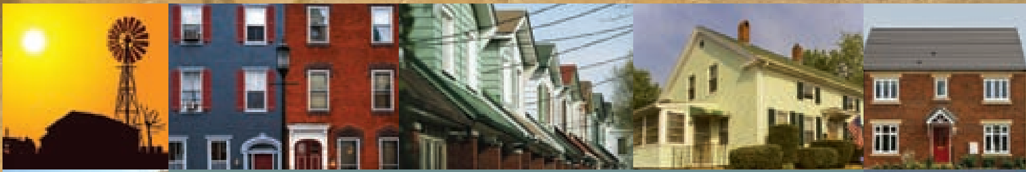

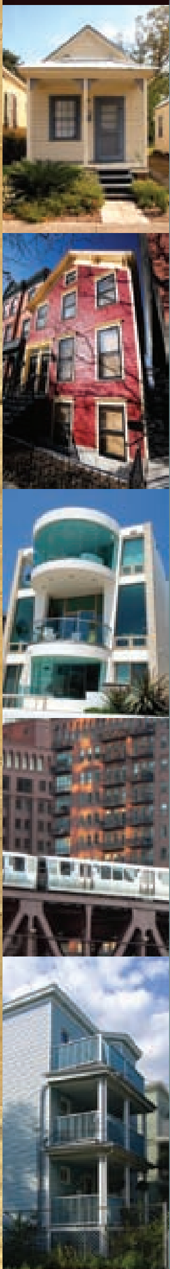

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Risk, Regulation, and Policy

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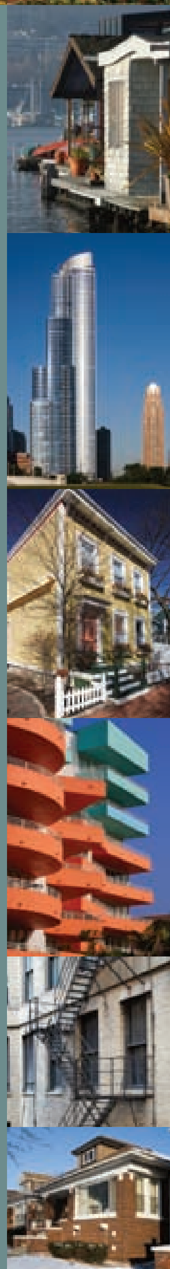

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CAMBRIDGE, MASSACHUSETTS

Library of Congress Cataloging-in-Publication Data

Housing markets and the economy : risk, regulation, and policy : essays in honor of Karl E. Case / edited by Edward L. Glaeser and John M. Quigley.
p. cm.
Papers from a conference sponsored by the Lincoln Institute of Land Policy, held in Dec. 2007.
Includes index.
ISBN 978-1-55844-184-2
1. Housing—United States—Congresses. 2. Housing policy—United States—Congresses. 3. Housing—Prices—United States—Congresses. 4. Housing—Law and legislation—United States—Congresses. I. Case, Karl E. II. Glaeser, Edward L. (Edward Ludwig), 1967– III. Quigley, John M., 1942–
HD7293.H678 2009
333.33'80973—dc22 2008043990

Designed by Westchester Book Composition

Composed in Electra LH Regular by Westchester Book Composition in Danbury, Connecticut. Printed and bound by Puritan Press in Hollis, New Hampshire.
♻ The paper is Rolland Enviro 100, an acid-free, 100 percent recycled sheet.

MANUFACTURED IN THE UNITED STATES OF AMERICA

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Foreword

The Lincoln Institute of Land Policy sponsored and supported the conference "Housing and the Built Environment: Access, Finance, Policy," held in December 2007, and the subsequent publication of this volume, for several reasons. First, the scope of the chapters in this volume is fittingly wide, ranging from useful empirical studies to policy-relevant theoretical conjectures while still addressing mainly housing market issues. Second, the timing of the conference and this volume is opportune, taking place during the ongoing deflation of the U.S. housing bubble and associated financial crisis linked to the remarkable contagion effects of subprime mortgages and their securitized investment vehicles. Third, Chip Case, the honoree of this conference, has many long-standing ties to the Lincoln Institute. Many years ago the Institute wisely supported Chip's dissertation on the property tax in Boston, and more recently the Institute benefited from Chip's service as a distinguished member of the Institute's Board of Directors.

As noted by the editors in their introductory chapter, while Chip's interests are wide ranging, much of his work has been strongly linked to the housing market and associated issues such as price measurement, market efficiency, housing market behavior and its macroeconomic linkages, capitalization of local public services in housing prices, and property taxation. It is difficult to overstate Chip's contributions to the analysis of housing markets, particularly his formulation (along with Robert Shiller) of the repeat sales price index for housing. Indeed, the development of this price index and its growing coverage across locations and over time underpins most serious quantitative work on U.S. housing markets today, including the work reported in this volume. More accurate information about housing prices has improved our ability to measure housing market volatility and the effects of policy interventions in the housing market.

Perhaps the next challenge for housing market analysts is to assess the causes of the recent housing bubble. While much attention has been given to its financial sector causes, such as low interest rates and extension of credit to poorly qualified customers, land and housing policy at the local level—particularly restrictions on housing supply—seems also to have played a role. Housing market restrictions may have contributed to the widespread misconception that housing prices "could not go down." Ironically, those metropolitan housing markets that had the strongest restrictions on land and housing supply seem to be faring better during the post-bubble correction than metropolitan markets with few restrictions and rapid increases in supply. Analyses such as those in this volume provide the foundation needed to increase our understanding of how land and housing policy—both national and local—affects housing markets.

Gregory K. Ingram
President and CEO
Lincoln Institute of Land Policy

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Karl E. Case, Housing, and the Economy

Edward L. Glaeser
John M. Quigley

This volume collects 10 original essays honoring the career and the contributions of the influential economist Karl Case, whose work links real estate markets and movements in the broader economy. His work has considered the boom-and-bust cycles in real capital investment and their relationship to regional performance and the macro economy. But it has also considered the consequences of these cycles and the risks they impose on the actors in the housing market. In part, this work led him to consider institutional reform and the implications of regulating housing markets for households and housing suppliers. The topics treated in this book reflect many of the concerns raised in Case's academic writings.

Better known throughout the profession as "Chip" Case, Karl Case matriculated at Miami University (Ohio) and later at Harvard University. In between, he served as an officer in the U.S. Army Medical Corps in Viet Nam. He completed his doctoral dissertation in economics in 1977 under the supervision of Richard Musgrave and John Kain and subsequently joined the faculty of Wellesley College, where he has served for three decades. He is currently the Katherine Coman and A. Barton Hepburn Professor of Economics at Wellesley.

Case's doctoral dissertation formed the basis for his 1978 book, *Property Taxation: The Need for Reform*. This book analyzed the variations in effective property tax rates within and between jurisdictions in Massachusetts, offering a blueprint for reform of the institutions that determine local tax appraisal, property tax assessment, and tax policy. This early research identified the qualities he would be known for throughout his professional career: deep knowledge of real-world institutions, keen attention to empirical detail, and a clear focus on behavior and policy.

Case has written four other books, including the highly acclaimed undergraduate text *Principles of Economics* (first published in 1989), undertaken in collaboration with Ray Fair.

Case's analysis of "The Market for Single-Family Homes in Boston, 1979–1985" (1986), and his subsequent paper with Robert Shiller, "Prices of Single Family Homes Since 1970" (1987), introduced improved methods of measuring asset prices. These methods, so-called weighted repeat sales price indices, are now the standard techniques used by government and private industry to track housing prices in the United States and in other countries as well. One of the great virtues of these indices, when compared to their hedonic counterparts, is that they depend far less on researchers' discretionary choices. These techniques have diffused rapidly. For example, they have been used to describe the course of housing prices in Amsterdam for the past 350 years (Eichholtz, 1997), to value private-equity start-up firms (Hwang, Quigley, and Woodward, 2005), and to record the price movements of paintings by the Dutch masters (Goetzmann, 1993), among many other applications.

These methodological contributions led directly to work on price dispersion and the equilibrium tendencies in spatially disbursed housing markets. The development of these price measures permitted direct investigations of market efficiency using micro data on prices. A major investigation of "The Efficiency of the Market for Single-Family Homes," also undertaken with Robert Shiller (1989), demonstrated how slowly equilibrium in the housing market was achieved. This treatment of market efficiency was an important development, and it remains the single most influential paper Case has produced.

In a related set of papers, Case analyzed the incidence of excess returns to housing investment (Case and Shiller, 1990), the distributional effects of housing booms and busts (Case and Cook, 1989), and the role of taxes in dampening speculative behavior in the housing market (Case, 1992). The magnitude and importance of house price fluctuations in affecting consumer welfare led to his important paper explicating the relevance of "Index-Based Futures and Options Markets in Real Estate" for housing and the real estate market (Case, Shiller, and Weiss, 1993). This paper is not among Case's most widely cited academic works, but it did lead to the practical development of institutions to mediate risk in the housing market. Consumers and investors now trade options on Case-Shiller Home Price Indices for a dozen cities on the Chicago Mercantile Exchange.

In tandem with his studies of housing dynamics, Case has conducted a series of empirical analyses linking local public finance to housing outcomes, especially school expenditures and school quality. His most widely cited paper in local public finance, "Property Tax Limits, Local Fiscal Behavior, and Property Values" (2001), undertaken with Katherine Bradbury and Christopher Mayer, concerns tax reform in Massachusetts.

It is a curse to live in interesting times. Case's career and prior work have made him the natural expositor and interpreter of the turmoil in the housing market after 2006. A once-overlooked Brookings paper he wrote, "Real Estate and the Macroeconomy" (2000), compared the volatility of house prices to the volatility in common stocks. In this paper, Case also exhibited the wide variety of short-run house price dynamics across different markets. This paper also emphasized the transmission of economic shocks through the construction sector—a mechanism that was subsequently observed more directly when housing starts declined from 2.3 million in 2006 to 500,000 in 2008. The Brookings essay also drew attention to the wealth effect of housing, that is, the propensity of homeowners to increase consumption in response to capital gains in the housing market. This work was subsequently extended by Case and his collaborators in "Comparing Wealth Effects," an empirical analysis using a panel of U.S. states and developed countries (Case, Quigley, and Shiller, 2005).

Case's analysis of housing market dynamics includes a more recent Brookings paper, "Is There a Bubble in the Housing Market?" (2003). Some of the conclusions of this paper seem almost prophetic a half-decade later. Importantly, however, this research was informed by analysis of a detailed survey of new home purchasers in four U.S. metropolitan areas. As this book goes to press, Case is distributing the fifth wave of this valuable survey to new home purchasers in Los Angeles, Boston, San Francisco, and Milwaukee.

It could not be more appropriate for a volume in honor of Karl Case to begin with a chapter by his longtime collaborator and business partner, Robert Shiller. Their long-term collaboration includes a mission to deepen the financial market so that individuals can hedge their investments in residential real estate. As Shiller points out in chapter 2, real estate is a $20 trillion market, and large groups of the population have the bulk of their wealth tied to a single volatile asset: their home. Yet, these households have little means of hedging the risk that arises from leveraged ownership of a particular house. Case and Shiller saw the development of derivatives, tied to the market prices of housing, as creating large social value by allowing homeowners to share some of their house value risk with investors and other market participants.

If there were to be a market for real estate index derivatives, then there needed to be clearly defined indices of real estate prices. As Shiller explains in his chapter, Case and Shiller's development of repeat sales indices represented an attempt to create a reliable and transparent alternative to hedonic price indices that could provide the basis for a financial instrument. The National Association of Realtors' (NAR's) monthly data on new home sales is the primary public data series that delivers price information at high frequencies (i.e., more often than once per year), but the NAR does nothing to correct for housing quality—and quality varies significantly over time and across markets.

So-called hedonic price methods provide one means of correcting for quality, but they give a great deal of discretion to the econometrician and are, inevitably, subject to a great deal of debate and ambiguity. Debate and confusion would be anathema to an index underlying a publicly traded security. Repeat sales indices have the great virtue of being enormously straightforward and eliminating econometric discretion. Case and Shiller's development of repeat sales indices made possible the development of a derivatives market tied to regularly measured, quality-adjusted real estate prices.

But even with these indices, the development of real estate derivatives has been a slow process. Shiller describes its tortuous pace, slowed down by a scandal in London, and he offers several explanations for why these markets have not matured more rapidly. One explanation, associated with Todd Sinai and Nick Souleles, is that home ownership is itself a hedge against changes in future housing costs. Although Shiller accepts this point, he also argues that surely there must still be millions of people, especially those who anticipate selling within five or 10 years, who would benefit from hedging their house price risk.

A second theory is that people are simply risk loving, which makes them uninterested in foregoing potential gains to hedge themselves against downside risk. Shiller also doubts the power of this explanation and instead argues that the root problem is that real estate index derivatives markets just have not yet become sufficiently liquid. Essentially, he is arguing that there is a coordination failure—people would like to trade if others are trading, but if volume is too small then no one enters the market. If this view is correct, then it is hard not to think that in the long run this coordination problem will be solved, and Case and Shiller's idea will eventually develop into a thriving market that provides hedging opportunities for millions of homeowners.

Timothy Riddiough's discussion of Shiller's essay distinguishes between the distinct, but related, notions of market efficiency and the insurance benefits of hedging. He demonstrates that the development of price indices by Case and Shiller has done much to improve the efficiency of the housing market. These efficiency gains, he argues, are independent of the insurance benefits to hedging that arise from the diversification of risk.

In Robert Van Order's commentary, he describes a variety of alternatives to the price indices developed by Case and Shiller, concluding that the methodology employed in producing the latter index is simply superior to the alternatives. He, too, professes bewilderment at the slow development of the futures market. He fervently hopes that this new market will take off, "although, given that my house will always go up in value, I am sure that I shall never want to use it."

In chapter 3, the second essay in this volume, Andrew Caplin, William Goetzmann, Eric Hangen, Barry Nalebuff, Elisabeth Prentice, John Rodkin, Tom Skinner, and Matthew Spiegel discuss a demonstration in one city (Syracuse, New York) in which home equity insurance was offered to homeowners. The authors' interest in helping homeowners reflects financial economists' concern with the losses arising from "missing markets." However, starting in the 1970s, community builders in Illinois thought that home equity insurance offered a means of protecting communities against the flight of homeowners eager to "cash out" before prices dropped. These plans, one of which was implemented in Oak Park, offered homeowners extremely generous insurance at low cost that was meant to be funded out of general property tax revenues. Over time, the success of the program implemented in Oak Park meant that this program was phased out, but it served as a model for the authors' pilot program implemented in Syracuse.

In Syracuse, the interest in home equity insurance also came from community builders, rather than financiers, and funds were available to subsidize the program. One of the goals of home equity insurance was to create more incentives for local renters to become homeowners. The essay describes the different elements involved in designing a home equity program for Syracuse. Unlike the Oak Park plan, the Syracuse plan tied home equity insurance to a repeat sales index rather than the price of an individual home. The use of an index, like that designed by Case and Shiller, reduces the scope for malfeasance or moral hazard by sellers. The legal challenges that had to be overcome to offer the product were considerable, and the authors describe these in great detail. The essay illustrates a particular and concrete setting where hedging home risk might be particularly appealing both to homeowners and policy makers.

In chapter 4, the third essay in this volume, Todd Sinai investigates the hedging demand for real estate index derivatives by using a classical model. A core insight of Sinai's work has been that renting is not necessarily less risky than owning. Everyone comes into the world needing to procure housing, and renters are continuously exposed to the risks of changes in future housing costs. Homeowners also face risks associated with changing housing prices, but those risks are realized only when the owner sells. The risk at sale, in turn, depends on the owner's residential arrangements after the sale and ultimately on the correlation between the price of the owner's current home and the price of the owner's future home. If the two homes, the current and the intended residence, are within the same metropolitan area, then the prices are certainly highly correlated, and there would be little value from hedging metropolitan area housing price risk.

If the owner is planning on moving across metropolitan areas, then the risk depends on the correlation in prices across those housing markets. Sinai empirically examines the correlation across those areas and concludes that it is rather high. For people who are planning on moving, at least to a relatively similar place, this mitigates the desire to hedge. Sinai concludes that the strongest demand for hedging should come from the elderly, who will be selling their residences at death and not moving anywhere else. But even that demand can be mitigated if older owners have children who are themselves renters and need hedging against housing costs.

In chapter 5, the fourth essay in this volume, Edward Glaeser and Joseph Gyourko address the no-arbitrage relationships that underlie all economic attempts to understand housing prices. This essay argues that the pure financial no-arbitrage relationship, which defines the margin between owning and renting, helps little in analyzing house price fluctuations. Although there are certainly people on the margin between owning and renting, the inability of researchers to measure all of the unobservable elements involved in the owning–renting decision makes the empirical use of that margin quite difficult.

Instead, the Glaeser–Gyourko essay argues that the spatial no-arbitrage condition, which requires that people be indifferent between different houses in different locations, offers a more solid grounding for analyzing housing price fluctuations. This viewpoint emphasizes that researchers should ask not whether prices are too high in relation to rents or the level of income in the country as a whole, but instead whether the price differences between two areas are too high in relation to differences in income and amenities available. The essay discusses empirical work, using this framework, that supports Case and Shiller's long-standing empirical finding that there is too much predictability of housing prices, and especially too much short-term momentum in prices, to be compatible with a perfectly rational model.

The fifth and sixth essays analyze the impact of credit innovations in the housing market. In chapter 6, Chris Mayer and Karen Pence turn to the subject of subprime mortgages. Over the past five years, subprime mortgages exploded in importance within the credit market. They seem to have been associated first with the boom in housing prices and then with a subsequent collapse in the price of housing. Mayer and Pence undertake the task of measuring the presence of subprime mortgages and then understanding the geography of those mortgages.

Because there is no formal definition of subprime mortgages, even basic measurement of subprime lending is difficult. Mayer and Pence use three different sources of data: high-cost loans reported under the Home Mortgage Disclosure Act (HMDA), data collected by the Department of Housing and Urban Development (HUD) on subprime lenders, and data from subprime mortgage pools gathered by First American Loan Performance. Although the three sources do not always agree—for example, the HMDA data report that there were almost a million more subprime mortgages in 2005 than are reported by either HUD or First American—the pattern of magnitudes of the variables that explain concentrations of subprime lending over space are similar.

The Mayer and Pence study documents at least five important facts about subprime lending. First, subprime loans were remarkably concentrated in particular metropolitan areas. Second, subprime lending was particularly prevalent in areas with booming housing markets, as measured by rising prices or the extent to which permits were issued for new construction. Third, subprime lending was more common in places with more poor and unemployed people. Fourth, subprime lending was more common in areas with higher home ownership rates. Fifth, there is a strong link between the subprime lending in a geographic area and the share of minorities residing in that area. These are important facts that can help us think about what happened in the explosion of higher-interest lending.

The commentary by C. F. Sirmans and Kerry Vandell on this timely research emphasizes the importance of Mayer and Pence's normalization of subprime loans per housing unit. This normalization clearly leads to an underestimation of the extent of subprime borrowing in largely renter-occupied areas, and it overestimates the extent of subprime lending in high-growth, high-price-appreciation areas. Sirmans and Vandell also point out that a broader definition of subprime mortgages would include many additional loans—option adjustable rate mortgages, interest-only mortgages, and a variety of second liens. Currently available data mask many of these distinctions and inevitably underestimate the incidence of exotic and subprime loans.

Chapter 7, by Stuart Gabriel and Stuart Rosenthal, also analyzes the impact of lending to poorer Americans who were not always served by traditional banks. Their essay analyzes the impact of the Community Reinvestment Act (CRA) and the Government-Sponsored Enterprises Act (GSEA) on home ownership and lending in the areas targeted by these pieces of legislation. Both acts require lenders to target lending toward poorer, traditionally underserved areas, with the aim of increasing lending within those areas. The two acts both have a narrow geographic focus that enables Gabriel and Rosenthal to use a spatial discontinuity research design to compare abutting tracts, some of which are defined as underserved and others of which are not.

Gabriel and Rosenthal find that underserved tracts experience an increase in GSE origination of conforming loans and a decrease at the same time in the origination of nonconforming loans. Gabriel and Rosenthal find exactly the opposite effect when they analyze the CRA. Nonconforming loans increase in the underserved areas and conforming loans decrease. Overall, they find that these interventions have no appreciable influence on the overall home ownership rate, which calls into question the value of these pieces of legislation.

The commentary by Lawrence Jones emphasizes the novelty of the essay by Gabriel and Rosenthal, namely their emphasis on the net change in home ownership in targeted areas, not merely the extent of lending.

The seventh essay continues on the topic of federal housing interventions that may affect distressed neighborhoods. In chapter 8, Ingrid Ellen, Katherine O'Regan, and Ioan Voicu turn the spotlight on the Low-Income Housing Tax Credit (LIHTC). Since 1986, the LIHTC has been the major federal program aimed at building new housing for poorer Americans. The program uses tax expenditures authorized under the tax code to subsidize new building, but that building must provide homes for poorer Americans. In some cases, the new housing must also be located in poorer areas. Two common criticisms of the act are that it concentrates poverty by building houses for poor people in poor areas and that low-income housing reduces the values of neighboring properties.

The evidence presented by Ellen, O'Regan, and Voicu calls these criticisms into serious question. Although LIHTC funding does encourage building in places that are poorer than the average census tract in the United States, the places chosen for investment are less poor than the average tract occupied by poorer Americans. As a result, the LIHTC actually helps to reduce residential segregation by income, at least relative to other federal housing programs such as Section 8 Vouchers. Ellen, O'Regan, and Voicu also find that housing prices tend to increase in areas that are close to LIHTC projects, which clearly rebuts the notion that these projects hurt their neighborhoods. Instead, the LIHTC seems to be contributing to neighborhood revitalization. Although many contentious issues surrounding the LIHTC remain, this essay provides a careful refutation of two important criticisms.

Daniel McMillen's commentary demonstrates that the LIHTC construction program cannot be expected to have significant effects upon the overall spatial concentration of poverty; there is just not enough new construction in large metropolitan areas for there to be large effects. Despite this, the LIHTC program can exert significant effects on smaller geographical areas. And the operation of the program does seem to be reducing segregation in these areas.

The eighth essay turns from national policy interventions in the housing market to more local interventions, specifically local land use controls. In chapter 9, John Quigley, Steven Raphael, and Larry Rosenthal present an overview of the literature on land use controls, and they present an index of land use restrictions in the San Francisco Bay Area based on a detailed survey of local land use officials. Over the past 40 years, land use controls have become more restrictive in many parts of the country. California has been a leader in restricting new development through local growth controls and statewide environmental rules. It is thus a natural place to study the impact of local land use controls.

The Berkeley Land Use Regulation Index combines information on explicit rules, average delays, and the political actors who are involved in the zoning process. Although many outsiders tend to see northern California as an antigrowth monolith, the index shows that there is considerable heterogeneity within the region. The essay also shows a strong connection between land use restrictions and higher prices and rents. Places that build less housing are more expensive. The entitlement process alone raises housing prices by $23,000 in the Bay Area.

In his discussion of this essay, Richard Green points out a potentially important reason why the statistical models explaining the effects of land use regulation on housing prices are more powerful than those explaining the effects of regulation on market rents. The user cost of capital (i.e., the ratio of rent to value) depends on interest rates, property tax rates, maintenance costs, and expectations about growth. These factors probably do not vary much within a metropolitan area, especially in California, where property taxes are mandated by state law. But marginal tax rates vary greatly within a region, especially in the San Francisco Bay Area (as per capita incomes vary from $22,000 a year in Oakland to $112,000 in Atherton). This increases the variability of house prices relative to rents within the region.

In his commentary, Stephen Malpezzi stresses the importance of understanding the determinants of the variation in regulatory stringency documented by Quigley, Raphael, and Rosenthal.

Chapter 10, the ninth essay in this volume, is by Ann Schnare, a respected consultant on housing policy and a longtime associate of Case, and Robert Kulick. Schnare and Kulick analyze competition among real estate agents. Although it is often alleged that the multiple listing service acts to enforce a cartel that keeps real estate commissions fixed, Schnare and Kulick present evidence suggesting that there is often significant flexibility and competition on price. This evidence certainly does not mean that the real estate industry is fully competitive, but it is not consistent with a view of the real estate brokerage industry as a tightly organized cartel.

The final essay in this volume is by Nancy Wallace and Case's graduate school classmate, Donald Walls. In chapter 11, Wallace and Walls exploit an important new data set reporting an annual time series of essentially all employment in all U.S. metropolitan areas by firm size and employment type. They exploit this unique resource to analyze the microeconomic determinants of the so-called rank-size rule, which seems to govern the size distribution of cities in developed countries. The point of departure for the Wallace–Walls analysis is the observation that the dynamics of job creation and destruction are inconsistent with the rank-size relationship, also known as Zipf's law. Wallace and Walls investigate the apparent dependence of establishment size and employment growth, as well as the effects of financial market frictions and industry-specific human capital on the linkage between size and employment growth. They find important effects of industry-specific capital and capital-labor ratios in explaining mean reversion in the growth and size relationships among firms and also in the aggregate economy. The data analyzed in this essay offer many more rich opportunities to explore economic development and metropolitan growth.

The 10 essays in this volume reflect broadly the intellectual pursuits of Karl Case—the operation of the housing market, its links to financial markets and the broader economy, and the role of policy in improving the efficiency and fairness of the market. We are pleased to dedicate their contributions to our friend and colleague, and this dedication is seconded by the discussants and the many participants in the 2007 policy conference in Cambridge on Housing and the Built Environment.

References

Bradbury, Katherine, Karl E. Case, and Christopher Mayer. 2001. "Property Tax Limits, Local Fiscal Behavior, and Property Values: Evidence from Massachusetts Under Proposition 2½." *Journal of Public Economics* 80(2) (May): 287–311.

Case, Karl E. 1986. "The Market for Single-Family Homes in Boston, 1979–1985." *New England Economic Review* (May/June): 38–48.

———. 1992. "Taxes and Speculative Behavior in Land and Real Estate Markets." *Review of Urban and Regional Development Studies* 4(2): 226–239.

———. 2000. "Real Estate and the Macroeconomy." *Brookings Papers on Economic Activity* 2: 119–162.

Case, Karl E., and Leah Cook. 1989. "The Distributional Effects of Housing Price Booms: Winners and Losers in Boston, 1980–89." *New England Economic Review* (March/April): 3–12.

Case, Karl E., John M. Quigley, and Robert Shiller. 2005. "Comparing Wealth Effects: The Stock Market Versus the Housing Market." *Advances in Macroeconomics* 5(1) (March).

Case, Karl E., and Robert Shiller. 1987. "Prices of Single Family Homes Since 1970: New Indexes for Four Cities." *New England Economic Review* (September/October): 45–56.

———. 1989. "The Efficiency of the Market for Single-Family Homes." *American Economic Review* 79(1) (March): 125–137.

———. 1990. "Forecasting Prices and Excess Returns in the Housing Market." *Journal of the American Real Estate and Urban Economics Association* 18(4): 253–273.

———. 2003. "Is There a Bubble in the Housing Market?" *Brookings Papers on Economic Activity* 2: 299–362.

Case, Karl E., Robert J. Shiller, and Allan N. Weiss. 1993. "Index-Based Futures and Options Markets in Real Estate." *Journal of Portfolio Management* 19(2) (Winter): 83–92.

Eichholtz, Piet M. A. 1997. "A Long Run House Price Index: The Herengracht Index, 1628–1773." *Real Estate Economics* 25(2): 175–192.

Goetzmann, William N. 1993. "Accounting for Taste: An Analysis of Art Returns over Three Centuries." *American Economic Review* 83(5): 1370–1376.

Hwang, Min, John M. Quigley, and Susan Woodward. 2005. "An Index for Venture Capital, 1987–2003." *Contributions to Economic Analysis and Policy* 4(1): Article 13.