

Introduction

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Housing is simultaneously a consumption good, an investment asset that is an important component of household wealth, and a key determinant of spatial opportunity. That complex combination of attributes helps make housing unusually difficult to measure well, which is a problem given that housing is a central object of local public policy especially and a major input into measured inflation. Economists know that a house or apartment is not simply a physical structure. It is bundled with land, neighborhood amenities and various local public goods, access to labor markets, exposure to environmental risk, tax treatment and financing arrangements, and expectations about future prices. Housing markets are also intensely local: prices, rents, ownership structures, construction possibilities, and risks often vary within metropolitan areas, within cities, and even across parcels on the same block.

The chapters in this volume confront these measurement challenges directly. They do not treat measurement as a preliminary technical step before ‘serious’ economic analysis begins. Instead, they show that the way housing is measured can change our understanding of inflation, affordability, mobility, environmental risk, housing supply, ownership concentration, and the returns to public investment. One message of this volume is that many longstanding debates in housing economics are, at least partly, debates about measurement: what is the relevant price index, what is the relevant housing quantity, who is the relevant owner, what is the relevant geography, and whose exposure or opportunity is actually being observed?

It is in this regard that the chapters are best read as measurement papers in the strongest sense of that term. Their contributions are not limited to new estimates or new empirical findings. They ask what is missing from existing data, propose new ways to measure otherwise latent or poorly observed objects, explain how those measures are constructed, validate them against existing benchmarks where possible, and demonstrate applications that would be difficult or impossible without the new measurement tool. This structure - motivation, innovation, explanation, validation, and application - runs through the volume. It also highlights a recurring caution: new measures are not automatically superior. They must be interpreted in light of the frictions, selection rules, and institutional features that generate the underlying data, something the excellent discussants of the chapters emphasize.

Several themes run through the chapters. One is the potential importance of spatial granularity and market segmentation. Housing outcomes are often summarized at the national, metropolitan, or county level, yet economically relevant variation may occur at much smaller scales. In Chapter 1, *Characteristics of a Sufficient Statistic to Measure City Housing Prices*, Broxterman, Larson, and Yezer argue that city-level housing price indexes must account for systematic within-city variation in appreciation rates and should aggregate relatively homogeneous

¹ Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the U.S. Census Bureau or the Bureau of Labor Statistics.

submarket indexes using housing-stock weights rather than relying only on observed transactions. Qin and Voorheis, in Chapter 8's *Flood Risk, Insurance and Housing in the United States*, make a related point in the context of flood risk: aggregate data can imply that floodplain exposure is concentrated among disadvantaged households, while parcel-linked household microdata reveal a different pattern, with especially high exposure among high-income households and a vulnerable subgroup of low-income, uninsured homeowners. In Chapter 4, *The Positive Spillovers to Risky Investments in Vacant, Abandoned and Disinvested Properties*, Chen, Lengefeld, and Asensio show that the effects of infill development in Savannah are highly localized, with the largest spillovers accruing to immediately neighboring properties and to blocks with a high density of redevelopment activity. This suggests that public redevelopment can generate localized benefits beyond the direct provision of housing. Moreover, these benefits are difficult to quantify without record-linked property and tax data and an empirical design suited to highly localized treatment.

These chapters highlight that the choice of geographic unit of measurement need not be neutral; it can shape economic conclusions. They can shape economic conclusions. Across different chapters, one illustration of this arises from the impact of aggregation. The Qin and Voorheis chapter referenced above shows that flood exposure cannot be adequately understood from neighborhood averages alone. At the household level, the income gradient is non-monotonic: exposure generally falls with income through much of the distribution but rises sharply at the top, where floodplains often coincide with high-amenity locations. This reconciles two views that can otherwise appear inconsistent - one emphasizing environmental justice and the other emphasizing amenity sorting by richer households. Kestelman, Diamond, et. al in Chapter 11, *Toward a Methodology for Measuring Rental Property Ownership in the United States*, argue that knowing landlord ownership details can be important in understanding affordability and how access varies across different types of households and markets. They measure ownership because rental housing is not simply a homogeneous stock supplied by anonymous landlords. It is an intermediated market in which owners set rents, screen tenants, choose maintenance, and decide whether to enter or exit. The nature of the economic ownership of the apartments could be a relevant factor in making those decisions.

The price-index chapters (Chapter 1 especially, but also Chapters 5 and 9) make a somewhat parallel point. A citywide index built from transactions is representative of the full housing stock only if transacted properties represent that stock or if appreciation is homogeneous across the relevant dimensions. However, the relevant dimensions may include specific location, structure type, price point, or other forms of segmentation, not simply distance to downtown. Thus, the problem is not only that cities are spatially heterogeneous. Housing markets are segmented along several margins, and an index must specify which object it is trying to measure and how the underlying units should be weighted.

A second theme builds on the well-known fact that quality adjustment is central to housing measurement. Steurer and Spiegel, in Chapter 9's *Filling the Gaps with MICE: Addressing Missing Data in Real Estate Price Indexes*, focus on a practical but important problem in hedonic real estate price indexes: missing property characteristics. They show that complete-case estimation can alter the composition of the estimation sample and destabilize price indexes, especially in thin or heterogeneous markets. Their proposed solution involves multiple imputation by chained equations with an aggregation procedure suited to chained price indexes. In Chapter 3's *Measuring Housing Quality Using Revealed Preference: A Geographic*

PageRank Approach, Bell, Calder-Wang and Zhong approach quality from a different angle. Their Geographic PageRank measure uses migration flows to infer place quality based on revealed preference. They use the network structure of moves to rank places rather than relying only on local characteristics or net migration. Both chapters emphasize that unobserved quality is not a nuisance detail. It can be the object that researchers and policymakers most want to understand.

Finally, there is an interesting discussion among authors and discussants about the fact that the measures of quality, desirability, and supply capacity are often equilibrium outcomes, not just direct observations of primitives. For example, migration flows that are used to infer place quality also can be influenced by moving costs, distance, housing supply constraints, affordability, and historical migration networks. A place could be highly desirable, yet show limited in-migration, because supply constraints capitalize demand into prices rather than population growth. Similarly, the distribution of buildable parcels is informative about housing supply, but parcel size is not the same thing as development capacity. Small parcels may support substantial infill construction where zoning, building codes, and local politics permit height or density; large parcels may matter most where production requires scale or where land assembly frictions are severe. Housing mobility measures face a related issue: outcomes assigned to childhood county may partly reflect the adult locations to which children move. Flood-risk measures likewise distinguish exposure - who is in the floodplain - from vulnerability - who suffers, who is insured, who has liquidity, and who can recover. Across the volume, one clear conclusion is that measurement requires asking not only what is observed, but what constraints determine who or what appears in the observed data.

A third theme is the growing importance of administrative, linked, and alternative data. Several chapters build new measurement infrastructures by combining data sources that were not originally designed for a single research purpose. Binder, Risch, and Voorheis, in Chapter 10's *Lands of Opportunity: Differences in the Geography of Wealth and Income Mobility in the United States*, link survey and administrative data to produce county-level measures of intergenerational mobility in income, labor income, homeownership, housing wealth, and total wealth for millions of families. The Kestelman, Diamond, et al. paper referenced above combines property records, the Census Bureau's Business Register, IRS Schedule K-1 filings, and SEC filings to trace rental property ownership through LLCs and other entities to ultimate owners. In Chapter 2's *A Blended Data Approach to Measuring Monthly Housing Starts: Satellite Imagery, Survey Data and More!*, Czaplicki, Shevlin et al. blend satellite imagery, convolutional neural-network predictions, building-permit data, and the Census Bureau's *Survey of Construction* to explore a new way of measuring monthly housing starts. This research shows that the use of remote sensing passes a proof of concept test. Future work will have to focus on cost control via the use of different sensing technologies. In sum, these chapters show the promise of new data linkages, but they also note their limitations: missing entities, incomplete ownership chains, high acquisition costs, nonresponse, cloud cover, model validation, and the continued need to reconcile new data products with legacy and contemporaneous official statistics.

The volume also highlights the changing production function for official and quasi-official housing statistics. Traditional surveys remain indispensable because they provide continuity, sampling discipline, and institutional legitimacy. But they also face rising nonresponse rates, increasing cost, and limited geographic detail. In Chapter 7, Loewenstein, Montag, and

Verbrugge in *Nonresponse Imputations and Related Measurement Issues in the CPI for Shelter* show that, beyond the well-known rising nonresponse to the Consumer Price Index (CPI), a broader implication is that a growing share of the data underlying employment, consumption, poverty, health, and housing statistics is now imputed. A key question is not only whether one imputation method predicts individual missing observations better than another, but whether it improves the target index. Steurer and Spiegel make a similar point for hedonic property price indexes: missing characteristics matter because they alter the estimation sample and the stability of quality adjustment, and imputation should be judged in the context of the price-index model. In Chapter 5's *Rental Prices and the Cost of Living in the United States, 1914-2006*, Lyons, Shertzer, and Gray illustrate the considerable potential payoff from using historical non-survey data, but their evidence also requires careful interpretation because newspaper listings measure rents for available units and new tenants rather than the full stock of incumbent tenants.

Another important strand of discussion among the authors and discussants of these chapters is how the new measures bring costs of their own. For example, the Czaplicki, Shevlin et al. paper shows that satellite imagery definitely can help measure housing starts, yet moving from experimental products to production statistics raises issues of imagery cost, storage, spatial and temporal resolution, model validation, and uncertainty propagation. The resulting lesson is not that administrative records, satellite imagery, or machine learning should replace surveys. It is that future housing measurement probably will increasingly be blended, combining surveys, administrative records, alternative data, and model-based inference while making explicit the uncertainty from each component.

A fourth theme is the well-known one that housing measurement matters for macroeconomic statistics. Shelter is the largest component of the CPI, and errors in measuring rents or owner-equivalent rent can affect assessments of inflation, real wages, real interest rates, and long-run living standards. The Loewenstein, Montag, and Verbrugge chapter examines nonresponse in the Bureau of Labor Statistics Housing Survey, where roughly 40 percent of observations are now imputed, and evaluate whether alternative imputation methods materially change measured shelter inflation. Their central empirical finding is reassuring: although the current procedure has theoretical potential for upward bias, several alternative methods produce similar aggregate shelter inflation indexes. As noted above, the Lyons, Shertzer, and Gray chapter takes a longer historical view. They revisit the apparent decline in real rents in the official CPI from 1914 to 2006 and show that much of the puzzle reflects changes in the treatment of shelter. Using the Historical Housing Prices rental index and revised shelter weights, they construct an alternative CPI that implies faster shelter inflation and higher overall inflation over the twentieth century than the official series. Together, these papers show that shelter measurement is not only a housing-market issue; it is foundational for macroeconomic measurement.

A fifth theme is housing supply and the measurement of physical constraints. Katz and Willen, in Chapter 6's *The Effect of Land Supply on New Homes on Residential Investment and House Prices*, use parcel-level data from New England to document the scarcity of large buildable parcels and to show how fragmentation of buildable land can reduce construction productivity, dampen the supply response to demand, and increase house prices. Their chapter complements the broader literature on land-use regulation by emphasizing that physical land fragmentation can constrain supply even apart from formal regulation. The discussion surrounding this chapter highlights that the relationship between parcel size and supply is best understood as conditional rather than mechanical. Parcel fragmentation is likely most constraining where production

requires scale, where assembly frictions are large, or where local rules prevent redevelopment on the intensive margin. In other settings, small parcels can support substantial infill conversion to townhouses, multiplexes, or small multifamily buildings.

A final theme of this volume is humility about what any single measure can capture. Housing wealth measured through property and tax records may miss assets held through certain entities or omit debts. Rental ownership measures may fail to trace some disregarded entities or corporate subsidiaries. Satellite-based starts measures face limits from image resolution, cloud cover, and geographic variation in building practices. Historical rent indexes depend on the representativeness of newspaper listings and on assumptions about shelter weights. Flood-risk measures distinguish exposure from vulnerability but cannot capture every dimension of adaptive capacity. The chapters are careful about these limitations, and that care is part of their contribution. Good measurement does not eliminate uncertainty; it makes uncertainty visible and structured.

The volume also expands the set of housing outcomes that can be measured. Just one example is Binder, Risch, and Voorheis' research in Chapter 10 showing that the geography of opportunity looks different when mobility is measured using wealth and homeownership rather than income alone. Relative mobility in wealth-related outcomes exhibits more spatial variation and less clustering than income mobility, and many cities and suburbs display stronger intergenerational persistence in housing wealth than in income. This finding is important because housing is the largest asset for many families and because homeownership mediates the transmission of wealth across generations. A geography that appears relatively open when measured by earnings may look less open when measured by asset accumulation.

The same chapter also illustrates why housing should not be treated as an unambiguously stabilizing asset. Homeownership can transmit opportunity across generations, but it can also transmit shocks. Marginal homeowners who hold most of their wealth in a leveraged, illiquid, geographically concentrated asset may be especially vulnerable to local house-price declines. For their children, the consequences of a housing downturn may differ sharply from the consequences for children whose parents rented in the same market.

Finally, one of the many contributions of the volume is that many chapters combine methodological innovation with the production of reusable data or measurement frameworks. Binder, Risch, and Voorheis provide county-level mobility statistics across multiple concepts of economic resources. Bell, Calder-Wang, and Zhong make Geographic PageRank rankings available for visualization and download. Kestelman, Diamond and coauthors develop a scalable method for tracing rental ownership. Czaplicki, Shevlin and coauthors provide an operational proof of concept for combining satellite imagery with official construction statistics. These are not merely one-off empirical exercises. They are attempts to build measurement infrastructure that can support future research.

Housing measurement is entering a new era. Researchers can now link households to parcels, owners to firms, structures to satellite images, rents to historical listings, and migration flows to revealed-preference measures of place quality. These advances make it possible to ask questions that were previously out of reach: How does the geography of wealth mobility differ from the geography of income mobility? Who ultimately owns rental housing? How much does missing information alter hedonic price indexes? Are flood risks borne by disadvantaged households,

wealthy amenity seekers, or both? Do infill investments create measurable spillovers? Does fragmented land supply reduce construction productivity? Can official housing-start statistics be supplemented with remotely sensed data? At the same time, the volume shows that more data alone are not enough. The central measurement choices remain conceptual. Better data expand the feasible set, but theory and institutional knowledge determine what should be measured.

For housing economics research more broadly, this is an especially important moment. Housing affordability has become a major public concern. Shelter inflation has played a central role in recent macroeconomic debates. Climate risk is increasingly capitalized into property markets and insurance markets. Institutional ownership and rental-market concentration are under scrutiny. Local governments are experimenting with infill redevelopment, land assembly, and zoning reform. Researchers and policymakers need measures that are accurate, timely, geographically detailed, and conceptually clear. The chapters in this volume make substantial progress toward that goal.