

# **What is the Most Cost-Effective Way to Finance Affordable Rental Housing?**

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# Abstract

According to the United Nations, 1.6 billion people worldwide live in inadequate housing.<sup>1</sup> In the United States alone, “71% of extremely low-income renter households are severely cost-burdened, spending more than half of their incomes on rent and utilities.”<sup>2</sup> The main channel for expanding the supply of affordable rental housing in the U.S. is a public-private partnership (PPP) approach, combining tax credits and bank regulation. Specifically, the Community Reinvestment Act and the Low-Income Housing Tax Credit. In this report, the Columbia University School of International and Public Affairs (SIPA) Capstone Team conducts a thorough financial analysis of four Citi Community Capital affordable housing projects in New York, NY, and cities in Florida and California. Part I discusses the motivation and goal of our project. Part II gives an overview of the four projects. Parts III and IV provide a financial and regional analysis. Part V summarizes risks for affordable housing investors and developers. Parts VI and VII conclude the report with opportunities for future research and suggestions for policymakers.

Please note that this is an abridged public version of a more extensive report provided to Citi Community Capital. Project names and proprietary financial information has been removed, and only the report methodology and main findings are discussed.

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<sup>1</sup> United Nations. (2019). *Affordable housing key for development and social equality*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2017/10/affordable-housing-key-for-development-and-social-equality-un-says-on-world-habitat-day/>

<sup>2</sup> National Low-Income Housing Coalition. (2019). *The U.S. Has National Shortage of More Than 7.2 Million Affordable & Available Rental Homes for Families Most in Need*. Retrieved from <https://nlihc.org/news/us-has-national-shortage-more-72-million-affordable-available-rental-homes-families-most-need>

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# Part I: Background

## Motivation for Capstone

### Worldwide Affordable Housing Challenge

“Ensuring housing affordability is a complex issue of strategic importance for development, social peace, and equality,” says Executive Director of UN-Habitat Dr. Joan Clos.<sup>3</sup> However, housing affordability remains a global issue yet to be solved. Despite increasing demand for housing, “an analysis of housing affordability over the last 20 years reveals that... housing - including rentals - has been largely unaffordable for the majority of the world population.”<sup>4</sup> To narrow the gap between demand and supply, affordable housing projects are needed to provide more adequate housing for the poorest and the most vulnerable populations. Although affordable housing is a worldwide need, there are important differences in characteristics and challenges across regions.

### Affordable Housing Challenges by Region

In Europe and North America, policymakers have largely retreated from providing ‘social’ housing in favor of ‘enabling the market’ as socio-economic inequalities increasingly make housing unaffordable to low- and middle-income households.<sup>5</sup>

In Asia, the availability of affordable housing remains a serious challenge for low-income households due to skyrocketing land prices and a lack of affordable and well-located housing alternatives.<sup>6</sup> Some Asian countries, such as China and India, have launched national programs to provide affordable housing on a large scale.<sup>7</sup>

Latin America and the Caribbean is a highly urbanized region, but the urban poor cannot afford housing within the formal sector.<sup>8</sup> As a result, the informal housing market has played a major role in meeting widespread demand for housing, but at a high cost to households and society.<sup>9</sup>

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<sup>3</sup> United Nations. (2019). *Affordable housing key for development and social equality*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2017/10/affordable-housing-key-for-development-and-social-equality-un-says-on-world-habitat-day/>

<sup>4</sup> Ibid.

<sup>5</sup> Tsenkova, S., & French, M. (2011). *Affordable land and housing in Europe and North America*. Nairobi: United Nations Human Settlements Programme (UN-HABITAT).

<sup>6</sup> Majale, M., Tipple, A. G., & French, M. (2011). *Affordable land and housing in Asia*. Nairobi: United Nations Human Settlements Programme.

<sup>7</sup> Ibid.

<sup>8</sup> McBride, B., & French, M. (2011). *Affordable land and housing in Latin America and the Caribbean*. Nairobi: United Nations Human Settlements Programme.

<sup>9</sup> Ibid.

In Sub-Saharan Africa, there is little evidence of affordable housing on a large-scale, with the exception of a few countries such as South Africa, Mali, and Ethiopia.<sup>10</sup> In North Africa, however, several countries such as Egypt, Morocco, and Tunisia have demonstrated a noteworthy improvement in affordable housing and slum upgrading over the last two decades.<sup>11</sup>

## **Affordable Housing Challenge in the United States**

The United States (U.S.) Government has a long history of sponsoring affordable housing projects. In 1934, Congress created the Federal Housing Administration and made home-ownership more affordable to citizens by lowering down payments and issuing long-term mortgages. In 1937, the U.S. Housing Act addressed affordable housing from the supply-side by constructing public housing. However, many of these buildings were poorly constructed, which created new challenges. The private sector was better equipped to provide quality housing, but low rental income made these projects unattractive. As a result, the Community Reinvestment Act (1977) and the Low-Income Housing Tax Credit (1986) were introduced to provide incentives for the market-led development of affordable housing buildings.

## **U.S. Approach to Increasing Affordable Housing Supply**

### **The Community Reinvestment Act (1977)**

The Community Reinvestment Act (CRA) requires federal financial regulatory agencies to encourage financial institutions to meet the credit needs of communities where they do business, including low income and moderate-income neighborhoods. The CRA is not legally mandatory for banks, but federal regulatory agencies grade banks based on their CRA compliance. Banks that receive poor grades can be prevented from opening new branches and conducting mergers and acquisitions.<sup>12</sup> Thus, the CRA drives 86% of Low-Income Housing Tax Credit (LIHTC) investment.<sup>13</sup>

### **The Low-Income Housing Tax Credit (1986)**

The Low-Income Housing Tax Credit (LIHTC) is a subsidy to finance the new construction and rehabilitation of affordable housing. This program creates an incentive for private investors and

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<sup>10</sup> Majale, M. (2011). *Affordable land and housing in Africa*. Nairobi, Kenya: United Nations Human Settlements Programme.

<sup>11</sup> Ibid.

<sup>12</sup> Federal Reserve Bank of St. Louis. (2019). *About the Community Reinvestment Act*. Retrieved from <https://www.stlouisfed.org/community-development/about-us/community-reinvestment-act#main>

<sup>13</sup> Desai, M., Dharmapala, D., & Singhal, M. (2008). *Tax Incentives for Affordable Housing: The Low-Income Housing Tax Credit*. doi:10.3386/w14149

developers to build affordable housing units by offering them a yearly dollar-for-dollar reduction in tax liability at either 9% or 4% of total eligible development costs, over a 10-year period.

To be eligible to receive LIHTC credits, projects must follow specific guidelines. Units eligible for LIHTC are those set aside for households earning 60% Area Median Income (AMI). Projects are also eligible when 40% percent of total units are set aside for renters earning no more than 60% AMI, or 20% of units are reserved for renters earning no more than 50% AMI.

The 9% tax credit, reserved for new construction and rehabilitation projects without federal subsidy, is awarded by the state Housing Finance Agency through an allocation process and is extremely competitive as it subsidizes 70% of eligible development costs. The 4% tax credit, on the other hand, can be used for new construction and rehabilitation projects financed with Tax-Exempt Private Activity Bonds. 4% tax credits are available to all eligible development projects and subsidizes 30% of eligible development costs.

The LIHTC program has helped build 2.4 million affordable housing units and costs the government about \$10 billion dollars annually.<sup>14</sup>

## Goal of Capstone

Given the extreme need for affordable housing in the U.S. and the motivation of the Community Reinvestment Act, Citi Community Capital (CCC) has tasked the Columbia University School of International and Public Affairs (SIPA) Affordable Housing Capstone Team with identifying the most effective way to finance affordable housing. The goal of the project is to identify the optimal capital structure to achieve private return targets, while minimizing the public costs of developing the project and considering the diverse needs and characteristics of each community.

In this report, our team analyzes four CCC projects in New York, NY, Florida, and California. We begin with an overview of the projects, followed by a comparison of the financial structures between projects using distribution waterfalls, which visualize the capital flows of each project and their sources and uses. Then, we conduct a regional analysis, including trends in construction costs and area median income. These assessments are subsequently enhanced by a discussion of project-specific risks identified from interviews with the project developers and opportunities for investors and developers in the affordable housing sector. Finally, we provide suggestions for future research and policy recommendations.

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<sup>14</sup> Office of the Community Developments. (2019). *Low-Income Housing Tax Credits: Affordable Housing Investment Opportunities for Banks*. Retrieved from <https://www.occ.gov/topics/community-affairs/publications/insights/pub-insights-mar-2014.pdf>



## Part II: Overview of the Four Projects

### Project 1: Project Brooklyn

Project Brooklyn is a 9% LIHTC deal with about 80% of the units eligible for LIHTC benefits. Additionally, 20% of the units are reserved for homeless and individuals with HIV/AIDS. Citigroup is the LIHTC investor and additional financial support is provided by an unaffiliated private investor.

### Project 2: Project Florida

Project Florida is a 4% LIHTC deal and all units are eligible for tax credits since apartments are for residents earning 30-60% AMI. The unit mix is about 70% one-bedroom apartments and 30% two-bedroom apartments.

Citigroup is the LIHTC investor, construction lender, and permanent lender. There are also four public lenders.

### Project 3: Project California

Project California is comprised of 20% one-bedroom, 50% two-bedroom, and 30% three-bedroom apartments for families earning 50%-60% AMI.

### Project 4: Project Queens

Project Queens is a multifamily mixed-income housing project in Queens, New York. Of the total units, about half are eligible for LIHTC and the remaining half are market-rate apartments. This is a 4% LIHTC deal and offers 1-, 2-, and 3-bedroom apartments.

## Part III: Financial Analysis of Projects

### Overview of Sources and Uses - Waterfall Analysis

To better understand the funding structure of each project, we create ‘waterfalls’ to analyze the sources and uses of funding for the projects. Based on our diagrams, we identify several key issues, discussed below.

### Analysis of Sources

All four projects are funded through a construction loan, permanent loan, LIHTC investor, deferred developer fee, and ‘other loans.’<sup>15</sup>

- **Permanent Loan:** The permanent loan in each deal is converted from a construction loan following the completion of the buildings. The permanent loan amount, between the four projects, is about half the amount of the construction loan.
- **LIHTC:** The LIHTC investment makes up the biggest share of sources for Project Brooklyn, which is quite reasonable since this project is the only one awarded with 9% LIHTC. Project Queens is the least funded by the LIHTC investment, likely because it is a mixed-income property.
- **Deferred Developer Fee:** The deferred developer fee is another approach used to finance each project and provides an incentive for the developer. Across all four projects, the deferred developer fee makes up the smallest portion of the funding structure. Among the projects, the maximum portion is 5.3%.
- **Other Loans:** Project Florida has the largest ‘other loans’ percentage. This is likely because this is the only project that is 100% affordable and so more public funding is available to these developers.

### Analysis of Uses

As for the uses, all four projects use funding to pay for hard costs, soft costs, contingencies, the developer fee, acquisition costs, and interest reserves.

- **Hard costs:** Hard costs make up the largest percentage of spending across projects at 60% to 70% of total uses. Hard costs are highly related to construction costs, labor costs and other material costs. Therefore, it is strongly associated with market fluctuations. Due to

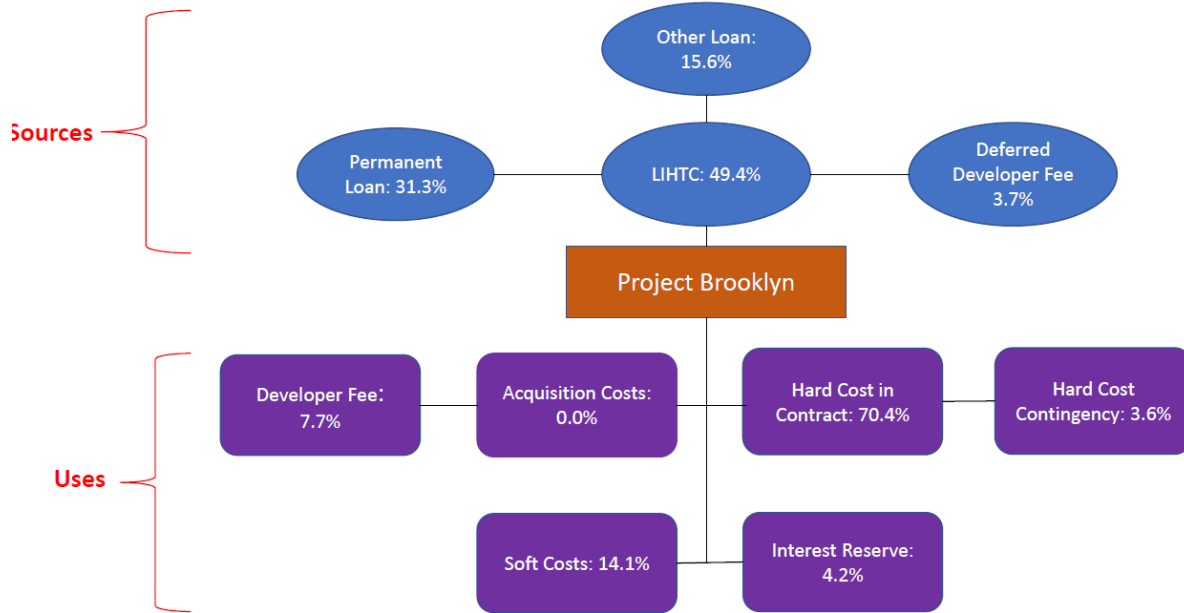
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<sup>15</sup> Other loan represents all the sources other than construction loan, permanent loan, LIHTC, and deferred developer fee.

its high proportion in every project, the related risk should be taken into consideration. Part IV discusses regional trends in construction and materials cost trends in more detail.

- **Soft costs:** Soft costs constitute the second largest use in all four projects. The share of total costs attributed to soft costs is fairly similar between projects, ranging from 13.2% to 19.0% of total project uses. The variance between projects may reflect differences in regulation and architectural expenses between the various locations.
- **Contingencies:** Hard cost contingency accounts for 3.0% to 4.5% of the total use of funds for each project. Only Project Florida has a specified soft cost contingency, accounting for 0.8% of its total uses of funds.
- **Developer fee:** The developer fee tends to increase with the number of building units. However, as a percentage of total development costs, the developer fee varies. As for the two projects based in New York, the developer fees are 6.6% and 7.7% of total uses. For Project California and Project Florida, the developer fee soars to 10% to 15%. One possible explanation is that there are more risks for the developer in Florida, where natural disasters are frequent. Thus, the developer receives a higher fee to be compensate for the level of risk. Another possible explanation for the lower developer fees in New York is that there is a larger supply of contractors in New York, compared to Florida and California, driving down prices.
- **Acquisition costs:** Total acquisition costs account for a small proportion of the total use of funds in each project. Project Brooklyn represents an extreme case, as the developer received a large government subsidy to purchase the land. Acquisition costs account for only 0.6% of the total costs for Florida A, and 1.4% for California A. As a mixed-income building, Queens A does not receive heavy subsidies, so the acquisition cost accounts for 12.5% of total use, which is higher than all of the other projects.
- **Interest reserve:** Interest reserve is a savings account established to repay interest costs accrued from each projects' long-term debt obligation. Interest reserve accounts for a small percentage of the total uses of funds. Project Brooklyn has the highest percentage share, 4.2%, of interest reserves, which may be due to its unusually long construction period of 24 months. Project Brooklyn has the second highest underwriting interest rate. The proportions of interest reserves for Project California, Project Florida, and Project Queens are 2.0%, 3.2% and 2.4% respectively.

**Figure 1. Waterfall Structure of Project Brooklyn**



**Figure 2. Waterfall Structure of Project Florida**

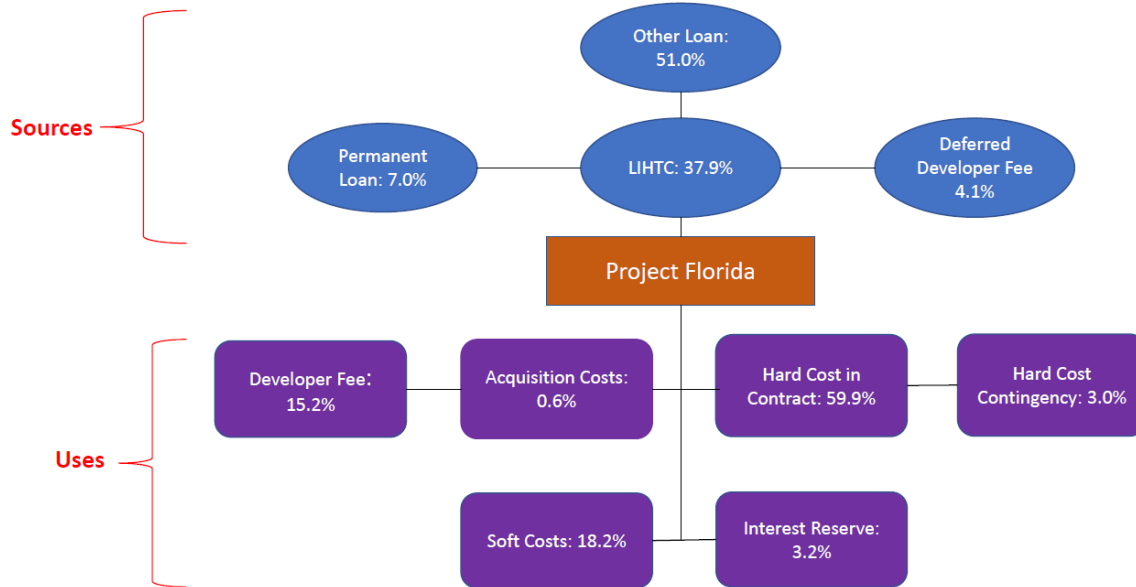


Figure 3. Waterfall Structure of Project California

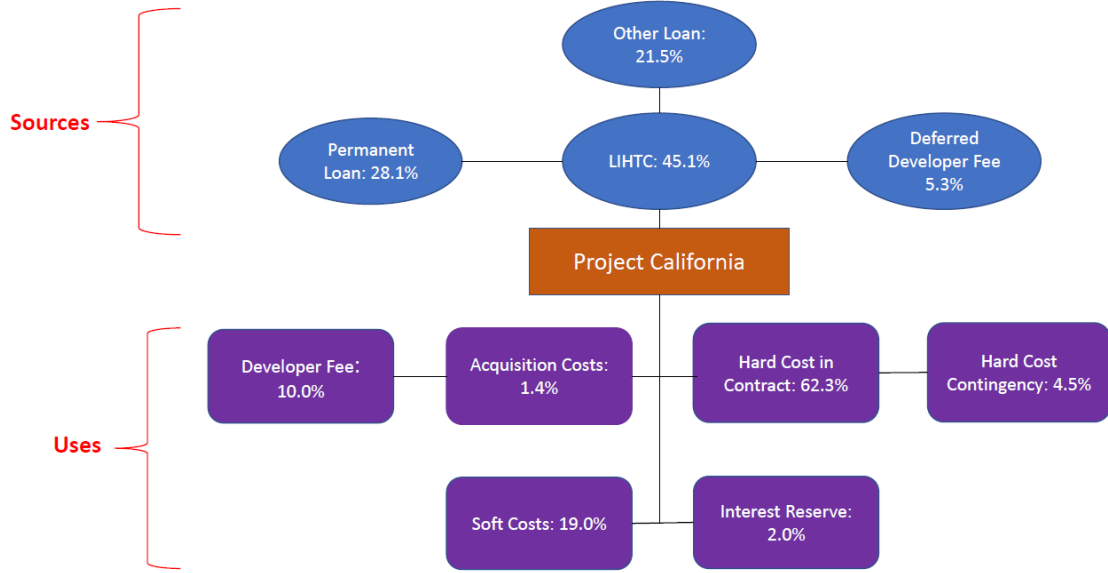
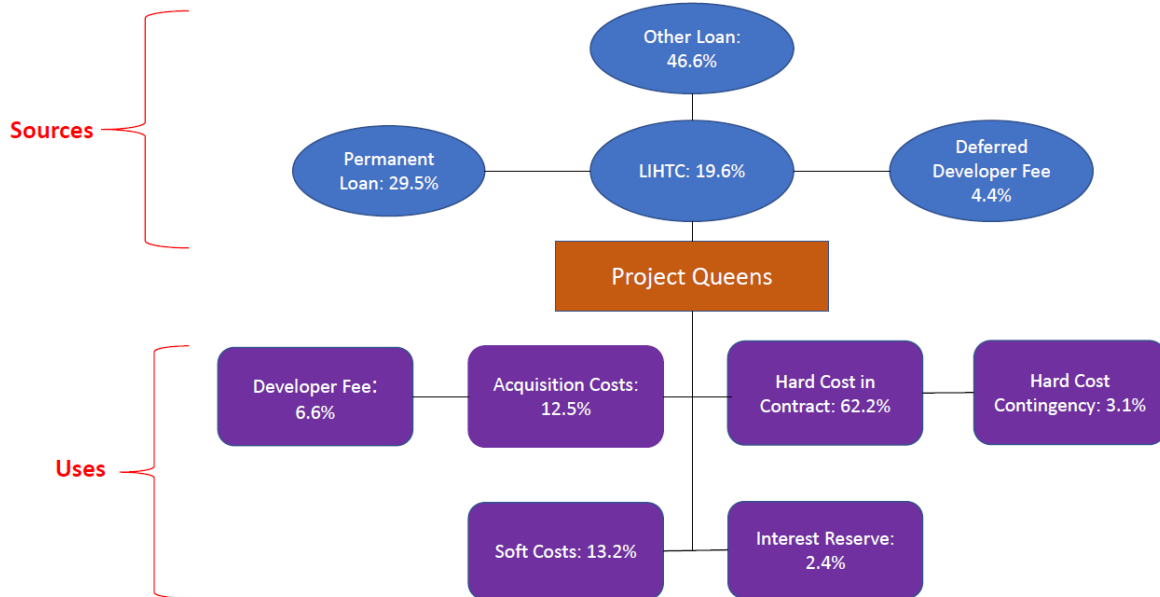


Figure 4. Waterfall Structure of Project Queens



## Analysis of Project Financing

To gain a better understanding of the financial structure of the projects, we made several calculations, including the percentage of LIHTC-applicable units, the Internal Rate of Return (IRR) for LIHTC investors, development cost/unit, development cost/square foot, and total public subsidy cost/development cost (Table 2).

- **LIHTC Applicable Percentage and LIHTC IRR:** This ratio is calculated by dividing the number of units eligible for LIHTC credits by the total number of units. Projects with a higher LIHTC-applicable percentage have more units subsidized under the credit program. Table 2 shows that 100% of Project Florida units and 99.1% of Project California units are eligible for tax credits, compared to 80.4% of units and 50.3% of units for Project Brooklyn and Project Queens. Projects Brooklyn and Queens also happen to be located in New York City. Table 2 shows that projects awarded 9% LIHTC deals do not necessarily lead to higher returns than 4% LIHTC deals. Project Queens, a 4% deal, has a 6.0% IRR, which is higher than Project Brooklyn, a 9% LIHTC program with a 5.2% IRR. This outcome may result from the fact that Project Queens is a mixed-income project, which can attract some higher-income residents and generate some market-rate return. This suggests that having a higher share of LIHTC-applicable units does not guarantee the highest return for LIHTC investors. This also suggests that having a lower percentage of LIHTC-applicable units, in favor of a higher percentage of market-rate units, can lead to higher returns for LIHTC investors.
- **Development Cost/Unit:** This ratio calculates the average cost per unit. The average cost per unit is highest in New York City, ranging from \$445,619 to \$426,648 (Table 2). In the area containing Project California the average cost is slightly lower at \$425,438, and the city containing Project Florida has the lowest cost per unit at \$267,786 (Table 2). Although there are many additional factors to consider, it is still reasonable to believe that location is a critical factor in determining the development cost per unit between projects.
- **Development Cost/Square foot:** Comparing projects using square footage allows us to control for variables between locations. The indexed development cost per square foot further normalizes differences between the cities. Overall, Table 2 shows that development costs in New York City are much higher than the locations of the projects in Florida and California. In fact, development cost per square foot for Project Queens is almost eight times higher than for Project Florida. In practice, we find that comparing development cost per square foot across regions is a useful perspective for public authorities when considering the stance of housing policy in different regions.

- **Total Public Subsidy Cost/Development Cost:** This ratio reveals the percentage of development cost funded through public subsidy. We find that Project Florida has the highest portion of public subsidy funding, at 89.5% of total development cost, while Project Queens has the least at only 15.1% (Table 2). The ratios for Project Brooklyn and Project California are 56.5% and 32.1%, respectively. This ratio is valuable for understanding which financial structure uses public subsidies most efficiently.

Table 2. Financial Overview of Projects

|   | <b>Project Brooklyn</b> | <b>Project Florida</b> | <b>Project California</b> | <b>Project Queens</b> |
|---|-------------------------|------------------------|---------------------------|-----------------------|
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
| <b>LIHTC Applicable Units (%)</b>           | <b>80.4%</b>            | <b>100.0%</b>          | <b>99.1%</b>              | <b>50.3%</b>          |
| LIHTC Award                                 | 9%                      | 4%                     | 4%                        | 4%                    |
| <b>LIHTC IRR</b>                            | <b>5.2%</b>             | <b>4.0%</b>            | <b>-</b>                  | <b>6.0%</b>           |
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
| <b>Development Cost/Unit</b>                | <b>\$445,619</b>        | <b>\$267,786</b>       | <b>\$424,754</b>          | <b>\$426,648</b>      |
| <b>Development Cost/Sf</b>                  | <b>\$2,526</b>          | <b>\$382</b>           | <b>\$439</b>              | <b>\$3,013</b>        |
| Indexed Development Cost/Sf (NYC = Base)    | \$2,526                 | \$439                  | \$859                     | \$3,013               |
|   |                         |                        |                           |                       |
| Public Subsidy Cost/Unit                    | \$251,970               | \$239,690              | \$136,478                 | \$64,367              |
| Public Subsidy Cost/Sf                      | \$1,428                 | \$342                  | \$141                     | \$455                 |
| <b>Public Subsidy Cost/Development Cost</b> | <b>56.5%</b>            | <b>89.5%</b>           | <b>32.1%</b>              | <b>15.1%</b>          |
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
|   |                         |                        |                           |                       |
| Debt Service Coverage                       | 1.15(Resi)/1.17(Retail) | 1.86                   | 1.29                      | 1.22                  |
| Loan to Cost                                | 69.0%                   | 52.3%                  | 58.4%                     | 44.7%                 |
| LTV Supervisory (construction)              | 51.7%                   | 46.8%                  | 54.4%                     | 36.0%                 |



# Part IV: Regional Analysis of Housing Markets

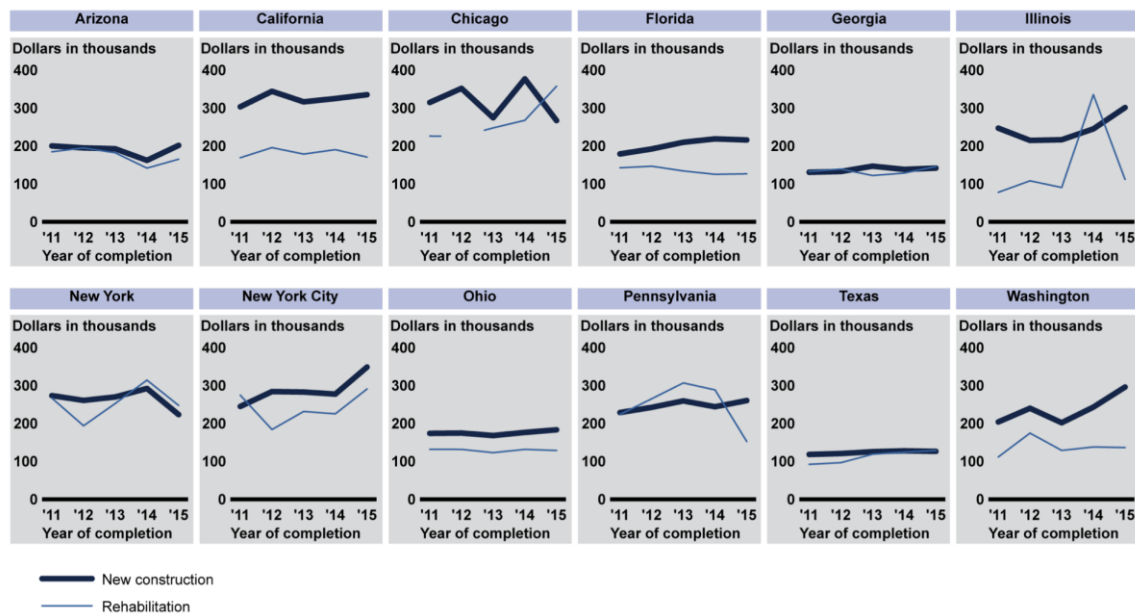
The affordable housing markets in New York, Florida, and California vary significantly and have changed in different ways over time. This section provides a regional overview of construction and labor costs, changes in area median income (AMI), the rent gap between market-rate and affordable apartments, and challenges to the supply of affordable housing units.

## Construction and Labor Costs

As mentioned in Part III, hard costs make up the largest percentage of ‘uses’ across all four projects. Hard costs, such as material cost and labor, can be quite variable within and between cities. This section discusses the trends in per-unit development cost, material cost, and labor cost.

California ranks the highest for median per-unit development cost of LIHTC new construction. In 2015, the total development cost per unit in California was \$335,727, while per-unit development was \$349,185 and \$21,639 in New York City and Florida, respectively (Figure 5). Florida’s construction cost is much lower than the construction costs in New York and California, and the rise in costs is growing more slowly there. Based on these trends, Florida is ideal for minimizing hard costs for affordable housing projects.

Figure 5. Median Per-Unit Development Cost of LIHTC New Construction and Rehabilitation Projects Completed 2011-2015<sup>16</sup>



<sup>16</sup> United States Government Accountability Office. (2018). *Low-Income Housing Tax Credit-Improved Data and Oversight Would Strengthen Cost Assessment and Fraud Risk Management* | GAO-18-637. Retrieved from <https://www.gao.gov/assets/700/694541.pdf>

One of the major drivers of increasing development costs is the price of materials, which has grown steadily in recent years. For example, the price of iron and steel has doubled since 2000 (Figure 6). The price of lumber is also rising and spiked in 2018 due to tariffs put on Canadian imports of lumber (Figure 7). Additionally, concrete prices have increased exponentially since 2010 (Figure 8).

Figure 6. Producer Price Index by commodity for Iron and Steel (2000-2019)<sup>17</sup>



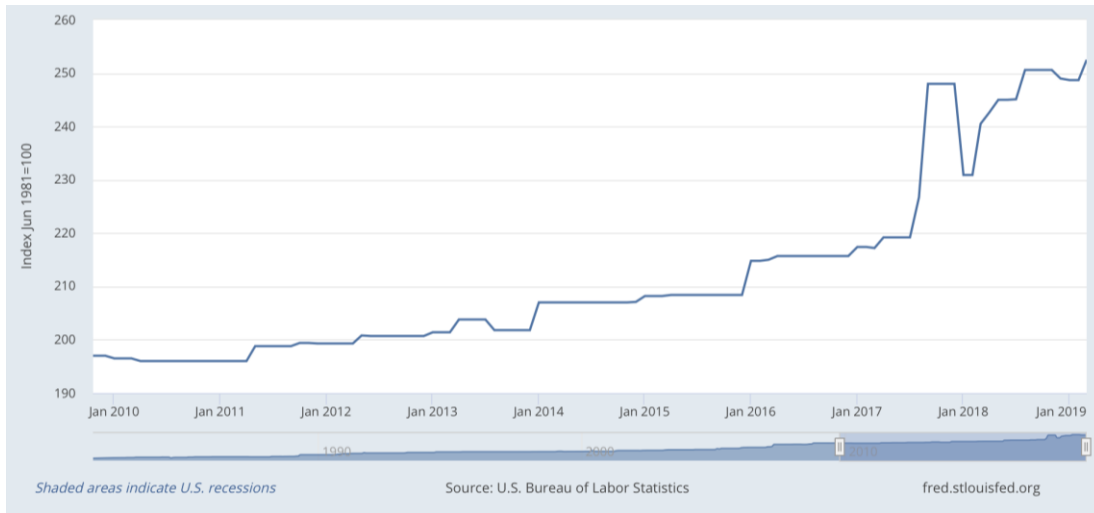
Figure 7. Producer Price Index by Commodity for Lumber and Wood Product (2000-2019)<sup>18</sup>



<sup>17</sup> FRED. (2019). *Price Index by commodity for metals and metal products: iron and steel*. Retrieved from <https://fred.stlouisfed.org/series/WPU101>

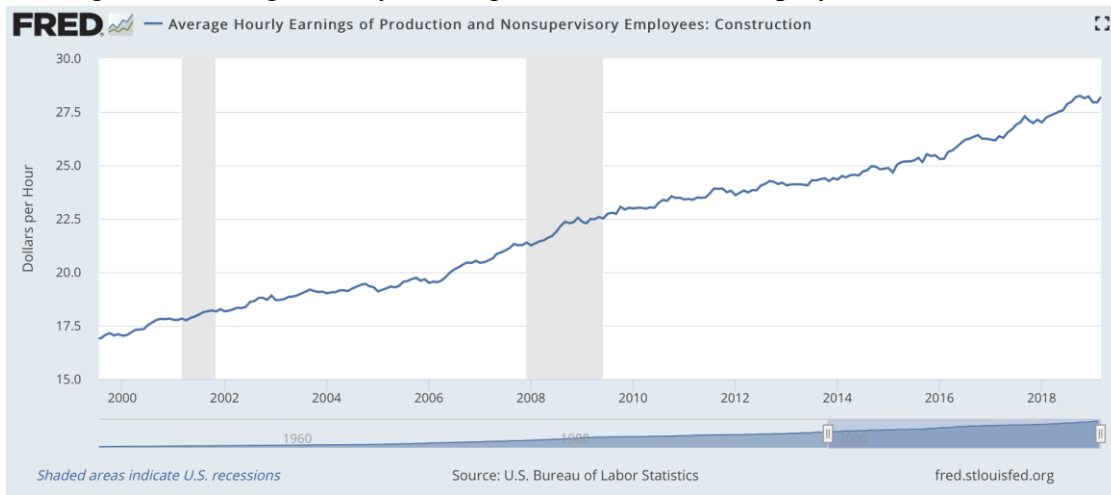
<sup>18</sup> Ibid.

Figure 8. Producer Price Index by Industry: Concrete Blocks and Brick Manufacturing (2010-2019)<sup>19</sup>



Another factor driving the increase in development cost is labor. In 2000, the average hourly earnings for construction employees was \$17.03. In 2019, average earning reached \$28.20, a 65.6% increase (Figure 9). One possible explanation is that immigrants used to provide cheap labor force to the construction industry, but in the recent decade, the immigrant population has been shrinking.<sup>20</sup>

Figure 9. Average Hourly Earnings of Construction Employees (2000-2019)<sup>21</sup>



<sup>19</sup> FRED. (2019). *Producer Price Index by industry: concrete blocks and brick manufacturing: concrete brick*. Retrieved from <https://fred.stlouisfed.org/series/PCU32733132733106>

<sup>20</sup> Porter, E. (2019). *Short of Workers, U.S. Builders and Farmers Crave More Immigrants*. Retrieved from <https://www.nytimes.com/2019/04/03/business/economy/immigration-labor-economy.html>

<sup>21</sup> FRED. (2019). *Average hourly earnings of production and nonsupervisory employees: construction*. Retrieved from <https://fred.stlouisfed.org/series/AHECONS>

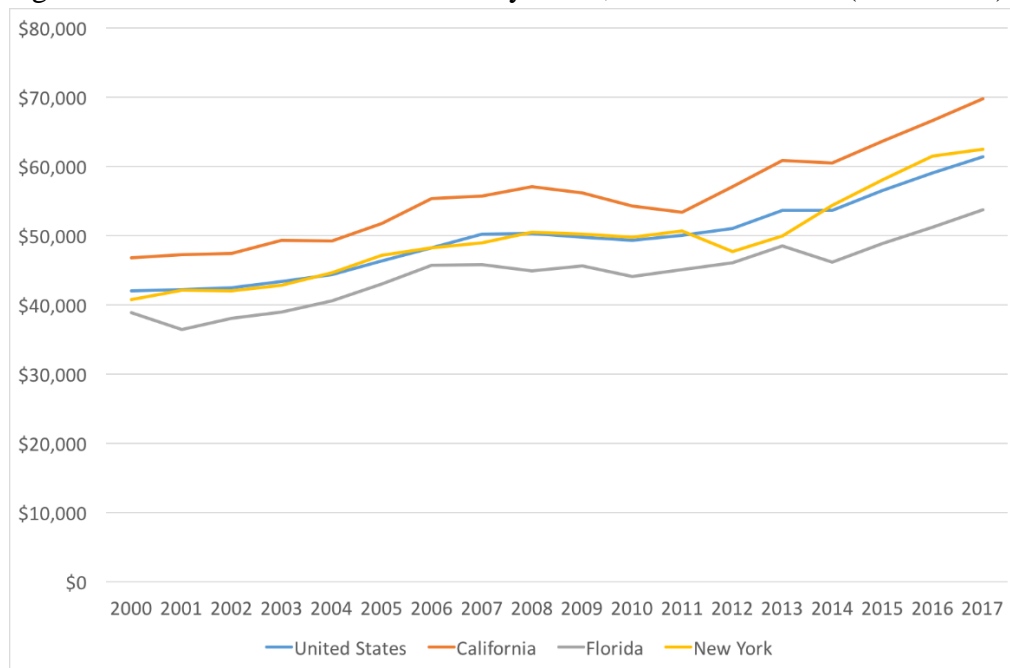
## Area Median Income (AMI)

As construction and labor costs continue to rise, it is valuable to look at how developers' revenue in the affordable housing market has changed as well. Area Median Income (AMI) is a way of measuring that change.

Since the global financial crisis, the U.S. unemployment rate has decreased from 7.8% in January 2009 to 3.8% in March 2019.<sup>22</sup> As a result, the nationwide median household income has been increasing and currently stands higher than pre-crisis levels (Figure 13).

In 2017, California's median household income was higher than the national average of \$69,759, while New York State was close to the national average (\$62,447) and Florida was below the average (\$53,681) (Figure 13).

Figure 13. Median household income by states, in current dollars (2000-2017)<sup>23</sup>



To compare AMI on a micro level, we used county-level data. Specifically, Kings (New York) County (New York), Queens County (New York), and counties in Florida and California.

The median household income in the California county is significantly higher than the national average, while the median income in the Florida county is much lower than the U.S. average.

<sup>22</sup> CPS News Releases. (n.d.). Retrieved from <https://www.bls.gov/cps/>

<sup>23</sup> US Census Bureau. (2018, August 28). *Historical Income Tables: Households*. Retrieved from <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html>

Kings County and Queens County have median household income that closely follow the nationwide average.

Between 2011 and 2017, median household income in Kings County, the California county, the Florida county and Queens County rose by 3.5%, 2.7%, 2.0% and 1.6% respectively (Figure 14). From the open data on Department of Numbers, we calculated that the national benchmark growth rate is 1.5% per year.

The California County has the highest AMI, which would make this city the ideal place for affordable housing developers interested in charging higher rent.

Figure 14. Real Median Household Income (2006-2017)<sup>24</sup>

Graph redacted

## Rent for Market-Rate vs. Affordable Housing

Since AMI is a core determining factor of rent in the affordable housing market, the last section shows that rent for affordable apartments has increased fairly slowly. Alternatively, the rent for market-rate apartments has been increasing at a much faster rate. This section will discuss the increase in market-rate rent over time and the widening gap between affordable and market-rate apartments.

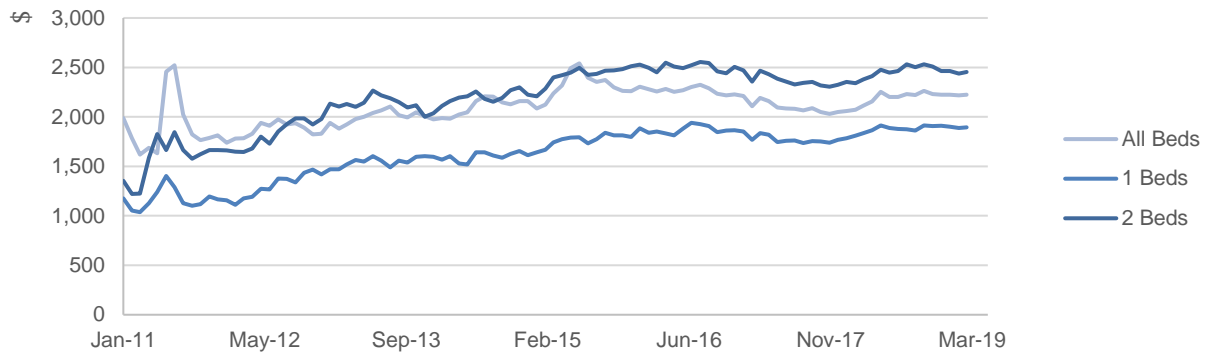
### Market-Rate Rent

In the city where Project Florida is located, the average rent is \$2,223/month (Table 3). Further, rent increases have been gradual (Figure 10). Since January 2011, the average rent (all beds) has only increased by about 11.8% and by 4.9% in the last year (Table 3).

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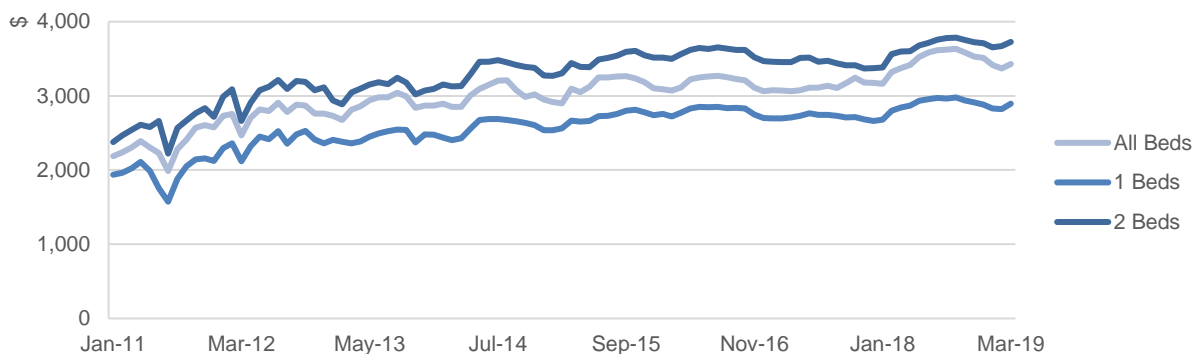
<sup>24</sup> Data retrieved from <https://www.deptofnumbers.com/income/>

Figure 10. Florida City Rent (Jan 2011 - Mar 2019)<sup>25</sup>



In New York City, the average rent is \$3,369 (Table 3). Comparatively, in the neighborhood of New York where Project Queens is located, rent averages \$1,709/month.<sup>26</sup> On the other hand, in the neighborhood of Brooklyn, NY, where Project Brooklyn is located, rent averages \$3,615.<sup>27</sup> Rent in NYC has increased significantly over the years (Figure 11). Since January 2011, the average rent (all beds) in NYC increased by 56.7%, and by 1.6% in the last year.<sup>28</sup>

Figure 11. New York City Rent (Jan 2011 - Mar 2019)<sup>29</sup>



In the city where Project California is located, the average monthly rent is \$1,784.<sup>30</sup> Since January 2011, the average monthly rent increased by 50.8% (Table 3), from \$1,183/month to \$1,784/month.<sup>31</sup> In the last year, average rent increased by 0.5% (Table 3).

<sup>25</sup> Footnote retracted

<sup>26</sup> Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-new-york-rent-trends/>

<sup>27</sup> Ibid.

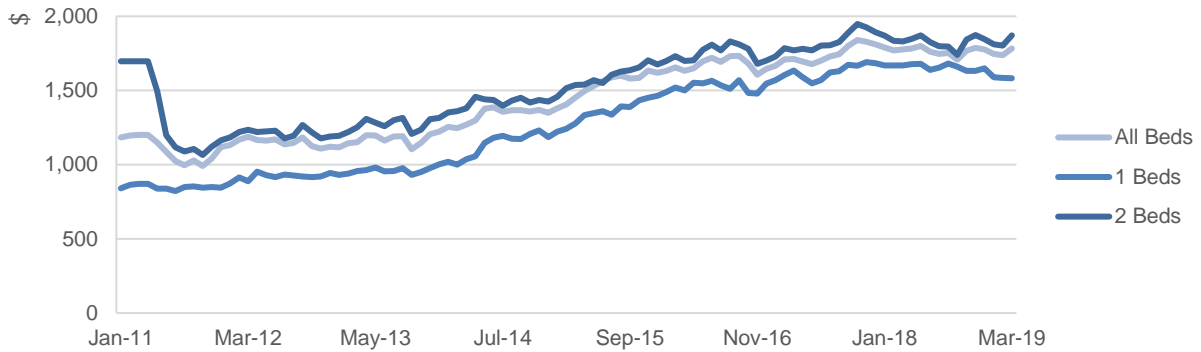
<sup>28</sup> Ibid.

<sup>29</sup> Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-new-york-rent-trends/>

<sup>30</sup> Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-pittsburg-rent-trends/>

<sup>31</sup> Ibid.

Figure 12. California City Rent Trends (Jan 2011 - Mar 2019)<sup>32</sup>



Overall, rent is increasing in Florida, New York, and California. NYC experienced the fastest increase in rent since 2011 at 56.7%, while Florida rent increased by only 11.8%. On the other hand, Florida rent increased the most over the last year with a 4.9% increase (Table 3).

<sup>32</sup> Ibid.

Table 3. Market-Rate Rents in Florida, NYC, and California (2019)

| City   | Florida <sup>33</sup> | New York City <sup>34</sup> | California <sup>35</sup> |
|--|-----------------------|-----------------------------|--------------------------|
| Avg. Monthly Rent (All Beds)                           | \$2,223               | \$3,369                     | \$1,784                  |
| 1BD rent/month   | \$1,893               | \$2,895                     | \$1,583                  |
| 2BD rent/month   | \$2,454               | \$3,726                     | \$1,872                  |
| % Increase in Avg. Rent (1 year)                       | 4.9%                  | 1.6%                        | 0.5%                     |
| % Increase in Avg. Rent<br>(January 2011 - March 2019) | 11.8%                 | 56.7%                       | 50.8%                    |

### Affordable Housing Rent

While market-rate rent fluctuates significantly with changes in the market, affordable housing rent does not change as freely. Earlier, we found that AMI only increased by 1.6%-3.5%, while market-rate rent increased by 11.8%-50.8%. As the average market-rate for rent increases, the gap between market and affordable housing rent widens as well.

Table 4 estimates income and monthly rent for a three-person household earning 60% of the area median income (AMI). This table reveals that in California, this type of family would have a much higher income (\$66,960) compared to the same family in Florida (\$42,540) or New York City (\$56,340) (Table 4). Additionally, the estimated cost of rent is highest in California, with a range of \$1,221 to \$2,231 per month for a studio to five-bedroom apartment. Although California has the highest monthly rent, the gap between market rate and affordable housing rent for a two-bedroom apartment is much smaller compared to the other cities. In California, affordable rent is only 16.2% cheaper than market rent, compared to 56.6% cheaper in Florida and 65.6% cheaper in New York City (Table 4).

<sup>33</sup> Footnote retracted

<sup>34</sup> Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-new-york-rent-trends/>

<sup>35</sup> Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-pittsburg-rent-trends/>



Table 4. Affordable Housing Rents in Florida, NYC, and California (2019)

| City  | Florida <sup>36</sup> | New York City <sup>37</sup> | California <sup>38</sup> |
|---|-----------------------|-----------------------------|--------------------------|
| Income (60% AMI)                            | \$42,540              | \$56,340                    | \$66,960                 |
| Studio rent/month                           | \$827                 | \$837                       | \$1,221                  |
| 1BD rent/month                              | \$886                 | \$1,058                     | \$1,308                  |
| 2BD rent/month                              | \$1,064               | \$1,280                     | \$1,569                  |
| 3BD rent/month                              | \$1,228               | \$1,472                     | \$1,813                  |
| 4BD rent/month                              | \$1,370               | -                           | \$2,022                  |
| 5BD rent/month                              | \$1,511               | -                           | \$2,231                  |
| Avg. Market Rent for 2BD                    | \$2,454               | \$3,726                     | \$1,872                  |
| Affordable Rent: Market Ratio <sup>39</sup> | 56.6%                 | 65.6%                       | 16.2%                    |

The cheaper affordable housing is, compared to market rate, the higher the demand tends to be for affordable housing. Thus, affordable housing tends to be in higher demand in Florida and New York compared to California.

## Challenges to Affordable Housing Supply

Even with a high demand for affordable housing, each city faces their own challenges with maintaining their affordable housing supply, including regulatory, environmental, and financial challenges.

### New York City

New York City is experiencing a displacement crisis as affordable housing expires and neighborhoods become more expensive.

<sup>36</sup> Reference Retracted

<sup>37</sup> Area Median Income (AMI). (n.d.). Retrieved from <https://www1.nyc.gov/site/hpd/renters/area-median-income.page>

<sup>38</sup> Reference Retracted

<sup>39</sup> This was calculated using the following equation:  $[(\text{Market Rent} - \text{Affordable Rent}) / \text{Market Rent}]$ . The percentage reflects how much cheaper affordable housing rent is compared to market rate rent.

- **NYC has lost many affordable housing units.** Between 2015 and 2016, NYC neighborhoods, such as Astoria, Central Harlem, and Bedford Stuyvesant have lost 634, 500, and 460 affordable units respectively.<sup>40</sup>
- **The number of expiring City-backed affordable housing units is growing.** Astoria and Central Harlem alone have more than 1,000 LIHTC units expiring in the next 3-5 years.<sup>41</sup>
- **Expiring Federal Subsidies.** The Upper West Side, East Harlem, and Lower East Side, and Chinatown are the most concentrated places where buildings are at risk of losing subsidies from the U.S. Department of Housing and Urban Development (HUD).<sup>42</sup>
- **As the supply of affordable housing is decreasing, the supply of market rate units is increasing.** In Midtown, Clinton/Chelsea, and the Lower East Side/Chinatown there are a significant number of new residential units under construction; over 1,000 units in each of those districts in 2017 alone.<sup>43</sup>

## Florida

As one of the most vulnerable real estate markets in the country, Florida is facing a severe affordable housing crisis caused by climate change.

- **“Climate Gentrification.”** Coining the theory of “climate gentrification,”<sup>44</sup> properties at a higher elevation are increasing in value as coastal properties are threatened by rising sea levels and natural disasters.<sup>45</sup>
- **Low-Income Homeowners are Being Pressured to Sell.** Many low-income renters are suffering from the increasing cost of living and they are more vulnerable to market fluctuations. Moreover, those who have financial problems are also targeted by developers offering them buyouts or relocation assistance. Many residents have to move from where they have lived for decades. This problem is particularly severe in waterfront areas.<sup>46</sup>

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<sup>40</sup> *New Affordable Housing Analysis Shows Where Displacement Risk Is Most Severe in New York City.* (2018, August 30). Retrieved from <https://anhd.org/press-release/new-affordable-housing-analysis-shows-where-displacement-risk-most-severe-new-york>

<sup>41</sup> Ibid.

<sup>42</sup> *New Affordable Housing Analysis Shows Where Displacement Risk Is Most Severe in New York City.* (2018, August 30). Retrieved from <https://anhd.org/press-release/new-affordable-housing-analysis-shows-where-displacement-risk-most-severe-new-york>

<sup>43</sup> Ibid.

<sup>44</sup> Hepler, L. (2017, August 17). *What is climate gentrification?* Retrieved from <https://www.greenbiz.com/article/what-climate-gentrification>

<sup>45</sup> Footnote retracted

<sup>46</sup> Board, T. E. (2019, April 27). *California Has a Housing Crisis. The Answer Is More Housing.* Retrieved from <https://www.nytimes.com/2019/04/27/opinion/california-housing.html>

## California

California is facing the risk of affordable housing units converting to market-rate buildings. The lack of government subsidies is also undermining the affordable housing market.

- **Affordable units converted to market-priced units.** One of the most urgent challenges faced in California is maintaining the current supply of affordable housing. According to a local assessment, most affordable rental housing units in California were achieved through subsidy contracts and deed restrictions/affordability covenants in exchange for rehabilitation and construction funds and/or mortgage assistance.<sup>47</sup> However, many units transitioned to market-rate buildings after a short period, which has undermined access to affordable rental units.
- **Lack of government subsidies.** California faces challenges meeting the needs of low-income individuals due to the declining amount of federal Community Development Block Grant (CDBG) funds in recent years.

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<sup>47</sup> Footnote redacted

## Part V: Risks for Affordable Housing Developers and Investors

Beyond the financial and regional considerations discussed above, our team considers important risks developers and investors should be mindful of when embarking on affordable housing projects.

### Low Occupancy

**RISK:** Affordable housing does not guarantee 100% or even 90% occupancy. Location remains an important factor for maintaining necessary occupancy rates. The risk for low occupancy is higher in California than it is in NYC and Florida, according to Part IV of this report. During an interview, the developer for Project Florida, discussed a time following the financial crash when one of their buildings was at 75% occupancy, even though rent was only \$600. This event signaled to the developer that even when monthly rent for affordable housing is low, there are times when it is still unaffordable to people living in the neighborhood.

**MITIGANTS:** To mitigate occupancy risk, developers must consider not just the city, but the income level of target residents, accessibility to public transportation and services, availability of other affordable housing units, affordable housing rent differential to market, and other potential threats to demand.

### Construction Delays

**RISK:** Delays in construction pose serious concerns for both developers and investors. LIHTC investors are unable to receive tax credits until the property is built and has reached a certain occupancy level, thus these delays prevent investors from receiving benefits in a timely manner. Developers, moreover, suffer from a decrease in the developer fee paid to them due to delays. Additionally, delays in project completion can drive up the development cost per unit via higher labor costs, which means rising public subsidy and developer costs.

**MITIGANT:** Construction delays are often the result of unforeseen circumstances. In order to absorb these risks, it is recommended that investors and developers include a reserve for unexpected cost in each development budget.

### Natural Disasters

**RISK:** The risk associated with natural disasters heavily depends on the location of the property, though each location is subject to its own type of risk. In New York City, hurricanes can seriously damage or destroy property completely. In Florida, there is the same vulnerability, in addition to

the challenge of wind storms. The magnitude of such risks are highly uncertain—while taxes, reserves, and fees can be budgeted by developers, the change in insurance premiums associated with a catastrophic event, are unpredictable. During our interview, the Florida developer said that following a single natural disaster, insurance premiums can increase by as much as 20-25%. This is a significant financial risk to developers. Natural disasters are also a significant risk to investors, as a natural disaster can result in the loss or delay of credit delivery if the property is destroyed.

**MITIGANTS:** To prepare for worsening weather conditions, developers should equip their buildings with better technology. During an interview with the developer for Project Queens, representatives discussed that for properties susceptible to hurricanes and rising tides, they install disaster-resistant features. Specifically, the developer has buildings with emergency generators that are able to heat water, and power elevators and outlets. Further, the developer has developed flood-proofed lobbies. These changes not only make the building more resilient, but they are often energy efficient, reducing the yearly maintenance cost per unit.

## Changes in Corporate Tax Rate

**RISK:** Since the debt carried by these projects tends to be for a long maturity (30 years), the uncertainty related to future tax adjustments and policy changes can impact both developers and investors. In December 2017, the Tax Cut and Jobs Act passed by Congress, lowered the corporate tax rate from 35% to 21%. As a result, pricing for LIHTC decreased by about 3 to 5 cents on the dollar.<sup>48</sup> Subsequently, investors could buy LIHTC credits cheaper, but it also meant their tax benefits were lower than before the change in tax rate. Developers were also hurt by this because they received less equity for the same LIHTC award. With an upcoming election, it is feasible that the corporate exchange rate could change again in the near future.

**MITIGANT:** Developers and investors can account for this change by incorporating a sensitivity analysis into their long-term projects. By calculating projections based on a corporate tax rate of 20%, 25%, 30%, etc., stakeholders can be aware of their financial position if the tax rate were to increase/decrease in the future.

## Community Resistance

**RISK:** Existing renters can often be resistant to new housing developments in their community, especially when it is affordable housing.

**MITIGANTS:** Next City provides the following recommendations for dealing with community resistance:

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<sup>48</sup> Kimura, D. (2018, March 1). *LIHTC Prices Expected to Drop as Market Adjusts to Tax Rate*. Retrieved April 25, 2019, from [https://www.housingfinance.com/finance/lihtc-prices-expected-to-drop-as-market-adjusts-to-tax-rate\\_o](https://www.housingfinance.com/finance/lihtc-prices-expected-to-drop-as-market-adjusts-to-tax-rate_o)

1. *“Craft the Message Carefully.* So that the neighborhood feels more respect towards these new neighbors and becomes willing to cooperate with the project;”<sup>49</sup>
2. *“Leverage what you have gained.* Hearing the personal stories of community members who need affordable housing can be incredibly powerful, say, advocates. However, again, tailor the story to the audience;”<sup>50</sup>
3. *“Think Bigger and Encourage Neighbors to Do So.* Neighborhood opposition to affordable housing does not happen in a vacuum. It is caused by many things, including a regulatory environment that often forces developers to consult local government and citizens repeatedly.”<sup>51</sup>

## Building Deterioration

**RISK:** Although most projects are designed to last 50 years, year 30 is a crucial point in time for developers to reinvest in property. Over such a long period, the rise of expenses related to variable costs, such as insurance, poses a risk for developers. Deterioration of property can also make buildings more vulnerable in the face of natural disasters.

**MITIGATION:** In response to these long-term risks, developers tend to choose better-quality materials that will last for a longer period of time. During our interview Pinnacle Housing Group, the developer mentioned that over the past 15 years, construction materials are continuously improved, allowing developers to find effective ways to extend the useful life of their projects.

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<sup>49</sup> Amanda Abrams. 2017. *Ways Affordable Housing Developers Are Fighting NIMBYism*, Next City. Retrieved from <https://nextcity.org/daily/entry/ways-affordable-housing-developers-deal-with-nimbys>

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

## Part VI: Opportunities for Future Research

Our assessment of affordable housing projects mainly focuses on the analysis of economic returns and risks. In addition to these issues, climate change and mixed-income housing tradeoffs are two areas in particular that deserve more attention than we are able to provide in this report, but that have significant implications for the future of affordable housing.

### Climate Change Risks Related to Affordable Housing

For future research, it would be valuable to analyze the cost-benefit analysis of development in areas most vulnerable to climate change. In the U.S., many cities on the coast are extremely populous, making them ideal for affordable housing. However, in the midst of rising sea levels and more frequent natural disasters, the risks to building on the coast are increasing. Are developers and investors better off building inland, where it is safer and less populous, or on the coast, where there is a higher demand for affordable housing, but a greater number of risks?

### Mixed-Income Housing Tradeoffs

Researching the cost-benefits of mixed-income housing, compared to 100% LIHTC housing, is another area for future research. For this report, the only mixed-income housing project was Project Queens. This project also happened to have the highest IRR for LIHTC investors and the lowest public subsidy cost per unit. Do all mixed-income projects maximize returns for investors, while minimizing public subsidy costs, or are these gains specific to Project Queens? Additionally, it seems that with a larger share of market-rate renters, developers are able to absorb costs more easily than in projects with only access to affordable housing rents. Is this always the case?

## Part VII: Policy Suggestions

In addition to opportunities for future research, we have the following suggestions for policymakers:

### Increase Funding for the LIHTC Program

Currently the Low-Income Housing Tax Credit (LIHTC) program is the main driver of affordable housing supply in the United States. In addition to directly supporting the construction of affordable housing, there are many other social benefits that need to be considered. The LIHTC program creates more job opportunities for the U.S. labor market aimed at less educated workers. Furthermore, it increases the demand for construction materials and boosts the development of related industries. Moreover, LIHTC contributes to community diversification and inclusion. Considering these social benefits, the federal government should allocate more funding to the LIHTC program.

### Allocate Portion of EB-5 Capital to Affordable Housing Projects

A portion of EB-5 Capital should be used towards financing affordable housing. The EB-5 program aims to attract immigrant investors in exchange for receiving green cards. The minimum investment to a targeted employment area (TEA), which is an area with high unemployment rate, is \$500,000. To increase private-sector funding of affordable housing, policymakers should incentivize EB-5 investments to this sector and allocate a specific percentage of capital to such projects.

### Provide More Land Acquisition Subsidies

A key finding of our analysis of the uses of total funds for each project is that acquisition costs were relatively low. What lies behind the low cost is the government subsidies for acquiring land at little-to-no cost. However, the recent boom in the U.S. real estate market has pushed the price of land up and made it less financially feasible to build affordable housing. To incentivize the construction of affordable housing, it is important for the government to continue to provide land to developers at a low cost.



# Bibliography

- Amanda Abrams. 2017. *Ways Affordable Housing Developers Are Fighting NIMBYism*, Next City. Retrieved from <https://nextcity.org/daily/entry/ways-affordable-housing-developers-deal-with-nimbys>
- Amanda Abrams, *6 Ways Affordable Housing Developers Are Fighting NIMBYism*, Next City, July 2017 <https://nextcity.org/daily/entry/ways-affordable-housing-developers-deal-with-nimbys>
- Area Median Income (AMI)*. (n.d.). Retrieved from <https://www1.nyc.gov/site/hpd/renters/area-median-income.page>
- Association for Neighborhood and Housing Development. 2018. *New Affordable Housing Analysis Shows Where Displacement Risk Is Most Severe in New York City*. Retrieved From <https://anhd.org/press-release/new-affordable-housing-analysis-shows-where-displacement-risk-most-severe-new-york>
- Board, T. E. (2019, April 27). *California Has a Housing Crisis. The Answer Is More Housing*. Retrieved from <https://www.nytimes.com/2019/04/27/opinion/california-housing.html>
- Bureau of Labor Statistics. 2019. *Labor Force Statistics from Current Population Survey*. Retrieved from <https://www.bls.gov/cps/>
- CPS News Releases. (n.d.). Retrieved from <https://www.bls.gov/cps/>
- Department of Numbers. 2019. *New York Household Income*. Retrieved from <https://www.deptofnumbers.com/income/new-york/>
- Desai, M., Dharmapala, D., & Singhal, M. (2008). *Tax Incentives for Affordable Housing: The Low Income Housing Tax Credit*.
- Federal Reserve Bank of St. Louis. (2019). *About the Community Reinvestment Act*. Retrieved from <https://www.stlouisfed.org/community-development/about-us/community-reinvestment-act#main>
- FRED. (2019). *Price Index by commodity for metals and metal products: iron and steel*. Retrieved from <https://fred.stlouisfed.org/series/WPU081>
- FRED. (2019). *Producer Price Index by Commodity for Lumber and Wood Products: Lumber*. Retrieved from <https://fred.stlouisfed.org/series/WPU081>
- FRED. (2019). *Producer Price Index by industry: concrete blocks and brick manufacturing: concrete brick*. Retrieved from <https://fred.stlouisfed.org/series/PCU32733132733106>
- FRED. 2019. *Average hourly earnings of production and nonsupervisory employees: Construction*. Retrieved from <https://fred.stlouisfed.org/series/AHECONS>
- Hepler, L. (2017, August 17). *What is climate gentrification?* Retrieved from <https://www.greenbiz.com/article/what-climate-gentrification>
- Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from <https://www.rentjungle.com/average-rent-in-new-york-rent-trends/>
- Jungle, R. (n.d.). *FIND APARTMENTS IN YOUR AREA*. Retrieved from

- <https://www.rentjungle.com/average-rent-in-pittsburg-rent-trends/>
- Kimura, D. (2018, March 1). *LIHTC Prices Expected to Drop as Market Adjusts to Tax Rate*. 2019. Retrieved from [https://www.housingfinance.com/finance/lihtc-prices-expected-to-drop-as-market-adjusts-to-tax-rate\\_o](https://www.housingfinance.com/finance/lihtc-prices-expected-to-drop-as-market-adjusts-to-tax-rate_o)
- Kings County New York Household Income. (n.d.). Retrieved from <https://www.deptofnumbers.com/income/new-york/kings-county/>
- Lauren Hepler. 2017. What is Climate Gentrification? Retrieved from <https://www.greenbiz.com/article/what-climate-gentrification>
- Majale, M. (2011). *Affordable land and housing in Africa*. Nairobi, Kenya: United Nations Human Settlements Programme.
- Majale, M., Tipple, A. G., & French, M. (2011). *Affordable land and housing in Asia*. Nairobi: United Nations Human Settlements Programme.
- McBride, B., & French, M. (2011). *Affordable land and housing in Latin America and the Caribbean*. Nairobi: United Nations Human Settlements Programme.
- National Low-Income Housing Coalition. (2019). *The U.S. Has National Shortage of More Than 7.2 Million Affordable & Available Rental Homes for Families Most in Need*. Retrieved From <https://nlihc.org/news/us-has-national-shortage-more-72-million-affordable-available-rental-homes-families-most-need>
- New Affordable Housing Analysis Shows Where Displacement Risk Is Most Severe in New York City*. (2018, August 30). Retrieved from <https://anhd.org/press-release/new-affordable-housing-analysis-shows-where-displacement-risk-most-severe-new-york>
- New York Housing Development. 2019. *Area Median Income*. Retrieved from <https://www1.nyc.gov/site/hpd/renters/area-median-income.page>
- Office of the Community Developments. (2019). *Low-Income Housing Tax Credits: Affordable Housing Investment Opportunities for Banks*. Retrieved from <https://www.occ.gov/topics/community-affairs/publications/insights/pub-insights-mar-2014.pdf>
- Porter, E. (2019). *Short of Workers, U.S. Builders and Farmers Crave More Immigrants*. Retrieved from <https://www.nytimes.com/2019/04/03/business/economy/immigration-labor-economy.html>
- Queens County New York Household Income. (n.d.). Retrieved from <https://www.deptofnumbers.com/income/new-york/queens-county/>
- Sunday Review. 2019. *California Has a Housing Crisis. The Answer Is More Housing*. Retrieved from <https://www.nytimes.com/2019/04/27/opinion/california-housing.html>
- The Bluestone Group. (2019). *About*. Retrieved from <https://bluestonegrp.com/about/>
- Tsenkova, S., & French, M. (2011). *Affordable land and housing in Europe and North America*. Nairobi: United Nations Human Settlements Programme (UN-HABITAT).
- United Nations. (2019). *Affordable housing key for development and social equality*. Retrieved From <https://www.un.org/sustainabledevelopment/blog/2017/10/affordable-housing-key-for-development-and-social-equality-un-says-on-world-habitat-day/>

- United States Government Accountability Office. (2018). *Low-Income Housing Tax Credit-Improved Data and Oversight Would Strengthen Cost Assessment and Fraud Risk Management* |GAO-18-637. Retrieved from <https://www.gao.gov/assets/700/694541.pdf>
- US Census Bureau. (2018, August 28). *Historical Income Tables: Households*. Retrieved from <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html>
- United States Census Bureau, *Median Household Income by State: 1984 to 2017.3*, Retrieved From <https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html>

## Public Subsidy Cost Calculation

Total public subsidy costs for the projects primarily fall into three categories: tax credit cost, tax-exempt interest cost, and other subsidies and grants. The tax credits cost is what the LIHTC investor receives in yearly tax reductions. LIHTC investors with a 4% deal receive a credit worth approximately 30% of eligible development. Investors with a 9% deal receive a credit worth 70% of eligible costs.

The tax-exempt interest cost is the tax reduction for bonds and loans which finance the affordable housing projects. We first calculate the interest amount over the next 15 years, given that investors usually only stay in the deal for that period of time. Then, we multiply the tax rate by the interest rate to derive the reduction in tax, which should have been charged for the interest income. Finally, we discount this over a 15-year period using the 15-year treasury yield to get the present value of the tax-exempt interest cost.

Other subsidies and grants vary from project to project. Usually such subsidies and grants are one-time payment, which makes our calculation straight forward by just accounting for the total amount.

## Indexed Development Cost Calculation

When calculating the development cost per square foot, it is important to account for differences between geographical locations. Therefore, we indexed development cost to provide a price-adjusted development cost per square foot.

Our research gives us the median housing development cost per square foot in New York City, California, and Florida. Using New York City as the base cost (\$282), we indexed the costs for Florida (\$264) and California (\$144). While the raw data shows that the development cost for Project Florida is \$382 per square foot, we need to inflate this cost to compare it to NYC price levels. Thus, we multiplied \$382 by \$282 over \$264, which equals \$408. For California, the indexed developer cost is \$439 times \$282 over \$144, which equals \$859.