

Global Research Unit

Working Paper #2021-029

Handbook of Real Estate and Macroeconomics:
An Introduction

Charles Leung, City University of Hong Kong

© 2021 by Leung. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Handbook of Real Estate and Macroeconomics: An Introduction

Charles Leung, City University of Hong Kong

This version: July 2021

Abstract

This paper provides some background for the book, Handbook of Real Estate and Macroeconomics. It gives an overview of different chapters and how various themes and ideas can be connected. Directions for future research are also discussed.

Keywords: housing, macroeconomics, real estate, urban and regional economics

JEL Classification: E00, G00, R00

The following story occurred during my visit to the Hoover Institution (2018~19). A seminar speaker began by "apologizing" that his talk may not be "very macro." A senior faculty at the Stanford University responded that there is *no boundary of macroeconomics*, implying there should not much worry about "not macro enough."

This book is a collection of papers relating to real estate and macroeconomics. Given the "definition" of macroeconomics offered by that Stanford economist, I can put any topic in this book without an apology. Still, I feel obligated to provide some background for the emergence of the macro-real estate literature. Therefore, this paper would facilitate the communication between the authors and readers of this book by mentioning some related contributions and not provide another survey on the macro-real estate literature. The chapters of this book provide outstanding reviews of different strands of the literature already. The objectives of this book are simple.

- (1) What should real estate economists know about macroeconomics?
- (2) What should macroeconomists know about real estate?
- (3) What general audience should know about the interactions between real estate and macroeconomics?

Although classical economists do not discuss housing, perhaps except David Ricardo relating trade policy to land prices (Leung, 2004), the recent decades witness a structural change. Literature on real estate (e.g., housing, commercial properties, land) and macroeconomics relate to each other (Baxter, 1996; Ben-Shafar et al., 2008; Edelstein and Kim, 2004; Greenwood and Hercowitz, 1991; Leung, 2004; Leung and Quigley, 2007; Mera and Renaud, 2000). The growth of that literature is further stimulated by the 2008 Global Financial Crisis (GFC) (Bardhan et al., 2012; Davis and Van Nieuwerburgh, 2014; Leung and Chen, 2017; Leung and Ng, 2019; Malpezzi, 2017; McMillen, 2011; Piazzesi and Schneider, 2016).

On the other hand, the change in the research frontier does not seem to be very visible in the teaching of economics. For instance, the standard introductory "macroeconomics" textbooks only loosely suggest that the fluctuation of house prices could lead to a wealth effect, affecting consumption and the GDP (Gross Domestic Products). It begs the question that, if housing wealth fluctuations would lead to a significant "wealth effect," should the

households be cautious as they allocate their wealth to housing? Yet standard introductory textbooks typically skip the decision process of how families make portfolio decisions, choosing between housing and other alternatives.

Much research efforts have been devoted to addressing this question. Part 1 of this book examines the real estate-related wealth effect. For instance, Ogawa (2021) employs both the aggregate and panel household data and exploits different statistical tools to help us understand the wealth effect in the context of Japan. The justifications are clear. A theoretical discussion of the wealth effect may sound too abstract for the general audience. Hence, putting the wealth effect in a particular context may help the readers understand the issue. In particular, Japan has experienced the so-called "bubble burst" in the early 1990s, where both the stock price and real estate prices (land and housing) experience significant downward adjustments. Arguably, Japan has not fully recovered from that "shock." Therefore, a case study of the wealth effect of Japanese real estate may be a good starting point.

Wealth is not an exclusive privilege of the private sector; governments can also acquire real estate-related wealth. For instance, Japan has adopted unconventional monetary policies, even before the U.S. and Euro areas (Dell'Ariccia et al., 2018; Fukuda, 2019; Westelius, 2021). In this book, Hattori and Yoshida (2021) examine the Bank of Japan's (BOJ) purchase of real estate investment trusts (REITs). Since REITs are relatively simple assets, some potential motives of holding stocks do not apply to REITs. Hattori and Yoshida study the intraday transactions and conclude that the evidence is consistent with the hypothesis that BOJ attempts to decrease the risk premiums.

The land is perhaps one of the most basic forms of wealth. Since the seminal work of Ricardo (1817), much has been written on the economics of land. More recently, researchers also notice the implications of land price fluctuations on the macroeconomy (Deng et al., 2021; Liu et al., 2013, 2016; Leung and Chen, 2006, among others). In this book, Prasad (2021) explains how the land market is related to macroeconomic variables. His chapter also provides evidence that some land reforms can promote urbanization.

Another essential issue bridging real estate and macroeconomics is housing affordability. Economists have studied housing affordability for decades, and now it becomes a global concern nowadays (Green and Malpezzi, 2003; Gong and Leung, 2021; Leung et al., 2020; Leung and Tang, 2021; Malpezzi, 2020; Quigley and Raphael, 2004; Yao, 2020; Yilmaz and Yesilirmak, 2020). Part 2 of this book examines the issue from different angles.

For instance, Tiwari and Shukla (2021) study housing affordability in India. India has the second-largest population globally, and the level of economic development significantly differs across regions. Hence, it is easy to imagine that housing affordability can be an issue in India. However, India's data is not always accessible, and her institutions are always well understood. Tiwari and Shukla present a clear picture of the situation and make a policy recommendation.

On the other hand, if housing units are being traded in the market, the high housing prices must reflect the demand for specific population segments. One possibility is that the residential residence is tied to the "right of education" (O'Sullivan, 2018). In many countries, local pre-college public education is often provided to "residents" only. Recent research has confirmed that human capital investment has long-term consequences, especially in the early years (Attanasio et al., 2020; Cunha and Heckman, 2007, 2008). Therefore, from a macroeconomic perspective, quality education is vital for economic performance (Hanushek and Woessmann, 2015, 2016; Hanushek et al., 2017). In this book, Hanushek and Yilmaz (2020) review the literature on the interaction between residential decisions and schooling choice. While their chapter focuses on the United States case, some lessons apply to other countries as well.

Other chapters of this book shed light on different aspects of the "affordability puzzle." For example, one explanation for unaffordable housing is that the housing prices deviate from the "economic fundamentals." Statistically, there are different approaches to verify this hypothesis. For instance, one can test whether there is a "bubble" in the house price. The asset price bubble is often cited as one reason for Japan's "lost decades" (Ito, 2003; Okina et al., 2001, Ueda, 2012). In this book, Girardin and Joyeux (2021) provide a comprehensive literature review and examine whether such a bubble exists in the Japanese data.

Perhaps, more fundamentally, what kind of "house price dynamics" is normal? And what is not? The macroeconomic approach often assumes a single housing market and focuses on the dynamics of national house prices (e.g., Davis and Heathcote, 2005; Favilukis et al., 2017; Leung, 2007, 2014). Macroeconomists distinguish a regular regime from a sunspot regime (Lubik and Schorfheide, 2003, 2004). The macroeconomic approach of housing would label whether the housing market is in a normal state or a bubble state (Chen, 2001, Phillips et al., 2011). It is also possible that there are more than one "normal state,"

with none of them being a bubbly state, and the housing market switches between them (Chang et al., 2011, 2012, 2013). Real Estate economists, on the other hand, pay attention to the cross-sectional heterogeneity. In this book, Lai and Van Order (2021) review the literature which employs the conventional panel data approach to study whether a bubble exists. They consider both the time series (i.e., the house price changes in different periods) and cross-sectional variations (i.e., the house price differences across other regions within the same time).

The traditional panel data method often assumes a constant variance. In practice, the world keeps changing. The recent pandemic illustrates this point. At the beginning of the outbreak, the threat of COVID-19 was under-estimated. Unfortunately, the number of causalities increases rapidly, and the world fell into panic. The implementation of vaccines brings hope to many, and the degree of uncertainty seems to ease. In this book, van Eyden et al. (2021) employ cutting-edge techniques and study the house price dynamics when the level of uncertainty changes over time. They find that the macroeconomic uncertainty will spill over to the housing market volatility in most states of America. Their results suggest another channel where the macroeconomy and the housing market are linked.

Yet another possibility is the housing market experiences a permanent change, often labeled as a "structural break" in the economics literature. A natural candidate to consider would be the 2008 Global Financial Crisis (GFC). Since the GFC involved the housing market and mortgage-backed securities, it quickly becomes a shared research interest among macroeconomists and real estate researchers. Many authors have studied the GFC (Gorton and Metrick, 2012; Lo, 2012). Part 3 of this book is devoted to this issue. Agarwal and Varshneya (2021) review the recent micro-evidence and shed light on the different explanations of the GFC.

The GFC may indeed mark a structural break in both the housing market and the macroeconomy. For instance, Green (1997) shows that residential investment is a "leading indicator" of the GDP in the United States. That provides another bridge between the housing market and the macroeconomy. In this book, Green (2021) finds that the relationship has vanished after the 2008 GFC. This result is consistent with Leung and Ng (2019), which examines the statistical relationships between housing market variables and macroeconomic variables in the United States. They find that the correlations are, in general, weakened after the GFC. In this book, Ng (2021) finds that such "structural change" occurs in other OECD

countries after the GFC. Also, in this book, Chang and Leung (2021) compare the statistical distribution of asset returns in the United States. They also find that the housing indices suggest that housing as an asset has become riskier after the GFC, while the stock market indices indicate that the stock market has become safer.

Part 4 of this book collects several essays on non-residential real estate, which should be the topic of a book, even books. The invited authors skillfully present some concise chapters to have a glimpse of the different aspects. As earlier chapters have explored the "disaggregate house price dynamics," one would naturally ask why other regions would have different house price dynamics. One potential explanation is that the underlying economic structure is different in the first place. It leads to the question of why people or firms would choose certain areas rather than others. In this book, Pinto and Sarte (2021) connect the regional economics and macroeconomics literature. They show the implications of the locational choices made by households and firms on the macroeconomy.

If regional economics matters, it is natural to ask whether or what the government can do. In this book, Kahn et al. (2021) explain a particular class of "regional economic policy," namely, the industrial parks established in China. They evaluate the possible misallocation of capital due to those policies and draw some lessons from those policy experiments.

The global aging issue may have significant economic implications (Acemoglu and Restrepo, 2017; Bloom et al., 2010; Cooley and Henriksen, 2018). The economic literature has studied the pension system for decades (Auerbach and Kotlikoff, 1987; Cooley and Soares, 1999; Feldstein and Liebman, 2002; Kotlikoff, 1992). Economists are also aware that commercial real estate plays a role in the economic growth and business cycle movements (Davis et al., 2020; Gort et al., 1999; Kan et al., 2004; Kwong and Leung, 2000). In this book, Riddiough (2021) shows how commercial real estate and its securitization could impact retirement financing.

World Health Organization (WHO) estimates that there are around 7 million people died of air pollution. The economics literature has also provided evidence that pollution diminishes economic performance (Graff Zivin and Neidell, 2013). In this book, Fu and Viard (2021) consider the effect of air pollution from a mayor's perspective and naturally connect the pollution issue to traffic congestion and other urban problems.

I want to stress that the topics explored in this book are by no means exhaustive. Moreover, several new developments are not covered (e.g., Kehoe et al., 2019; Kindermann

et al., 2021). Nonetheless, this book would facilitate more communication between macroeconomics and real estate economics.

I want to take this opportunity to thank all my teachers, coauthors, previous and current colleagues, especially Eric Hanushek, who have helped me for years, long before this project started. I also have too many to thank for those who have helped in the process. I will miss many names no matter how hard I try. First, I thank all the contributors of this book for their willingness to share their insights and wisdom. I also thank those who have read different chapters of this book at different stages, such as Nan-Kuang Chen, Julian Du, Yifan Gong, Vikas Kakkar, Fred Kwan, Jennifer Lai, David Leung, Lingxiao Li, Edward Tang, Chi Man Yip, Yuxi Yao, and others who prefer to remain anonymous. Some contributors also read other chapters. This project began when I was visiting the Hoover Institution, whose hospitality is gratefully acknowledged. I am also grateful to Mr. Alan Sturmer and colleagues at Edward Elgar for their patience and help throughout the whole process. And I would like to thank those who have prayed for me for years. Perhaps this book is a part of the answer.

Reference

Acemoglu, D. and P. Restrepo (2017). “Secular Stagnation? The Effect of Aging on Economic Growth in the Age of Automation,” *American Economic Review*, 107(5), 174-179.

Agarwal, S. and S. Varshneya (2021). Financial Crisis and the US Mortgage Markets – A Review, chapter in this book.

Attanasio, O., C. Meghir and E. Nix (2020). “Human Capital Development and Parental Investment in India,” *Review of Economic Studies*, 87, 2511–2541.

Auerbach, A. and L. J. Kotlikoff (1987). *Dynamic Fiscal Policy*, Cambridge: Cambridge University Press.

Bardhan, A., R. Edelman and C. Kroll (Ed.) (2012). *Global Housing Markets: Crises, Policies, and Institutions*. New York: John Wiley.

Baxter, M. (1996). “Are consumer durables important for business cycles.” *Review of Economics and Statistics*, 78(1), 147–155.

Ben-Shafar, D., C. Leung and S. E. Ong (Ed.) (2008). *Mortgage Market Worldwide*. Oxford: Blackwell.

Bhattacharya, P. (2021). Land and Macroeconomics, chapter in this book.

Bloom, D. E., D. Canning and G. Fink (2010). “Implications of population ageing for economic growth,” *Oxford Review of Economic Policy*, 26(4), 583–612.

Chang, K. L., N. K. Chen and C. K. Y. Leung (2011). “Monetary policy, term structure and real estate return: Comparing REIT, housing and stock,” *Journal of Real Estate Finance and Economics*, 43, 221-257.

Chang, K. L., N. K. Chen and C. K. Y. Leung (2012). “The dynamics of housing returns in Singapore: How important are the international transmission mechanisms?” *Regional Science and Urban Economics*, 42, 516-530.

Chang, K. L., N. K. Chen and C. K. Y. Leung (2013). “In the shadow of the United States: The international transmission effect of asset returns,” *Pacific Economic Review*, 18(1), 1-40.

Chang, K. L. and C. K. Y. Leung (2021). How did the asset markets change after the Global Financial Crisis? chapter in this book.

Chang, T. Y., J. G. Zivin, T. Gross and M. Neidell (2019). “The Effect of Pollution on Worker Productivity: Evidence from Call Center Workers in China,” *American Economic Journal: Applied Economics*, 11(1), 151-172.

Chen, N. K. (2001). “Asset price fluctuations in Taiwan: evidence from stock and real estate prices 1973 to 1992,” *Journal of Asian Economics*, 12(2), 215-232.

Cooley, T. F. and E. Henriksen (2018). "The demographic deficit," *Journal of Monetary Economics*, 93(C), 45-62.

Cooley, T. F. and J. Soares (1999). "A Positive Theory of Social Security Based on Reputation," *Journal of Political Economy*, 107(1), 135-160.

Cunha, F. and J. Heckman (2007). The technology of skill formation. *American Economic Review*, 97(2), 31-47.

Cunha, F. and J. Heckman (2008). Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation. *Journal of Human Resources*, 43(4), 738-782.

Davis, M. and J. Heathcote (2005). "Housing And The Business Cycle," *International Economic Review*, 46(3), 751-784.

Davis, M. and S. Van Nieuwerburgh (2014). "Housing, Finance and The Macroeconomy" (Working paper No. 20287). Retrieved from National Bureau of Economic Research website: <http://www.nber.org/papers/w20287>

Davis, J. S., K. X. D. Huang and A. Sapci (2020). "Imperfect Substitutability in Real Estate Markets and the Effect of Housing Demand on the macroeconomy," Globalization Institute Working Papers 401, Federal Reserve Bank of Dallas.

Dell'Ariccia, G., P. Rabanal, and D. Sandri (2018). "Unconventional Monetary Policies in the Euro Area, Japan, and the United Kingdom," *Journal of Economic Perspectives*, 32(4), 147-172.

Deng, Y., Y. Tang, P. Wang and J. Wu (2021). "Spatial Misallocation in Housing and Land Markets: Evidence from China." Mimeo.

Edelstein, R. and K. H. Kim (2004). "Special Issue on Housing and The Macroeconomy: The Nexus." *Journal of Housing Economics* 13 (4), 247-248.

Favilukis, J., S. C. Ludvigson and S. Van Nieuwerburgh (2017). "The Macroeconomic Effects of Housing Wealth, Housing Finance, and Limited Risk Sharing in General Equilibrium," *Journal of Political Economy*, 125(1), 140-223.

Feldstein, M. and J. B. Liebman (2002). Social security, in A. J. Auerbach and M. Feldstein (eds), *Handbook of Public Economics*, Volume 4, New York: Elsevier, p. 2245-2324

Fu, S. and V. B. Viard (2021). A Mayor's Perspective on Tackling Air Pollution, chapter in this book.

Fukuda, S. (2019). "The Effects of Japan's Unconventional Monetary Policy on Asian Stock Markets," *Public Policy Review (Ministry of Finance, Japan)*, 15(1), 1-19.

Girardin, E. and R. Joyeux (2021). Testing for Real Estate Bubbles, chapter in this book.

Gong, Y. and C. K. Y. Leung (2021). “When education policy and housing policy interact: can they correct for the externalities?” *Journal of Housing Economics*, forthcoming.

Gort, M., J. Greenwood and P. Rupert (1999). "Measuring the Rate of Technological Progress in Structures," *Review of Economic Dynamics*, 2(1), 207-230.

Gorton, G. and A. Metrick (2012). “Getting up to speed on the financial crisis: A one-weekend-reader's Guide,” *Journal of Economic Literature*, 50(1), 128-150.

Graff Zivin, J. and M. Neidell (2013). "Environment, Health, and Human Capital," *Journal of Economic Literature*, 51(3), 689-730.

Green, R. (1997). “Follow the leader: How changes in residential and non-residential investment predict changes in GDP,” *Real Estate Economics*, 25(2), 253-270.

Green, R. (2021). Is housing still the business cycle? Perhaps not, chapter in this book.

Green, R. and S. Malpezzi (2003). *A Primer on U.S. Housing Markets and Housing Policy*. Washington, D.C.: Urban Institute.

Greenwood, J. and Z. Hercowitz (1991). “The allocation of capital and time over the business cycle.” *Journal of Political Economy*, 99(6), 1188–1214.

Hanushek, E., J. Ruhose and L. Woessmann (2017). "Knowledge Capital and Aggregate Income Differences: Development Accounting for US States," *American Economic Journal: Macroeconomics*, 9(4), 184-224.

Hanushek, E. and L. Woessmann (2015). *The Knowledge Capital of Nations: Education and the Economics of Growth*. Cambridge, MA: MIT Press.

Hanushek, E. and L. Woessmann (2016). “Knowledge Capital, Growth, and the East Asian Miracle,” *Science*, 351(6271), 344-345.

Hanushek, E. and K. Yilmaz (2021). Residential Location and Education in the United States, chapter in this book.

Hattori, T. and J. Yoshida (2021). The Bank of Japan as a Real Estate Tycoon: Large-Scale REIT Purchases, chapter in this book.

Ito, T. (2003). “Retrospective on the Bubble Period and its Relationship to Developments in the 1990s,” *World Economy*, 26(3), 283-300.

Kahn, M. E., J. Wu, W. Sun and S. Zheng (2021). Industrial parks and urban growth: A political economy story in China, chapter in this book.

Kan, K., S. K. S. Kwong and C. K. Y. Leung (2004). “The dynamics and volatility of commercial and residential property prices: Theory and evidence.” *Journal of Regional Science*, 44(1), 95–123.

Kehoe, P. J., V. Midrigan and E. Pastorino (2019). “Debt Constraints and Employment,” *Journal of Political Economy*, 127(4), 1926-1991.

Kindermann, F., J. Le Blanc, M. Piazzesi, and M. Schneider (2021). “Learning about Housing Cost: Survey Evidence from the German House Price Boom,” NBER Working Paper No. 28895.

Kotlikoff, L. J. (1992). *Generational Accounting: Knowing Who Pays, and When, for What We Spend*, New York: Free Press.

Kwong, S. K. S. and C. K. Y. Leung (2000). “Price volatility of commercial and residential property.” *Journal of Real Estate Finance and Economics*, 20(1), 25–36.

Lai, R. N. and R. Van Order (2021). Disaggregating House Price Dynamics, chapter in this book.

Leung, C. (2004). “Macroeconomics and Housing: A Review of The Literature.” *Journal of Housing Economics* 13(4): 249-267.

Leung, C. K. Y. (2007). “Equilibrium correlations of asset price and return,” *Journal of Real Estate Finance and Economics*, 34, 233-256.

Leung, C. K. Y. (2014). “Error Correction Dynamics of House Price: an Equilibrium Benchmark,” *Journal of Housing Economics*, 25, 75-95.

Leung, C. K. Y. and N. K. Chen (2006). “Intrinsic cycles of land price: a simple model.” *Journal of Real Estate Research*, 28(3), 293-320.

Leung, C. K. Y. and N. K. Chen (2017). “A Special Issue on Housing, Credit Markets, and The Marcoeconomy: An Introduction.” *Taiwan Economic Review* 45 (1): 1-3.

Leung, C. K. Y. and C. Y. J. Ng (2019). “Macroeconomic Aspects of Housing,” In Hamilton, J. H., Dixit, A., Edwards, S., Judd, K. (eds) *Oxford Research Encyclopedia of Economics and Finance*, Oxford University Press. Available at

<https://doi.org/10.1093/acrefore/9780190625979.013.294>

Leung, C. K. Y., C. Y. J. Ng and E. C. H. Tang (2020). “Why is the Hong Kong housing market unaffordable? Some Stylized facts and estimations,” *Quarterly Bulletin*, Central Bank of the Republic of China (Taiwan), 42 (1), 5-58.

Leung, C. K. Y. and J. Quigley (2007). “Special Issue on Macroeconomics, Regulation, and Housing: Introduction.” *Journal of Housing Economics* 16: 99-101.

Leung, C. K. Y. and E. C. H. Tang (2021). “The Dynamics of the House Price-to-Income Ratio: Theory and Evidence,” *Contemporary Economic Policy*, forthcoming.

Leung, C. K. Y. and C. Y. Tse (2017). “Flipping in the housing market,” *Journal of Economic Dynamics and Control*, 76, 232-263.

Liu, Z., J. Miao and T. Zha (2016). “Land prices and unemployment,” *Journal of Monetary Economics*, 80(C), 86-105.

- Liu, Z., P. Wang and T. Zha (2013). “Land-Price Dynamics and Macroeconomic Fluctuations,” *Econometrica*, 81(3), 1147-1184.
- Lo, A. W. (2012). “Reading about the Financial Crisis: A Twenty-One-Book Review,” *Journal of Economic Literature*, 50(1), 151-178.
- Lubik, T. A. and F. Schorfheide (2003). “Computing sunspot equilibria in linear rational expectations models,” *Journal of Economic Dynamics and Control*, 28(2), 273-285.
- Lubik, T. A. and F. Schorfheide (2004). “Testing for Indeterminacy: An Application to U.S. Monetary Policy,” *American Economic Review*, 94(1), 190-217.
- Malpezzi, S. (2017). “Residential Real Estate in The U.S. Financial Crisis, The Great Recession, and Their Aftermath.” *Taiwan Economic Review* 45(1), 5-56.
- Malpezzi, S. (2020). “Housing “Affordability” and Responses During Times of Stress: A Brief Global Review,” paper presented at the City University of Hong Kong Housing Affordability Workshop.
- McMillen, D. (2011). “Special Issue: The Effect of The Housing Crisis on State and Local Government Finances.” *Regional Science and Urban Economics* 41(4), 305.
- Mera, K. and Renaud, B. (2000). *Asia's Financial Crisis and The Role of Real Estate*, New York: M. E. Sharpe.
- Ng, J. (2021). International Macroeconomic Aspect of Housing, chapter in this book.
- O’Sullivan, A. (2018). *Urban Economics*, New York: McGraw Hill, 9th ed.
- Ogawa, K. (2021). Real Estate Market and Consumption: Macro and Micro Evidence of Japan, chapter in this book.
- Okina, K., M. Shirakawa and S. Shiratsuka (2001). “The Asset Price Bubble and Monetary Policy: Japan's Experience in the Late 1980s and the Lessons: Background Paper,” *Monetary and Economic Studies*, Bank of Japan, 19(S1), 395-450.
- Phillips, P. C. B., Y. Wu and J. Yu (2011). “Explosive Behavior in the 1990s Nasdaq: When Did Exuberance Escalate Asset Values?,” *International Economic Review*, 52(1), 201-226.
- Piazzesi, M. and M. Schneider (2016). Housing and Macroeconomics (Working paper No. 22354). Retrieved from National Bureau of Economic Research website: <http://www.nber.org/papers/w22354>
- Quigley, J. M. and Raphael, S. (2004). “Is housing unaffordable? Why isn’t it more affordable?” *Journal of Economic Perspectives*, 18, 191-214.
- Ricardo, D. (1817). *On the Principles of Political Economy and Taxation*, reprinted by Batoche Books in 2001.
- Riddiough, T. (2021). Pension Funds and Private Equity Real Estate: History, Performance, Pathologies, Risks, chapter in this book.

Tiwari, P. and J. Shukla (2021). Affordable housing conundrum in India, chapter in this book.

Ueda, K. 2012. “Deleveraging and Monetary Policy: Japan since the 1990s and the United States since 2007,” *Journal of Economic Perspectives*, 26(3), 177-202.

van Eyden, R., R. Gupta, C. André and X. Sheng (2021). The Effect of Macroeconomic Uncertainty on Housing Returns and Volatility: Evidence from US State-Level Data, chapter in this book.

Westelius, N. (2021). Twenty Years of Unconventional Monetary Policies: Lessons and Way Forward for the Bank of Japan, IMF, accessed at <https://www.imf.org/en/Publications/WP/Issues/2020/11/08/Twenty-Years-of-Unconventional-Monetary-Policies-Lessons-and-Way-Forward-for-the-Bank-of-49765>

World Health Organization (2020). “Air Pollution,” https://www.who.int/health-topics/air-pollution#tab=tab_1

Yao, Y. (2020). “Accounting for the decline in homeownership among the young,” paper presented at the City University of Hong Kong Housing Affordability Workshop.

Yılmaz, K. and M. Yesilirmak (2020). “Access to transportation, residential segregation, and economic opportunity,” paper presented at the City University of Hong Kong Housing Affordability Workshop.