure.* A 1998 report by HUD and the Federal Reserve Board concluded that the reform of the existing disclosure and enforcement scheme under the Real Estate Settlement Procedures Act (RESPA) and the Truth in Lending Act (TILA) could improve consumer understanding and facilitate meaningful loan shopping. Building on the recommendations in that report, HUD and Treasury recommend that Congress: amend RESPA and TILA to make information provided to consumers about the costs of credit and settlement services more reliable, more timely, and more helpful in comparison shopping.
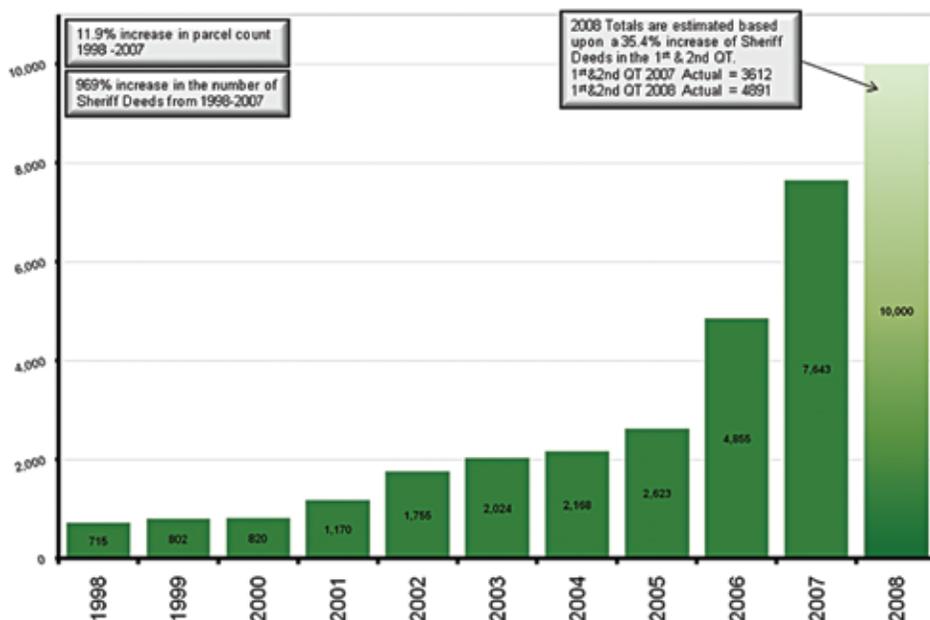
• *Harmful Sales Practices.* Targeting Predatory Loans to Specific Populations. The Task Force forums suggested that minorities, women, and the elderly bear the brunt of abusive mortgage lending practices, particularly in predominantly minority or low-income neighborhoods that do not have access to mainstream sources of credit. To ensure that the potential civil rights implications of predatory lending receive the attention they deserve, HUD and Treasury recommend that:

Congress fund the President's request for fair lending enforcement and for funding of state, local, and private agencies with the capacity to effectively combat predatory lending practices that disadvantage minorities, women, and the elderly.

The Federal Reserve Board take steps to increase the information lenders must report under the Home Mortgage Disclosure Act (described more fully below under part (4), Market Structure). (HUD-Treasury, 2000, 59)

Mapping parcel data with demographics, identifying at-risk populations based on past trends, and deploying community-based response is certainly one approach to immunization for individual financial health as well as the larger community economic health.

What Role for the Professionals?
In the public health system, physicians and public health workers report incidences of disease to the CDC. Should land surveyors, assessors, appraisers, and GIS professionals have a similar role in the monitoring and tracking of public economic health? If suspected fraudulent valuation and lending activity were to be reported locally and compiled nationally, this would be an important service for the nation's economic health.

Other participants in the parcel financial picture, such as bankers, real estate agents, and insurance companies, all have a contribution to make and a role to play. What role and when and how they all participate need to be defined.

Figure 3 - County-wide Foreclosures on Mortgages (Sheriff's Deeds)

Is participation tied to federal bailout support or tax breaks or tax incentives? Is it a professional licensing topic?

A Transparent System

The recent NRC report on parcel data (2007) identified the benefits of and needs for a national parcel data system that would use locally collected and maintained information that in turn would be standardized and summarized and compiled at the state level and then made available for national applications. The NRC proposal is not a centralized database of all parcel transaction data in the country, and it is not a federal repository. It is a distributed system that is *state-centric*, using Web technologies to build virtual Web services for harvesting, querying, and displaying the data.

It is easier to build a transparent system that can be viewed and monitored by everyone when the analysis engine is public records. This means that standardized data sets can be developed nationwide and pulled together virtually through an application portal. Writing in *Government Computer News* about technology trends for 2009, Joab Jackson quoted Tom Simmons, who leads federal sales at Citrix Systems:

Government transparency is one of the Obama administration's top goals. The public wants to see what the government is doing and how it is being done. The best tool for sharing this information is the World Wide Web. The new administration is expected to primarily use Web technologies to make the government more transparent, *Simmons said.* (Jackson 2009)

Maximizing the use of the national map or similar single-access portals that combine all spatial data and harvest data from local and state data sets without building a centralized data store is certainly possible.

The NRC proposed system combined with a national digital parcel data system and a new focus on transparency optimizing the use of Web tools could form the basis of a Parcel Early Warning System. The participation of local assessors and their contribution to such a system should be a point of continuing discussion.

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