

Comparison of the Costs of Manufactured and Site-Built Housing

JULY 2023 | CHRISTOPHER HERBERT, CHADWICK REED, JAMES SHEN



JOINT CENTER FOR
HOUSING STUDIES
OF HARVARD UNIVERSITY

**Joint Center for Housing Studies
Harvard University**

Comparison of the Costs of Manufactured and Site-Built Housing

Christopher Herbert, Chadwick Reed, and James Shen

July 2023

©2023 President and Fellows of Harvard College.

Support for this research was provided by The Pew Charitable Trust. Any opinions expressed in this paper are those of the author(s) and not those of the Joint Center for Housing Studies of Harvard University or of any of the persons or organizations providing support to the Joint Center for Housing Studies.

For more information on the Joint Center for Housing Studies, visit our website at www.jchs.harvard.edu.

Abstract

Manufactured housing holds promise as an affordable form of housing that could expand homeownership opportunities for low- and moderate-income households at a time when house value growth is outpacing income gains in markets across the country (JCHS 2022). Simple comparisons of the cost of manufactured housing to site-built housing find that manufactured housing offers significant cost advantages, derived in large part from greater efficiencies in purchasing, production, and installation. However, recent comparisons are relatively simplistic, comparing the average cost of homes built without considering differences in size, amenities, or the costs of transporting and siting manufactured homes. The goal of this study is to document the cost of comparable site-built and manufactured homes such that these differences are accounted for. To achieve this, we analyze three common types of manufactured homes: single-section, double-section, and CrossMod™. While single- and double-section (known colloquially as “single-wide” or “double-wide”) homes have long been staples of the manufactured housing industry, CrossMod™ is a relatively new type of home developed by the industry to make manufactured homes more comparable to site-built homes in their physical appearance, thus broadening consumer appeal, appraised value, and financing opportunities, and reducing community opposition to the siting of these homes. The results of our analysis find that all three types of manufactured homes continue to offer significant cost advantages over site-built housing. These findings suggest that efforts to expand access to manufactured homes hold the potential to increase homeownership opportunities for low- and moderate-income households.

Acknowledgements

This report was funded by a grant from The Pew Charitable Trusts. The Center and the report authors gratefully acknowledge the thoughtful review and feedback provided by Rachel Siegel, Alex Horowitz, and their colleagues at The Pew Charitable Trusts. We are also very grateful to Chris Nicely, President of ManufacturedHomes.com, who was instrumental in the development of this study by providing access and substantial insight into the survey data on the cost of producing manufactured housing conducted by Next Step Network. The authors also wish to thank Jim Gray, Tom Hodges, Brian Potter, Grant Beck and Stacey Epperson, all of whom reviewed an earlier draft of this report.

Introduction

The Continued Appeal and Value of Homeownership

Over the last two decades, the owner-occupied housing market has experienced dramatic ups and downs. Home prices soared through most of the first decade of the century, then crashed historically, and have since experienced a slow recovery punctuated by surging prices during the recent pandemic. Despite these gyrations, one thing that has remained fairly constant is the continued desire of a large majority of US residents to own a home. Examining a Fannie Mae survey from 2010-11, Drew and Herbert (2013) found that 79 percent of all renters expressed a desire to own a home someday. A decade later, a similar Fannie Mae survey from the end of 2021 found that this share is actually slightly higher now, at 83 percent.¹ This desire to own is particularly strong among renters of color and young people, with 89 percent of Black renters, 81 percent of Hispanic renters, 93 percent of Asian renters, 96 percent of those age 18-34, and 95 percent of those age 35-44 all expressing a preference for homeownership.

The strong desire to own a home reflects in part the perceived financial benefits of owning. According to another Fannie Mae survey from late 2020, a large majority of the general public (85 percent) believe that owning a home is associated with “being better off financially overall,” including most renters (69 percent), Black respondents (87 percent), Hispanic respondents (81 percent), and young adults age 35-44 (88 percent).²

These views are supported by the fact that homeownership is an important source of wealth for most households, particularly people of color and lower-income households. Indeed, the latest Survey of Consumer Finances from 2019 found that the median wealth of homeowners was \$254,900, compared to \$6,300 among renters (JCHS 2022). Housing wealth was particularly important for Black and Hispanic homeowners and those with incomes in the lowest quartile, among whom housing wealth is two-and-a-half to more than five times as large as non-housing wealth (Herbert 2021). Another significant benefit of homeownership is the potential for more stable housing costs over time as payments on a fixed-rate mortgage remain constant over time (Loftin 2021; Goodman and Mayer 2018).

¹ Fannie Mae National Housing Survey Q4 2021, <https://www.fanniemae.com/media/document/xlsx/q4-2021-nhs-data-summary.xlsx>.

² Fannie Mae National Housing Survey Q4 2020, “Consumers Continue to See Homes as a Safe, High Potential Investment,” <https://www.fanniemae.com/media/38891/display>.

The preference for homeownership also reflects a variety of non-financial benefits that are associated with owning a home. In the same 2020 Fannie Mae Survey, 80 percent of renters also indicated that owning a home increased control over one’s living space and led to a heightened sense of privacy and security. Once again, even higher shares of Black and Hispanic households and younger households shared these views.

Despite these favorable views toward homeownership, the share of households headed by people of color and young adults who own a home fell sharply in the years following the Great Recession. And, despite recent improvements, homeownership rates among these groups have yet to regain the ground lost. As of 2022, the Black homeownership rate stood at 45.0 percent, 4.1 percentage points lower than the previous peak in 2004.³ Hispanic homeownership rates have fared better, but still remain more than a percentage point below their 2007 peak of 49.7. Finally, among young adults, the homeownership rate has fallen even more sharply, with the rate in 2022 for those under age 35 down by 4.1 percentage points since peaking in 2004, and down by 7.1 percentage points for those age 35-44 since their peak in 2004.

Lower homeownership rates among young adults are driven by a number of factors (Bleemer et al. 2014; Xu et al. 2015; Choi et al. 2018). One set of factors relates to demographic trends, including delayed marriage and child-rearing and increased shares of people of color among younger adults who face greater challenges in attaining homeownership. A significant role has also been played by market forces, including tighter mortgage credit, increased levels of student debt, higher rent burdens, and a lack of supply of affordable homes.

The high cost of homes relative to incomes has recently become an even more significant barrier in the wake of sharp price increases in markets across the country. As reported in “The State of the Nation’s Housing 2022,” the ratio of median home price to income reached a record 5.3 in 2021, well above the previous record of 4.9 which was set at the peak of the housing boom in 2005 (JCHS 2022). During the 1990s, the ratio for the nation was nearly constant at 3.1, with the vast majority of the country’s metropolitan areas maintaining ratios under four. By 2021, the share of markets with a price-to-income ratio under four had fallen to just 45 percent, while 30 percent had ratios of five or higher. Such high ratios make it exceedingly difficult for renters to meet mortgage underwriting criteria – both the income needed to cover monthly housing costs and the savings needed for down payment and closing costs.

³ US Census Bureau, Housing Vacancy Survey, Historical Tables, <https://www.census.gov/housing/hvs/data/histtabs.html>.

These elevated housing prices reflect both higher land values and increasing costs for constructing homes themselves. According to estimates by the Federal Housing Finance Agency, between 2012 and 2019, the cost of land increased by 67 percent while the price of a standard home increased by 45 percent (Davis et al. 2021). The higher cost of constructing homes reflects increases in both construction costs and the size and quality of new homes. Consider that in 2000, 36 percent of new homes built were under 1,800 square feet and 46 percent had two or fewer bathrooms. But as of 2021, only 24 percent of homes were under 1,800 square feet and 38 percent had two or fewer bathrooms. Meanwhile the share of homes over 3,000 square feet increased by five percentage points and the share with three or more bathrooms increased by 13 percentage points.⁴

Given the strong preference for homeownership and the potential socioeconomic benefits it brings, there is a clear need for efforts to bring down the cost of new entry-level housing supply. In this regard, manufactured housing—that is, factory-built homes that comply with building codes established by the US Department of Housing and Urban Development—is often cited as holding promise (Kaul and Pang 2022). And, studies show, these claims – that manufactured housing could represent a viable alternative to site-built homes for a significant contingent of low-to-moderate income homebuyers – are not without evidence. In an analysis of the homeownership boom of the 1990s, Belsky and Duda (2002) found that 28 percent of low-income homebuyers in 1997 bought a manufactured home, as did 24 percent of Black homebuyers.

Manufactured Housing as an Affordable Homeownership Option

Given the potentially strong demand for homeownership and the limited supply of new conventionally built homes that are affordable for low- and moderate-income households, manufactured housing has the potential to expand opportunities for affordable homeownership (Goodman et al. 2018; Kaul and Pang 2022). The cost advantage of manufactured homes is most readily evident in a simple comparison between the cost of a new conventional home and the cost of a manufactured home. The Census Bureau provides such a comparison as part of its Manufactured Housing Survey.⁵ In 2021, the latest year for which information is available, the average price of a manufactured home was \$108,100, compared to \$365,900 for a site-built home (excluding the estimated cost of land). Part of the difference in cost comes from the larger size of site-built homes, but on a per-square-foot basis, manufactured homes are

⁴ US Census Bureau, Characteristics of New Housing, <https://www.census.gov/construction/chars/current.html>.

⁵ US Census Bureau, Manufactured Housing Survey, <https://www.census.gov/data/tables/time-series/econ/mhs/annual-data.html>.

still found to be much lower-cost, averaging \$72 per-square-foot, or just over half the site-built home average of \$144.

While per-square-foot comparisons do account for the size of the home, there are still other factors that may contribute to cost differences between manufactured and site-built homes. Among these are the costs associated with transporting and siting the manufactured home. In addition, site-built homes typically include several features which are not found in the average manufactured home. Exceptionally, the CrossMod™ type of manufactured home does incorporate many of these features.⁶ However, these additional elements will add to the cost of these manufactured homes, potentially eroding some of the cost advantage over simpler and more standardized forms of manufactured housing.

The goal of this study is to provide a careful, detailed comparison of the cost of producing and siting manufactured homes of various types with the cost of comparable site-built homes. The purpose is to document the extent to which manufactured homes hold the potential to provide more affordable homeownership opportunities for low- and moderate-income households. Previous studies have provided this type of cost comparison, most notably a 1998 study conducted by the NAHB Research Council for the US Department of Housing and Urban Development (NAHB 1998), but this review is now quite dated. It also does not include the new CrossMod™ type of manufactured housing, which may have greater potential for adoption but will also cost more than a traditional manufactured home.

The following section provides a brief overview of manufactured housing, including the origins of the industry, recent trends in production, and the principal typologies of these homes. This section also reviews what is known about the potential for these homes to offer investment returns similar to those of site-built homes and the conditions necessary to realize these returns. The third section then reviews what is known about the source of a cost advantage in production of manufactured homes and examines previous studies that have assessed these cost advantages. We then describe the data and methodology used in this study to compare the cost of manufactured and site-built homes, followed by the presentation of the findings of this analysis. Finally, the report concludes with a brief discussion of these findings and their implications for policy.

⁶ For a description of the CrossMod™ home, see <https://www.claytonhomes.com/studio/crossmod-questions-and-answers/> and <https://www.manufacturedhousing.org/new-class-of-homes/>.

Overview of Manufactured Housing

The Origins of the Manufactured Home Industry

Today's manufactured homes evolved from what were originally known as "travel trailers." Initially conceived in the 1920s, early travel trailers were designed to facilitate motor camping, the popularity of which was spurred by America's growing nationwide network of roadways and the inception of the National Park Service (Young 2017). However, during the Great Depression, these trailers were increasingly used as housing for the poor. Trailers offered rent- and bill-free living, but also offered the ability to migrate to find work, giving them a significant advantage over stationary housing options. Across the nation, trailer camps popped up as transitory residents consolidated to form semi-permanent communities (Sullivan 2018).

During World War II, the US government used trailer homes to house hundreds of thousands of workers in defense production areas. As millions of American servicemembers returned home following the war's conclusion, these homes helped meet the exploding demand for housing (Sullivan 2018). Competition in the market engendered product innovations, and with the shift to permanent use came the realization that the average home, unlikely to be transported with regularity, need not adhere to the eight-foot width standard of the recreational travel trailer.

Though mobile home makers delivered in a time of need, the rush to production meant that shortcuts were taken in design and testing. As a result, houses were constructed with toxic materials, insufficient thermal insulation, and failure-prone plumbing and ductwork. While trailers boasted a low upfront cost, the accumulated expenses associated with maintaining and repairing shoddily made homes inevitably canceled out any initial savings (Baird 2017). Even worse, the rate of fire-related fatalities in mobile homes was found to be roughly three times that of site-built homes.

In 1974, Congress passed the National Mobile Home Construction and Safety Standards Act, formally charging the US Department of Housing and Urban Development (HUD) with the regulation of mobile homes. Two years later, HUD established the Manufactured Home Construction and Safety Standards, commonly referred to as the "HUD Code" (Wallis 1997). The act legitimized the use of mobile homes as permanent housing by establishing baseline requirements for their design and construction, formally categorizing those built in accordance with the HUD Code as "manufactured" (George and Barr 2002, 4).

Since the HUD Code was the United States' first—and still, only—federally controlled building code, its ratification was a significant milestone for the homebuilding industry, and its effects were far-

reaching. HUD-Code-adherent manufactured homes were not only safer than their mobile counterparts—fire fatalities in post-1976 manufactured homes were reduced to approximately the same rate as that of site-built homes—they were also more durable and more energy-efficient than their predecessors (Hession 1984).

Naturally, the new regulations translated to increases in construction costs. HUD estimated that its new code would add 3 percent of the going cost for the simplest structure (Congressional Research Service 1976, 3). However, because the HUD Code is performance-based rather than prescriptive—stipulating functional standards for the completed building rather than technical standards for individual components, as is typical in conventional homebuilding codes—builders could use cost-effective alternative materials and methodologies (Apgar et al. 2002). Furthermore, the HUD Code preempts state and local building codes, mitigating inspection delays and enabling factories to concurrently deliver homes to customers in any number of locales with no loss in efficiency.

A widely held belief regarding manufactured homes is that their lower prices are a byproduct of inferior construction standards as compared to site-built homes. Studies by housing scholars at both the University of Michigan and Harvard University have demonstrated that quality differences between local site-built codes and the HUD Code are minimal, as are the differences in average usable lifespan between the two housing types (Genz 2001; Vermeer and Louie 1997). Boehm and Schlottmann (2008) also find that the same factors determine the quality of both manufactured and site-built homes and that there is no difference in the rate of depreciation of both types of structures over time. Historically the HUD Code was not very strict about energy efficiency, resulting in manufactured homes using much more energy per-square-foot than site-built single-family homes.⁷ However, recent regulations have updated the energy efficiency standards for manufactured homes to be more stringent and consistent with those of site-built homes.⁸

Trends in Manufactured Home Production

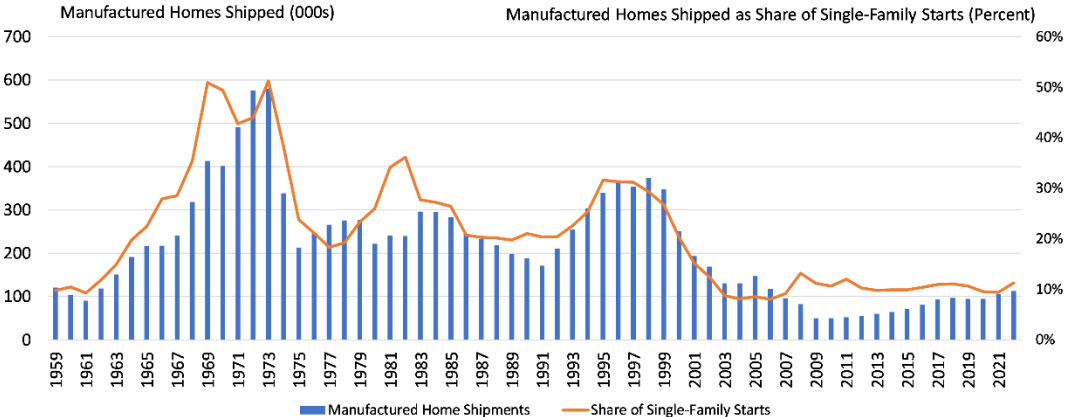
Leading up to the 1974 passage of the National Mobile Home Construction and Safety Standards Act, the volume of mobile homes produced grew rapidly. Between 1960 and 1972, annual shipments increased by a factor of six, and by 1973 reached 580,000, roughly half the volume of the nation's single-

⁷ The Residential Energy Consumption Survey for 2015 found that the average manufactured home consumed 50.0 BTUs per square foot of space, compared to 37.1 BTUs for detached single-family homes. Accessed on May 16, 2023 at <https://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce1.1.pdf>.

⁸ See “Energy Conservation Program: Energy Conservation Standards for Manufactured Housing,” <https://www.federalregister.gov/documents/2022/05/31/2022-10926/energy-conservation-program-energy-conservation-standards-for-manufactured-housing>.

family home starts (Figure 1). However, shipments stalled during the economic recession of the mid-1970s, and production volumes stagnated around 250,000 through the 1980s. Production grew rapidly in the early 1990s, but never recovered to pre-HUD Code levels, peaking in 1998 at 373,000 homes shipped.

Figure 1: Manufactured Home Shipments



Source: US Census Bureau, *Manufactured Home Survey and Survey of Construction*

The 1990s manufactured housing boom was largely fueled by a decline in credit standards. Between 1993 and 1998, a sharp surge emerged in lenders interested in financing new manufactured homes who resorted to waiving documentation requirements and, in some instances, even falsifying credit applications, thus qualifying less creditworthy borrowers as a means of expanding the market for lending institutions (Apgar et al. 2002; CFPB 2014).

As a result of these practices, defaults skyrocketed, presaging the subprime crisis in the broader housing market that followed a few years later (CFPB 2014). Between 1999 and 2002, repossessed home inventory grew by more than fourfold, with single-year repossessions reaching higher than 75,000. By 2007, default rates for loan vintages originated between 1995 and 2002 ranged between 30 and 54 percent. Reacting to this loss, at least eight major lending institutions withdrew from the manufactured housing industry entirely in 2002. In the same year, the industry’s leading lender, Conseco, Inc., declared bankruptcy. The remaining lenders and others in the industry took action to stem further losses, greatly tightening credit standards. With the market now flooded with used units from repossessions and credit

for new homes harder to come by, the industry sustained significant losses as annual units shipped dropped to 49,700 by 2009, just 13 percent of the 1998 peak. The number of home manufacturers also fell sharply, from 88 companies to fewer than half that many in 2014.

The manufactured housing industry has recovered slowly but steadily since 2009, finally shipping more than 100,000 homes in 2021 and reaching a post-recession high of 112,000 in 2022. Still, this level is well below the typical volume of production that prevailed prior to the downturn of the early 2000s. And given the need for increased supply of affordable entry-level homes, this level of production is well below potential demand for these homes.

A commentary on the current state of the market by researchers at the Urban Institute cited three factors that contribute to these low levels of production: restrictive zoning that limits the ability to place these homes in many communities, a lack of affordable financing related to the challenges of titling these homes as real estate, and lower appreciation rates of homes in at least some cases (Goodman et al. 2018).⁹

Types of Manufactured Homes

While the HUD Code does not stipulate size requirements for manufactured homes, historically, the vast majority of manufactured homes have fallen into one of two categories—single-section and multi-section (double- or triple-section). In recent years, multi-section homes have accounted for slightly more than half of all homes shipped. The dimensions of the sections are generally determined by state-level transportation requirements. According to Clayton Homes, the nation’s largest builder of manufactured homes, the dimensions of these categories are as follows:¹⁰

- Single-section: 14’ to 18’ wide and 56’ to 80’ long, with total area ranging from 784 sq. ft. to 1,440 sq. ft.;
- Double-section: 24’ to 32’ wide and 56’ to 76’ long with area ranging from 1,344 sq. ft. to 2,432 sq. ft.; and
- Triple-section: 36’ to 45’ wide and 56’ to 66’ long with area ranging from 2,016 sq. ft. to 2,970 sq. ft.

More recently, the manufactured housing industry has promoted CrossMod™ as a new type of manufactured home which features design elements and specifications intended to more closely

⁹ A forthcoming report from the Joint Center for Housing Studies will review what is known about the barriers to greater adoption of manufactured housing in more detail, while we provide more information below on evidence related to the potential of manufactured homes to appreciate in value.

¹⁰ See <https://www.claytonhomes.com/studio/how-big-can-manufactured-and-modular-homes-get/>.

resemble those of a site-built home.¹¹ These features include a steeper roof pitch, attached porches and garages, and a permanent foundation. CrossMod™ has been marketed as an alternative to single- or multi-section manufactured homes, but it does not denote a specific size or dimension range. However, currently, only multi-section homes are eligible for CrossMod™-specific lending programs. Figure 2 illustrates the features that distinguish CrossMod™ from single- and double-section manufactured homes.

The CrossMod™ category is designed to expand the consumer appeal of manufactured housing. In addition to the aesthetic differences between CrossMod™ and conventional manufactured homes, the category also offers expanded access to mortgage financing via special lending programs offered by both Fannie Mae and Freddie Mac that require the use of site-built homes as comparables for appraisal purposes. Historically, access to conventional mortgages has been a key barrier to more widespread adoption of manufactured housing since traditional manufactured homes are frequently financed using chattel or personal property loans which are characterized by higher interest rates and shorter repayment terms. Figure 3 summarizes key elements of manufactured homes that Fannie Mae requires in order to be eligible for their Manufactured Home Advantage Lending program. CrossMod™ homes are also intended to help overcome zoning restrictions on the siting of manufactured homes by reducing local opposition and stigma attached to this form of housing.

¹¹ The term CrossMod™ is trademarked by the Manufactured Housing Institute, a trade association which represents the US manufactured housing industry. See <https://www.manufacturedhousing.org/new-class-of-homes/>.

Figure 2: Manufactured Home Types, Illustrations and Typical Features

Single Section

- 3/12 roof pitch
- Vinyl skirting
- Vinyl siding
- 36" typical height from exterior grade to entry elevation



Double Section

- 3/12 roof pitch
- Vinyl skirting
- Vinyl siding
- 36" typical height from exterior grade to entry elevation



CrossMod™

- 5/12 roof pitch
- Masonry perimeter wall
- Engineered Wood Siding
- 30" maximum height from exterior grade to entry elevation
- 6 inch eaves
- Dormer
- Covered porch
- Attached garage



Figure 3: Required Features to Qualify for Fannie Mae Advantage Financing

	<p>Home must be designed as a multi-section property (i.e. no single wide homes)</p>
	<p>Eaves that are 6 inches or greater (which may be eaves no less than 4 inches to which site-completed gutters of 2 inches or more are to be added)</p>
	<p>Roof pitch, following installation on site in accordance with the home's plans, will be at a ratio of 4/12 or greater (does not apply to triple wide homes, which may have any roof pitch)</p>
	<p>The home is designed with one of the following pairs of features:</p> <ul style="list-style-type: none"> • Dormer(s) and Covered Porch (minimum 72 square feet); OR • Dormer(s) and Attached Garage/Carport; OR • Covered Porch (minimum 72 square feet) and Attached Garage/Carport
	<p>Designed with low-profile finished floor set that does not exceed 30 inches from bottom of floor joist to the exterior grade for the front or entry elevation (note, this is design standard only – topography of site or other considerations may affect actual placement of home on site and does not disqualify the home from MH Advantage)</p>
	<p>One of 3 energy standards: Overall U-Value of 0.076 or less, 2009 IECC, or Energy Star. Manufacturer may seek Fannie Mae prior approval of alternative specifications that it can demonstrate meet or exceed one of these 3 energy standards.</p>
	<p>The design will accommodate a foundation that meets all the following criteria (note, actual foundation is the responsibility of retailer and does not disqualify the home from MH Advantage):</p> <ul style="list-style-type: none"> • Masonry perimeter wall; • HUD's Permanent Foundations Guide to Manufactured Housing; AND • Engineered Foundation certified by a registered architect or professional engineer
	<p>Interior has all features listed below:</p> <ul style="list-style-type: none"> • Drywall (tape and texture) throughout the home (including closets); • Kitchen and bath cabinets with fronts of solid wood or veneered wood; AND • Fiberglass, solid surface, acrylic, composite, porcelain/enamel coated steel, or tile for all showers and/or tubs in the home
	<p>Exterior siding is comprised of one or more of following – Fiber Cement Board, Hardwood Siding, Engineered Wood Siding, Masonry, Stone, Stucco, or Vinyl siding backed with Oriented Strand Board.</p>

Source: Fannie Mae Lending for MH Advantage Retailer Guide and Talking points, available at <https://singlefamily.fanniemae.com/media/9496/display> (accessed May 22, 2023).

Appreciation in Manufactured Home Values

An important consideration for manufactured housing as an affordable homeownership option is whether these homes offer the same potential for appreciation over time as site-built homes.

Appreciation is an important contributor to the financial benefits of owning a home. In fact, research on this issue has consistently found that when manufactured homes are owned along with the land they are sited on, rates of appreciation are similar to those of site-built homes (although the average rates of appreciation are slightly lower and the variation in appreciation rates is greater, suggesting these returns come with higher risk relative to site-built) (Jewell 2003; and Boehm and Schlottmann 2008).¹²

As with site-built homes, the rate of appreciation is found to vary with the initial quality of the home, the degree of maintenance spending, and the location of the home. However, in cases where manufactured homes are not on owned land, the structures are generally found to depreciate over time—as all housing structures do—and so do not offer opportunities for appreciation.

The conclusions regarding the appreciation rates of manufactured homes on owned land are supported by more recent Federal Housing Finance Agency analysis that developed a repeat sales index for manufactured homes as a point of comparison with its index for site-built homes.¹³ FHFA found that between 1995 and 2018, changes in the price of manufactured homes closely followed the trends of site-built homes, although the price trends were more volatile, with a larger decline peak-to-trough and a slower recovery since the Great Recession. Still, the general conclusion of FHFA’s analysis is that price trends of manufactured and site-built homes are broadly similar.

Previous Studies Comparing Costs of Manufactured and Site-Built Housing

This study aims to assess the extent of construction cost advantages of manufactured homes relative to the conventional, site-built alternative. The potential for cost advantages is derived from several sources. As noted above, the standardized HUD Code offers the advantage of a simpler process for inspecting homes in the factory rather than on site. But, more importantly, by creating a single national standard, the HUD Code also facilitates the mass production of these homes for markets in multiple states, enabling factory-based assembly line production that site-built homes cannot replicate (Durst and Sullivan 2019; NAHB 1998; Apgar et al. 2002). These advantages include economies of scale that result from large material purchases, reduced waste from more standardized designs and the controlled

¹²As of 2011, half of all manufactured homes were sited on land owned by the homeowner (Furman 2015).

¹³ See https://www.fhfa.gov/DataTools/Downloads/Documents/HPI_Focus_Pieces/2018Q2_HPIFocus_N508.pdf.

factory environment, vertical integration of the production process that eliminates the use of subcontractors, advanced fabrication machinery not used on conventional construction sites, and a reduced reliance on skilled labor that comes from this increased degree of automation. In addition, the building process is insulated from changes in weather and seasonal variation which can lead to setbacks and delays.

However, few studies have attempted to compare the construction of manufactured housing to that of site-built housing with the goal of determining the actual scale of this cost advantage and the specific components of the construction process from which it stems. As noted above, the Census Bureau does report annually on the average costs of manufactured homes compared to site-built homes, excluding the estimated value of land. The most recent estimate, for 2021, finds that on a per-square-foot basis, the average site-built home cost is roughly double that of the average manufactured home. Specifically, the average site-built home in 2021 cost \$144 per square foot to build compared to \$67 and \$72 per square foot for single-section and double-section homes, respectively. However, these per-square-foot estimates may not hold across homes of different sizes, as economies of scale manifest in the construction costs of larger homes. In addition, even within each housing type, design and structural features vary widely, and these estimates fail to capture these variations.

A researcher at Fannie Mae attempted to account for this difference by employing data from the firm RS Means, a leading purveyor of cost estimates for the construction industry, to provide construction cost estimates for homes equivalent to the size of single- and double-section homes (1,072 and 1,747 square feet, respectively) (Zahalak 2020). Using estimates from the Census Bureau for manufactured homes in 2018, Fannie Mae found that site-built homes were roughly twice as costly to build on a per-square-foot basis as double-section homes (\$103 versus \$51). Meanwhile, single-section homes had an even larger cost advantage, as the cost per square foot of the smaller homes was much higher (\$125 versus \$49). The overall cost advantage of manufactured homes reflects not only this lower cost per square foot to construct, but also the fact that manufactured homes are smaller than most site-built housing constructed today. In 2021, only 24 percent of site-built homes were under 1,800 square feet and only 7 percent were under 1,400 square feet.

While RS Means data does account for the significant size differences between typical site-built and manufactured homes, this simple comparison fails to take into account other aspects of the process of siting homes. Perhaps most obviously, the total cost of the manufactured home will include the cost of constructing footings or a foundation, preparing the site, and delivering and installing the home.

The most thorough comparison of the costs of producing manufactured homes and site-built homes that includes estimates for all of these cost elements was commissioned by HUD and conducted by the NAHB Research Center in 1998 (NAHB 1998). The study compares the costs of a typical site-built home, single- and double-section manufactured homes, and modular homes. It employs three methodologies: a comparison of the final costs of these homes as typically produced, a comparison of homes standardized across size and foundations, and a comparison of the monthly payments for owners of typical homes based on assumptions about the form of financing used.

The comparison of homes as typically produced allows for manufactured homes to employ non-permanent foundations and to be smaller than the site-built or modular homes. The comparison that standardizes the home sizes and foundations is of most interest for our study as we are interested in assessing the degree of cost advantage associated with the manufactured home construction process and not the advantage due to smaller size or fewer amenities.

The NAHB study assessed the cost of manufactured homes by starting with the sales prices of homes captured by the Census Bureau's Manufactured Housing Survey as the cost of building the homes. To this cost they add estimates of the cost of building foundations based on telephone surveys with firms involved in this business and estimates of site preparation costs from RS Means. Finally, assumptions about overhead, administration and profit as fixed percentages of these costs are added to these costs of producing and siting the home. For site-built homes, the cost estimates are based on surveys of homebuilders about the shares of the total cost of a new home that fall into these different categories (i.e., cost of the structure, land, foundations and site work, overhead, administration and profit). These shares are applied to the final sales price of site-built homes as captured by Census Bureau surveys. Modular home costs are simply assumed to be 15 percent lower for construction costs based on a rule-of-thumb, and all other cost rates from site-built homes are then applied to this lower production cost.

The results of this 1998 analysis are summarized in Table 1. The findings confirm the significant cost advantage of manufactured housing. On a per-square-foot basis, the construction costs of double-section and single-section manufactured homes are 61 percent and 56 percent, respectively, of the cost of a site-built home. Of note, all of the homes are assumed to be 2,000 square feet in size except for the single-section, which is 1,215 square feet. Assessing the total cost of the home, including land, overhead and administration, and financing, double-section homes are found to be 68 percent of the cost of a site-built home, while a single-section is 49 percent of this cost. The greater total cost advantage of the single-section reflects the smaller size of the home as well as the lower construction cost per-square-

foot. The total cost of a modular home is 90 percent that of the site-built home, but the result is purely the result of the assumption that construction costs are 15 percent lower than site-built homes. The study notes that modular housing does not achieve the same cost efficiencies as manufactured housing despite being built largely in a factory, in part because modular homes involve greater customization both in the factory and on-site.

Table 1: Construction Cost Estimates from NAHB Study of Manufactured, Modular, and Site-Built Homes in 1999

Cost Category	Site-Built	Modular		Double-Section		Single-Section	
		Cost	As % of Site-Built	Cost	As % of Site-Built	Cost	As % of Site-Built
Construction Cost	\$77,140	\$65,560	85%	\$47,277	61%	\$26,350	34%
Cost per Square Foot	\$38.57	\$32.78	85%	\$23.64	61%	\$21.69	56%
Land	\$35,314	\$35,314	100%	\$35,314	100%	\$35,314	100%
Overhead and Admin	\$29,380	\$27,652	94%	\$14,644	50%	\$8,232	28%
Financing	\$2,895	\$1,298	45%	\$610	21%	\$343	12%
Total Cost	\$144,728	\$129,822	90%	\$97,845	68%	\$70,239	49%

Notes: Double-section costs are assumed for a home placed on an individual lot; single-section also assumes the cost of an individual lot that was not included as an option in the NAHB study as published. All homes are 2,000 square feet except single-section, which is 1,215 square feet.

Source: NAHB (1998), Table 20, page 99.

Nearly a quarter-century has passed since HUD commissioned that study, raising questions of whether these cost advantages have held up over time. In addition, the development of the CrossMod™ form of manufactured housing that is intended to expand consumer interest and overcome local opposition also increases the appeal of manufactured housing as an alternative to site-built homes, although the additional building elements associated with this form of housing may add to costs. This study is designed to provide a more up-to-date estimate of the relative costs of site-built and manufactured housing, including the new CrossMod™ variant.

Data and Methodology

Sources

Cost estimates for manufactured homes were developed by Next Step Network through a survey of 22 manufactured home producers, retailers and lenders conducted in 2020.¹⁴ The survey asked respondents to provide estimates of costs for a series of elements of the production and siting of manufactured homes, including the construction of the home, its transportation, preparation of the foundation and the site including utility hookups, placement of the home, any alterations to the structure needed as part of the installation, and the cost of local permits. The survey asked for estimates corresponding to three specific types of manufactured homes: a single-section unit, a double-section home, and a CrossMod™ home. The survey also specified square footage for each type to ensure that estimated costs were for similar-sized homes. The responses were averaged to generate the cost of producing and siting a typical manufactured home in each of these categories. Separate estimates were provided for the Western states of California, Oregon and Washington, as these states were found to have higher production costs compared to the rest of the country. Since a CrossMod™ manufactured home needs to have several specific elements (including a raised roof, a porch, and a garage) to qualify for special financing programs offered by the government-sponsored enterprises, we have added the estimated average cost of a single-car garage to the CrossMod™ cost estimates since this was not included in Next Step's specifications.

For site-built homes – as well as for the garages referenced above – cost estimates were developed using software from RS Means, drawing on a comprehensive database for cost estimation that is widely used in the construction industry.¹⁵ The data is continually updated and can be filtered for specific time periods. For this study, data from the second quarter of 2020 was used, matching the period of the estimates from Next Step. RS Means software allows for estimations based on customized definitions that allowed us to match the size and other structural characteristics of the three categories of manufactured homes studied.

Of note, the survey was conducted just as the COVID pandemic was beginning and prior to the period of rapid inflation in both construction costs and the broader economy that began in 2021. As a

¹⁴ Next Step Network is a nonprofit organization whose mission is to build relationships between the factory-built housing industry, housing developers, affordable housing advocates, lenders, and other key stakeholders to deliver factory-built homes as a viable, sustainable homeownership solution. For information on Next Step Network, see www.nextstepus.org.

¹⁵ For more information on RS Means and its methodologies, see <https://www.rsmeans.com/info/contact/about-us>.

result, the cost estimates presented are well below current costs. However, since our concern is with the relative costs of manufactured and site-built housing, the change in cost levels will mainly be a factor to the extent that inflation impacted these two segments of the housing market differently.

Assumptions

One key aspect of the standardization was to estimate site-built homes of the same square feet as used in the Next Step survey. Many existing comparisons of site-built and manufactured housing rely on a per-square-foot cost as a means of accounting for different home sizes. However, since some of the highest-cost elements of a home are the heating and cooling systems, appliances, and plumbing for kitchens and bathrooms, and since these are needed regardless of the size of the home, the per-square-foot cost generally declines as home size increases. Assuming the same-size home is intended to eliminate differences in per-square-foot costs arising from size differences. Two sizes of hypothetical houses were used in the comparison: The size of a single-section was 16 by 76 feet, or 1,216 square feet, while both the double-section and CrossMod™ were defined as 28 by 56 feet, or 1,568 square feet in area. As noted earlier, for the CrossMod™ comparison, the cost of a single-car garage was added to both the CrossMod™ category and its site-built counterpart.

Other aspects of the hypothetical site-built houses used for comparison were also defined by the range of product offerings available within each manufactured housing type. Characteristics include the same number of bedrooms and bathrooms. Interior and exterior finishes, appliances included, and HVAC systems of manufactured homes were also matched with the hypothetical site-built home. However, there may remain differences in materials used to build these homes that could not be controlled (for example, the materials used for walls, cabinets or shower stalls). Differences in materials are also expected to be minimal for CrossMod™ homes that are specified to have materials similar to those in typical site-built homes.

The original manufactured housing cost data showed regional cost differences between the West Coast states and the rest of the country. To match this geography, separate site-built estimates were developed for Los Angeles, Seattle, and Portland, and averaged together to represent the West Coast states.

In the first section below, we compare the costs of these homes without any estimate of land costs. In a subsequent section, we examine how the cost advantage of manufactured housing is impacted by a range of assumptions about land costs.

Cost Comparison

Table 2 presents the results of our cost comparison, which shows that all three forms of manufactured homes have a notable cost advantage over site-built.¹⁶ The cost of a single-section home was \$56,956, or just 35 percent of the \$161,796 cost of a comparable site-built home. The cost advantage of the other two larger manufactured homes was not nearly as large. The CrossMod™ was estimated to cost \$147,022, or 73 percent of the site-built home cost of \$200,582, while the double-section home cost was \$109,852, or 60 percent of the site-built cost.¹⁷ These latter estimates are slightly lower than the estimated cost advantage of manufactured homes found by the 1998 NAHB study, which found a site-built home to cost 68 percent more than a comparable double-section home. The difference found here for a single-section manufactured home is much larger than that found by the NAHB study, where the cost was 49 percent of the site-built cost. The lower cost advantage of the CrossMod™ is not surprising given that it is marked by higher-cost features, siting, and roof pitch. But the price discount of more than \$50,000 is still quite substantial.

Table 2: National Construction Cost Estimates

Cost Category	Site-Built (1,568 sf)	CrossMod™		Site-Built (1,568 sf)	Double-Section		Site-Built (1,216 sf)	Single-Section	
		Cost	% of Site-Built		Cost	% of Site-Built		Cost	% of Site-Built
Building Cost	\$150,119	\$78,000	52%	\$135,576	\$68,000	50%	\$119,243	\$35,000	29%
Foundation	\$24,300	\$6,700		\$24,300	\$8,000		\$21,449	\$4,000	
Transportation and Installation		\$42,043			\$18,700			\$10,100	
Admin and Profit	\$26,163	\$20,279		\$23,981	\$15,152		\$21,104	\$7,856	
Total Cost	\$200,582	\$147,022	73%	\$183,857	\$109,852	60%	\$161,796	\$56,956	35%

Notes: Foundation costs for manufactured homes include site prep and footings. Transportation and installation costs include transportation, siting of home, skirting, trimming out home, on-site add-ons, and cleaning. CrossMod™ also includes costs of raising roof and adding a garage. The site-built house for comparison with CrossMod™ includes a single-car garage, which is not included with double-section or single-section comparisons.

Source: Authors' tabulations of RS Means data for site-built homes and Next Step industry survey for manufactured homes. Cost of garage addition is from RS Means for both housing types.

¹⁶ See Appendix for detailed cost estimates.

¹⁷ The estimated cost of a foundation for a CrossMod™ is lower than for a double-section home, which seems surprising given that the homes are comparable in size. While the data collected does not provide a clear indication of the reason for this difference, it appears that the higher costs of installing the CrossMod™ account for it. Even if the difference of \$3,800 in foundation costs were added to the CrossMod™ costs, it would not significantly alter the cost relative to a site-built home.

Even in the high-cost West Coast states, the relative cost advantage of manufactured homes remained largely unchanged. The higher costs of homes in West Coast states are mostly attributed to the higher cost of labor and materials in these markets. But since these factors affect both site-built and manufactured homes, they do not net a meaningful impact on the relative cost. In fact, manufactured homes have a slightly larger cost advantage in these markets. As illustrated in Table 3, the price of a single-section manufactured homes is 47 percent that of a comparable site-built home; for a double-section manufactured home, the figure is 64 percent, and for a CrossMod™, 80 percent.

Table 3: West Coast Construction Cost Estimates

Cost Category	Site-Built (1,568 sf)	CrossMod™		Site-Built (1,568 sf)	Double-Section		Site-Built (1,216 sf)	Single-Section	
		Cost	% of Site-Built		Cost	% of Site-Built		Cost	% of Site-Built
Building Cost	\$187,085	\$90,000	48%	\$172,542	\$85,000	49%	\$140,130	\$50,000	36%
Foundation	\$30,564	\$19,000		\$30,564	\$14,500		\$25,428	\$11,500	
Transportation and Installation		\$64,243			\$28,500			\$15,800	
Admin and Profit	\$32,647	\$27,719		\$30,466	\$20,480		\$24,834	\$12,368	
Total Cost	\$250,296	\$200,962	80%	\$233,572	\$148,480	64%	\$190,392	\$89,668	47%

Notes: Foundation costs for manufactured homes include site prep and footings. Transportation and installation costs include transportation, siting of home, skirting, trimming out home, on-site add-ons, and cleaning.

CrossMod™ also includes cost of raising roof and adding a garage. The site-built house for comparison with CrossMod™ includes a single-car garage, which is not included with double-section or single-section comparisons.

Source: Authors' tabulations of RS Means data for site-built homes and Next Step industry survey for manufactured homes. Cost of garage addition is from RS Means for both housing types.

Impact of Land Costs on Relative Affordability

As noted earlier, the cost estimates presented in the preceding section include only the costs of constructing the homes and placing them on a physical site and do not include the cost of the land itself, any improvements to the land, the cost of connecting to utilities, or municipal impact fees. Since the total cost of a finished lot can be quite high and would theoretically add the same increase in total cost to both types of housing, the proportional cost advantage of a manufactured home will be reduced when these land costs are added to both homes. And, as will be shown, as the cost of land increases the share of the total cost accounted for by construction costs of the home declines, thereby reducing the cost advantage of manufactured housing.

Table 4: Cost Comparison Including Finished Lot Costs

Housing Value with Finished Lot Cost

Finished Lot Cost	CrossMod™		Double-Section		Single-Section	
	Site-Built	Manuf.	Site-Built	Manuf.	Site-Built	Manuf.
\$0	\$200,582	\$147,022	\$183,857	\$109,852	\$161,796	\$56,956
\$25,000	\$225,582	\$172,022	\$208,857	\$134,852	\$186,796	\$81,956
\$40,000	\$240,582	\$187,022	\$223,857	\$149,852	\$201,796	\$96,956
\$65,000	\$265,582	\$212,022	\$248,857	\$174,852	\$226,796	\$121,956
\$105,000	\$305,582	\$252,022	\$288,857	\$214,852	\$266,796	\$161,956
\$185,000	\$385,582	\$332,022	\$368,857	\$294,852	\$346,796	\$241,956

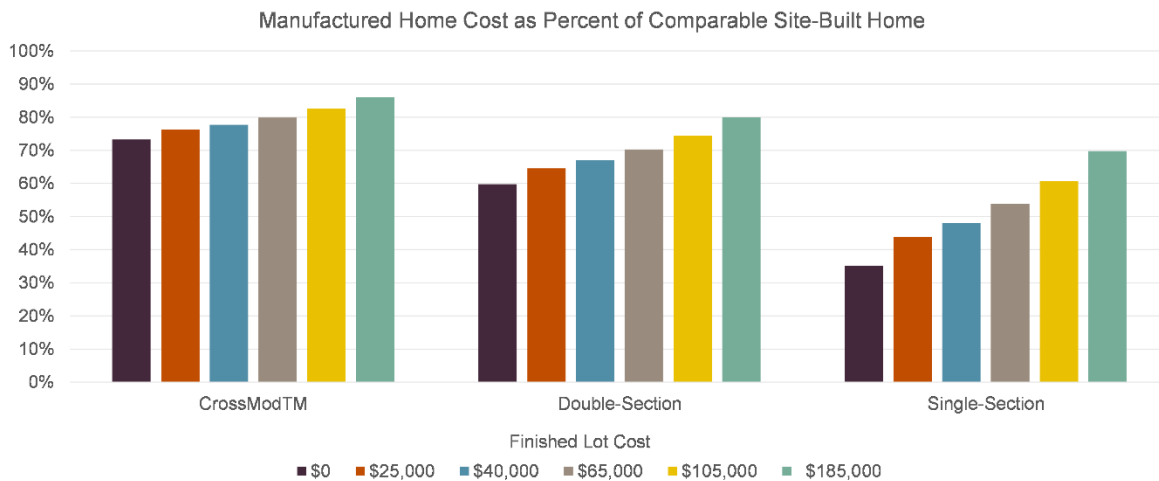
Source: Authors' tabulations of cost estimates from Next Step Manufactured Housing Cost Survey and RS Means.

Table 4 illustrates how adding the cost for a finished lot reduces the relative cost advantage of manufactured housing. The table includes a range of assumed finished lot costs that reflect the distribution of finished land costs across US counties as estimated by the American Enterprise Institute in 2020.¹⁸ The range of finished lot costs shown reflects the 10th, 25th, 50th, 75th, and 90th percentile values (rounded to the nearest \$5,000 increment) for a quarter-acre finished lot across US counties in 2020. Since the land costs add equally to both site-built and manufactured housing, the proportional cost advantage of these homes declines as land prices rise. Table 4 provides estimates of the total house value including both construction costs and finished lot costs for the three types of manufactured housing and comparable site-built homes. The estimates show how the absolute cost advantage of manufactured homes becomes a smaller share of the total house value as land prices rise. Figure 4 illustrates this point, showing the manufactured home price as a share of the site-built home price as the cost of a finished lot increases.

Recall that in a comparison of construction and installation costs alone, single-section, double-section and CrossMod™ manufactured homes are found to cost 35 percent, 60 percent, and 73 percent, respectively, of the comparable site-built home. When the median value of a finished lot across US counties of \$65,000 is added to construction costs, the cost advantage of these manufactured homes declines to 54 percent, 70 percent, and 80 percent, respectively. For counties with land prices in the 90th percentile, these advantages are just 70 percent, 80 percent, and 86 percent, respectively. While these lower costs are not insignificant, they are much reduced with these higher land costs, suggesting that manufactured homes will have the most appeal in lower land cost markets.

¹⁸ The methodology and data for these land cost estimates for housing can be found at <https://www.aei.org/housing/land-price-indicators/>.

Figure 4: Manufactured Housing Cost Advantage Declines as Land Prices Rise



Source: Author tabulations of Next Step Survey and RS Means data.

Summary and Implications

Since its establishment by the 1976 HUD Code, manufactured housing has proven to have cost advantages in production relative to site-built homes. These advantages stem from the efficiencies offered by a single national building code that supports economies of scale in producing these homes. While there were concerns about the quality of these homes in the first decades of their production, research since the 1990s has consistently found that the quality of these homes can be equivalent to that of site-built homes if properly maintained. Importantly, manufactured homes sited on land owned by the homeowner have also been found to appreciate at rates similar to those of site-built homes, although with slightly heightened variability over time.

This study provides an updated comparison of the cost of manufactured and site-built homes of comparable size and attributes and considers the full costs of transporting and siting manufactured homes. The results of this analysis confirm that manufactured homes continue to offer significant cost advantages, with single-section, double-section and CrossModTM manufactured homes costing 35 percent, 60 percent, and 73 percent, respectively, as much as comparable site-built homes. Adding finished-lot costs to these construction costs does reduce these advantages, but they remain significant for land values that prevail in most counties in the country. Given the potential for this version of manufactured homes to have broader appeal, better access to conventional financing, and greater community acceptance, this cost advantage suggests great potential for these models to serve as

affordable entry-level homes. However, in markets with much higher land costs the cost advantage of manufactured housing is greatly reduced, limiting the appeal of these homes in these areas.

The principal implication raised by these findings is that today's relatively low level of production of manufactured housing represents a missed opportunity to expand homeownership and improve housing affordability. Assessments of the state of the market have identified several factors that have contributed to these low production levels, including limits on access to affordable financing, zoning restrictions on the siting of these homes, and consumer concerns about appreciation and the quality of these homes. With CrossMod™, in particular, which has the potential to increase consumer acceptance and address financing barriers, zoning codes seem to be a particularly critical obstacle to more widespread utilization of manufactured housing. Future reports in this series will delve further into the nature of the barriers, their significance in limiting manufactured home placements, and what can be done to address them.

References

- Apgar, William C., Allegra Calder, Michael Collins, and Mark Duda. 2002. *An Examination of Manufactured Housing as a Community- and Asset-Building Strategy: Report to the Ford Foundation*. Joint Center for Housing Studies of Harvard University.
- Baird, Sarah. 2017. "Mobile Homeland." *Curbed*, September 13.
<https://archive.curbed.com/2017/9/13/16275948/mobile-manufactured-homes-clayton-trailers>.
- Belsky, Eric S., and Mark Duda. 2002. "Anatomy of the Low-Income Homeownership Boom in the 1990s." In *Low-Income Homeownership: Examining the Unexamined Goal*, edited by Nicolas P. Retsinas and Eric S. Belsky, 15-63. Washington, DC: Brookings Institution Press.
- Bleemer, Zachary, Meta Brown, Donghoon Lee, and Wilbert Van der Klaauw. 2014. "Debt, Jobs, or Housing: What's Keeping Millennials at Home?" Federal Reserve Bank of New York Staff Report 700.
- Boehm, Thomas P., and Alan Schlottmann. 2008. "Is Manufactured Owned Housing a Good Alternative for Low-Income Households? Evidence from the American Housing Survey." *Cityscape* 10 (2): 159-224.
- CFPB (Consumer Finance Protection Bureau). 2014. "Manufactured Consumer Finance in the United States." Consumer Finance Protection Bureau.
- Choi, Jung Hyun, Jun Zhu, Laurie Goodman, Bhargavi Ganesh, and Sarah Stochak. 2018. "Millennial Homeownership: Why Is It So Low, and How Can We Increase It?" The Urban Institute, July 11.
- Congressional Research Service. 1976. "Federal Standards for Mobile Homes: A Summary of the New Regulations." Washington, DC: Congressional Research Service, Library of Congress, August 31.
- Davis, Morris A., William D. Larson, Stephen D. Oliner, and Jessica Shui. 2021. "The Price of Residential Land for Counties, ZIP Codes, and Census Tracts in the United States." *Journal of Monetary Economics* 118: 413-31.
- Drew, Rachel Bogardus, and Christopher E. Herbert. 2013. "Postrecession Drivers of Preferences for Homeownership." *Housing Policy Debate* 23 (4): 666-87.
- Durst, Noah J., and Esther Sullivan. 2019. "The Contribution of Manufactured Housing to Affordable Housing in the United States: Assessing Variation among Manufactured Housing Tenures and Community Types." *Housing Policy Debate* 29 (6): 880-98.
- Furman, Matthew. 2015. "Eradicating Substandard Manufactured Homes." Joint Center for Housing Studies of Harvard University.
- Genz, Richard. 2001. "Why Advocates Need to Rethink Manufactured Housing." *Housing Policy Debate* 12 (2): 393-414.
- George, Lance, and Milana Barr. 2002. "Moving Home: Manufactured Housing in Rural America." Housing Assistance Council.

- Goodman, Laurie, Edward Golding, Alanna McCargo, and Bhargavi Ganesh. 2018. "Manufactured Homes Could Ease the Affordable Housing Crisis. So Why Are So Few Being Made?" *Urban Wire* (blog), January 29. The Urban Institute.
- Goodman, Laurie S., and Christopher Mayer. 2018. "Homeownership and the American Dream." *Journal of Economic Perspectives* 32 (1): 31-58.
- Herbert, Christopher. 2021. Written testimony at the hearing *Home = Life: State of Housing in America, before the US Senate Committee on Banking, Housing, and Urban Affairs*, 117th Congress, March 16. <https://www.banking.senate.gov/imo/media/doc/Herbert%20Testimony%203-16-21.pdf>.
- Hession, J.C. 1984. "Safety Standards for Mobile Homes Make a Difference." *Rural Development Perspectives*, October. US Department of Agriculture. <https://handle.nal.usda.gov/10113/AGE86927792>.
- JCHS (Joint Center for Housing Studies). 2022. *The State of the Nation's Housing 2022*. Joint Center for Housing Studies of Harvard University.
- Jewell, Kevin. 2003. "Manufactured Housing Appreciation: Stereotypes and Data." Consumers Union Southwest Regional Office.
- Kaul, Karan, and Daniel Pang. 2022. "The Role of Manufactured Housing in Increasing the Supply of Affordable Housing." The Urban Institute, July.
- Loftin, Mike. 2021. "Homeownership Is Affordable Housing." The Urban Institute.
- NAHB (National Association of Home Builders Research Center). 1998. "Factory and Site-Built Housing—A Comparison for the 21st Century." US Department of Housing and Urban Development.
- Sullivan, Esther. 2018. *Manufactured insecurity: Mobile Home Parks and Americans' Tenuous Right to Place*. Berkeley: University of California Press.
- Vermeer, Kimberly, and Josephine Louie. 1997. "The Future of Manufactured Housing." Joint Center for Housing Studies of Harvard University.
- Wallis, Allan D. 1997. *Wheel Estate: The Rise and Decline of Mobile Homes*. Baltimore: Johns Hopkins University Press. First published 1991 by Oxford University Press.
- Xu, Yilan, Carrie Johnson, Suzanne Bartholomae, Barbara O'Neill, and Michael S. Gutter. 2015. "Homeownership among Millennials: The Deferred American Dream?" *Family and Consumer Sciences Research Journal* 44 (2): 201-12.
- Young, Terence. 2017. *Heading Out: A History of American Camping*. Ithaca: Cornell University Press.
- Zahalak, Tanya. 2020. "Manufactured Housing Landscape 2020." Fannie Mae (website), May 21.

Appendix Tables

Appendix Table 1: National Average Comparison of Manufactured and Site-Built Costs (2nd Quarter 2020)

Manufactured Homes				Site-Built Homes			
	Single-Section	Double-Section	CrossMod™		Equivalent to Single-Section	Equivalent to Double-Section	Equivalent to CrossMod™
Area sf	1216	1568	1568	Area sf	1216	1568	1568
Dimensions ft	16'x76'	28'x56'	28'x56'	Dimensions ft	16'x76'	28'x56'	28'x56'
Perimeter ft	184	168	168	Perimeter ft	184	168	168
Cost per sf	\$ 46.84	\$ 70.06	\$ 93.76	Cost per sf	\$ 133.06	\$ 117.26	\$ 127.92
Site and Foundation Work Cost Total	\$ 4,000	\$ 8,000	\$ 6,700	Site and Foundation Work Cost Total	\$ 21,449	\$ 24,300	\$ 24,300
Site Prep	\$ 2,000	\$ 3,500	\$ 3,500	Site Work	\$ 2,784	\$ 2,784	\$ 2,784
Install Footings	\$ 2,000	\$ 4,500	\$ 3,200	Foundation	\$ 18,665	\$ 21,517	\$ 21,517
Building Cost, Transportation and Installation Total	\$ 45,100	\$ 86,700	\$ 120,043	Building Cost Total	\$ 119,243	\$ 135,576	\$ 150,119
Home Invoice (offsite part)	\$ 35,000	\$ 68,000	\$ 78,000	Framing	\$ 17,065	\$ 20,437	\$ 20,437
Deliver Home	\$ 1,500	\$ 3,000	\$ 3,000	Exterior Walls	\$ 27,916	\$ 30,727	\$ 30,727
Set home	\$ 2,500	\$ 3,500	\$ 5,000	Roofing	\$ 6,104	\$ 7,871	\$ 7,871
Raise Roof			\$ 4,800	Interiors	\$ 31,678	\$ 38,027	\$ 38,027
Trim Out (to join sections)		\$ 2,000	\$ 2,500	Specialties: kitchen sink	\$ 4,452	\$ 4,452	\$ 4,452
Skirting (to protect under home)	\$ 1,500	\$ 2,500	\$ 4,500	Mechanical	\$ 10,483	\$ 11,700	\$ 11,700
Site build adds	\$ 4,500	\$ 7,500	\$ 7,500	Electrical	\$ 3,930	\$ 4,746	\$ 4,746
Clean house	\$ 100	\$ 200	\$ 200	2 full bath	\$ 13,040	\$ 13,040	\$ 13,040
Garage			\$ 14,543	Range	\$ 585	\$ 585	\$ 585
				Water heater	\$ 2,300	\$ 2,300	\$ 2,300
				Garage			\$ 14,543
				Dishwasher	\$ 505	\$ 505	\$ 505
				Hood for range	\$ 240	\$ 240	\$ 240
				Refrigerator	\$ 945	\$ 945	\$ 945
Retail Gross Profit (16%)	\$ 7,856	\$ 15,152	\$ 20,279	Contractor's Overhead and Profit (15%)	\$ 21,104	\$ 23,981	\$ 26,163
Total Cost of Building and Foundation	\$ 56,956	\$ 109,852	\$ 147,022		\$ 161,796	\$ 183,858	\$ 200,582
Costs Excluded from Comparison	\$ 6,600	\$ 6,950	\$ 6,950				
Permits	\$ 350	\$ 500	\$ 500				
Inspections	\$ 450	\$ 450	\$ 450				
Utility Connections	\$ 2,500	\$ 2,500	\$ 2,500				
Gravel/Flat Work	\$ 2,000	\$ 2,000	\$ 2,000				
Finish Grd/Landscaping	\$ 800	\$ 1,000	\$ 1,000				
Miscellaneous	\$ 500	\$ 500	\$ 500				

Notes: Costs excluded from comparison were provided in the Next Step survey for manufactured homes but were not available in RS Means cost estimations and so not included in the total costs. These costs are likely to be similar for both forms of housing. Source: Authors' tabulations of RS Means data for site-built homes and Next Step industry survey for manufactured homes. Cost of garage addition is from RS Means for both housing types.

Appendix Table 2: West Coast States Comparison of Manufactured and Site-Built Costs (2nd Quarter 2020)

Manufactured Homes				Site-Built Homes			
	Single-Section	Double-Section	CrossMod™		Equivalent to Single-Section	Equivalent to Double-Section	Equivalent to CrossMod™
Area	1216	1568	1568	Area sf	1216	1568	1568
Dimensions	16'x76'	28'x56'	28'x56'	Dimensions ft	16'x76'	28'x56'	28'x56'
Perimeter	184	168	168	Perimeter ft	184	168	168
Cost per sf	\$ 73.74	\$ 94.69	\$ 128.16	Cost per sf	\$ 156.57	\$ 148.96	\$ 159.63
Site and Foundation Work Cost Total	\$ 11,500	\$ 14,500	\$ 19,000	Site and Foundation Work Cost Total	\$ 25,428	\$ 30,564	\$ 30,564
Site Prep	\$ 7,500	\$ 8,500	\$ 9,000	Site Work	\$ 3,325	\$ 3,414	\$ 3,414
Install Footings	\$ 4,000	\$ 6,000	\$ 10,000	Foundation	\$ 22,102	\$ 27,149	\$ 27,149
Building Cost, Transportation and Installation Total	\$ 65,800	\$ 113,500	\$ 154,243	Building Cost Total	\$ 140,130	\$ 172,542	\$ 187,085
Home Invoice (offsite part)	\$ 50,000	\$ 85,000	\$ 90,000	Framing	\$ 21,558	\$ 29,019	\$ 29,019
Deliver Home	\$ 2,800	\$ 5,500	\$ 6,000	Exterior Walls	\$ 35,067	\$ 44,064	\$ 44,064
Set home	\$ 4,000	\$ 8,000	\$ 10,000	Roofing	\$ 7,231	\$ 9,911	\$ 9,911
Raise Roof			\$ 8,200	Interiors	\$ 36,678	\$ 46,196	\$ 46,196
Trim Out (to join sections)		\$ 2,000	\$ 3,000	Specialties: kitchen sink	\$ 5,159	\$ 5,530	\$ 5,530
Skirting (to protect under home)	\$ 2,500	\$ 4,500	\$ 14,000	Mechanical	\$ 12,213	\$ 14,409	\$ 14,409
Site build adds	\$ 6,000	\$ 8,000	\$ 8,000	Electrical	\$ 4,664	\$ 5,909	\$ 5,909
Clean house	\$ 500	\$ 500	\$ 500	2 full bath	\$ 12,985	\$ 12,929	\$ 12,929
Garage			\$ 14,543	Range	\$ 585	\$ 585	\$ 585
Miscellaneous*				Water heater	\$ 2,300	\$ 2,300	\$ 2,300
				Garage			\$ 14,543
				Dishwasher	\$ 505	\$ 505	\$ 505
				Hood for range	\$ 240	\$ 240	\$ 240
				Refrigerator	\$ 945	\$ 945	\$ 945
Retail Gross Profit (16%)	\$ 12,368	\$ 20,480	\$ 27,719	Contractor's Overhead and Profit (15%)	\$ 24,834	\$ 30,466	\$ 32,647
Total Cost of Building and Foundation	\$ 89,668	\$ 148,480	\$ 200,962		\$ 190,392	\$ 233,572	\$ 250,296
Costs Excluded from Comparison	\$ 35,500	\$ 36,500	\$ 60,000				
Permits	\$ 15,000	\$ 15,000	\$ 35,000				
Inspections	N/A	N/A	N/A				
Utility Connections	\$ 15,000	\$ 15,000	\$ 15,000				
Gravel	\$ 4,000	\$ 4,000	\$ 6,500				
Finish Grd/Landscp	\$ 500	\$ 1,000	\$ 1,000				
Miscellaneous	\$ 1,000	\$ 1,500	\$ 2,500				

Notes: Costs excluded from comparison were provided in the Next Step survey for manufactured homes but were not available in RS Means cost estimations and so not included in the total costs. These costs are likely to be similar for both forms of housing. Manufactured home costs are for California, Oregon and Washington states and site-built home costs are for Los Angeles, Seattle and Portland, OR.

Source: Authors' tabulations of RS Means data for site-built homes and Next Step industry survey for manufactured homes. Cost of garage addition is from RS Means for both housing types.