TERNER CENTER FOR HOUSING INNOVATION
UC BERKELEY

Making It Pencil: The Math Behind Housing Development

Authored by **David Garcia, Policy Director**

Building new housing is complicated and costly. From land acquisition to project design to entitlement to financing, a developer must go through numerous steps before the first shovel ever hits the ground. However, the steps that a developer navigates to take new housing from idea to occupancy are not well understood by the public or by policy makers. As a result, some well-intentioned decisions—such as imposing inclusionary zoning requirements on new developments when those requirements are not supported by market fundamentals—may lead to the unintended consequence of fewer, rather than more, affordable housing units being built. The "math" underlying housing development is critical, but very few resources exist to explain that math to those outside the real estate industry.

We believe that demystifying the math that underpins whether a project "pencils" is an important step towards forming a shared understanding of what it will take to move forward in solving California's housing crisis. To that end, the Terner Center has undertaken an analysis of development scenarios in various regions in Northern California to shed light on the development process.

This brief will explain the steps a developer undertakes to design, finance, build, and set the rents for market-rate housing. We answer the following questions:

» What are the various costs that go into the development of new housing?

» How are new housing developments financed?

» What are the benchmarks required by financial institutions and capital sources to invest in new housing?

» How do various requirements impact the ability of developers to deliver projects?

Unpacking the factors that impact what a developer can build in today's market helps in understanding why so much new housing is expensive, and why new supply is often only affordable for upper-income households.[1]

Methodology

Underlying every project is a "pro forma"—the analysis a developer undertakes to estimate total development costs relative to projected income (e.g., the monthly rents) in order to determine financial feasibility. Every type of project—be it a four-story, 20-unit building or a 20-story, 300-unit building—will have a different cost and return calculus associated with it. To explain the various elements that go into a pro forma, we created a prototypical development project to demonstrate the process by which developers construct and finance new rental, market-rate housing.

While there are various types of development (e.g., high-rises, townhomes, accessory dwelling units), our prototype is designed as a market-rate, mid-rise, rental apartment building. Specifically, the prototype is a multistory residential building with a Type 1 concrete podium first floor and Type 5 wood frame construction above.[2] Since different construction types are subject to very different costs and code requirements, the results of our prototype analysis should not be extrapolated to other forms of development. For example, townhomes are often constructed primarily of wood framing and do not require more costly features such as concrete podiums, underground parking, or elevators. Also, high-rise construction above 85 feet (or roughly seven stories) requires a shift from wood frame building materials to concrete and steel, which raises the overall cost of a project considerably. Regardless of building type, the financing principles of any new housing development are the same: any project must demonstrate the ability to meet an acceptable return requirement in order to obtain financing.

To demonstrate geographic differences in how pro formas can vary, we assess pro formas for this prototype in three different areas of California: the East Bay (e.g., Oakland, Berkeley), the South Bay (e.g., San Jose, Santa Clara), and Sacramento. As with design type, costs can vary significantly by region which may feature different building codes, local requirements, and labor markets. The selection of these regions was informed by our project partners who were interested in the costs to develop in their specific localities.[3]

To determine project costs, we put the hypothetical prototype "out to bid" with general contractors to provide a broad estimate of how much this project would cost in today's market. Our analysis was also informed by conversations with developers in each region to ensure that project assumptions and characteristics were representative of each market.

To determine whether the prototype would "pencil" in each market area, we also made a series of assumptions regarding the financial thresholds each project must meet. As with project cost, these assumptions (explained in more detail below) were vetted with lenders and equity providers and represent standards in their respective market areas. In addition to the overall cost of construction, financing dynamics drive rental costs, as the obtainable rents for a project must support the overall cost to develop, while also meeting the financial requirements of banks and investors.

Beyond our baseline assumptions, we also examined how changes in pro forma inputs, such as higher impact fees or reduced parking requirements, changed our project's calculus and potential for feasibility. This additional analysis was done to explore how different policy priorities are reflected in the development math.

Table 1: Prototype Characteristics

Total Units	120
Unit Mix	Studio - 48 1 Bed - 40 2 Bed - 32 3 Bed - 0
Parking	120
Ground Floor Retail	1,500 sf

Project Prototype

While in reality no two housing developments are the same,[4] we developed a simple prototype project in order to show how the math works and how the same project will have different financial fundamentals in different housing markets. Table 1 depicts the design characteristics for our prototypical project including unit number, mix, parking, and retail.

In addition to specific development characteristics, we also made a series of assumptions regarding site conditions as well as jurisdiction requirements (e.g., parking requirements). These assumptions are detailed in Table 2.

While we made these assumptions in order to compare across prototypes, it should be noted that any increase or change to any combination of these components could dramatically increase the total cost of a project. For example, land that requires significant remediation of contaminated soil or the demolition of an existing building would increase the total cost of development. City requirements could significantly change the development math as well, such as requirements to upsize underground infrastructure, or provide significant off-site, public right-of-way improvements as a condition of approval.

Breaking Down Costs

Three categories of costs are associated with any development project: hard costs, soft costs, and land costs. We've broken down our project prototype by these three categories.

Hard Costs

The most significant costs of any project are those associated with its physical construction. These include labor and materials, including the cost of concrete, timber, and

Table 2: Prototype Assumptions

No Environmental Impact Report The prototype is not required to conduct a full Environmental Impact Report, as generally required by the California Environmental Quality Act (CEQA).	**No Affordable Housing Requirement** The prototype is not required to include any below-market units, or pay into an affordable housing program.
No Demolition No existing structures existed on the site that required demolition.	**Total Impact Fees of $40,000/unit** Impact fees are fees levied on a project as a condition of approval by a city, county, or other fee-levying body (e.g. school district, municipal utility district).
No Environmental Remediation The prototype site does not require any significant remediation of contaminated soil, or other issues commonly found in urban infill locations.	**Parking Requirements** One parking space per unit is required.
No Significant Offsite Requirements There is sufficient existing infrastructure to service the prototype. The project does not need to undergo significant work in order to improve capacity for services such as water, power, or wastewater.	**Non-Prevailing Wages** Prevailing wages for the prototype are not required as no subsidy is used for project finance.[5]

mechanical systems. Hard costs are also reflective of various building code requirements that impact the way a structure is built. For example, in seismic zones, building codes require new buildings to be constructed with materials that will hold up during an earthquake. A 5 percent hard cost contingency is also included in our pro formas to mitigate against project overruns.

Soft Costs

The second largest component of overall project costs are known as "soft costs," which are those associated with the design and implementation of the project, but not the physical construction (i.e. hard costs). As there are numerous components to any project's soft costs, we've grouped them together in broad categories—fees, financing, consulting, and tax, title, and insurance—each of which is described in more detail in Table 3. We assumed a flat rate of $40,000 in impact fees per unit for the purpose of comparing equally across markets. However, it should be noted that fees vary widely by jurisdiction, with many localities charging much more than our assumed amount.[6]

Consultant costs refer to the broad set of experts that developers need to design and execute a building. The majority of these costs go to the architects and engineers hired to work on the project. We also include the costs of the various other consultants typically required for a development of this size. On any given project, these consultants can include, but are not limited to, geotechnical engineers (e.g., to determine the integrity of soil on the project site); historical resource consultants (e.g., to determine whether the site contains buildings or resources that can be considered historic); and joint trench consultants (e.g., consultants that coordinate trenching of existing overhead utilities). It should also be noted that the bulk of these costs are typically paid for upfront by the developer before obtaining financing or full project approvals.

The financing category includes items that are related to the costs associated with obtaining financing, but do not include return requirements, which are discussed in the next section. The financing of soft costs includes a required interest reserve (to pay interest on the construction loan during the construction period), soft cost contingency funds (in case soft costs exceed the budgeted amount), and the costs to close financing. In addition, the financing section also includes an amount for a "developer fee." Generally, financial partners allow developers to budget 3 to 5 percent of the total project cost in order to compensate for risk and cover developer overhead, which includes the out-of-pocket expenses that the developer incurs specific to managing the project during predevelopment, construction, and lease-up phases.[7] This fee is not accessible to a developer until financing has closed and construction commences. As such, costs associated with paying development team staff, city fees for plan check and other services, and general property holding costs are borne solely by the developer.

Table 3: Soft Cost Categories

Fees Includes any fees required as a condition of approval for the project, such as school fees, utility connection fees, park fees, art fees, or transportation fees. NOTE: our prototypes standardized total fees at $40k per unit, however total fees vary widely by jurisdiction, and are levied by different entities.	**Consultants** Includes costs associated with professional services to design the project. This includes, but is not limited to, architects; structural engineers; civil engineers, landscape architects; mechanical, electrical, and plumbing design; geotechnical engineers; joint trench consultants; waterproofing consultant; accounting; and legal.
Financing Costs Includes costs associated with obtaining debt and equity, including loan closing costs, soft cost contingencies, and operating reserves. Also, our prototypes include 3 percent of total costs for a "developer fee" to mitigate developer risk and pay for overhead to build and manage the project.	**Tax, Title, and Insurance** Includes costs of general liability and builder's risk insurance, as well as property taxes during construction.

Land Costs

The cost of land is a significant part of overall costs, but is determined in a different manner from hard and soft costs. Generally speaking, land costs are "residual" in that the cost of land should be determined by the amount a developer can afford to pay for the land without making the project too expensive to reach threshold financing requirements. Put another way, the cost of land should be determined by the amount of funds left over after estimating total hard and soft costs without pushing the project into infeasibility. In theory, the market value of land, and what the developer can pay for it, is driven by what can be developed there.

In reality, however, land costs are impacted by various factors, many of which are not related to project feasibility. For example, a property owner may hold out on selling property at the residual price to a developer for many reasons, such as: continuing to operate a profitable business on the property (e.g., a surface parking lot), anticipating that the value of the land will increase in the future, or owing more on the property than the residual value. In these and other instances, a residual land price offered by a developer may be less than what a property owner is willing to sell for. As a result, developers must choose to pay more than the residual value or not purchase the land at all.

For our prototype, we determined land cost by using comparable sales of land in each of the three markets.

In addition to total cost, this category also includes costs associated with closing on the land, as well as due diligence reports (e.g., environmental "phase 1" or "phase 2" reporting to determine the extent to which the presence of harmful substances exist on the site).

Pro Forma Cost Results

Based on the characteristics and assumptions described above, we calculated the total cost of the prototype in the three markets:

- Costs were highest in the East Bay, with the project estimated at a total of **$68,828,255 ($573,569/unit)**, driven by higher construction and land prices.
- The South Bay project was similarly costly at **$61,579,785 ($513,165/unit)**.
- In Sacramento, the prototype was significantly less expensive at **$45,581,075 ($379,842/unit)** due to lower construction and land costs.

Figure 1: Total Prototype Cost

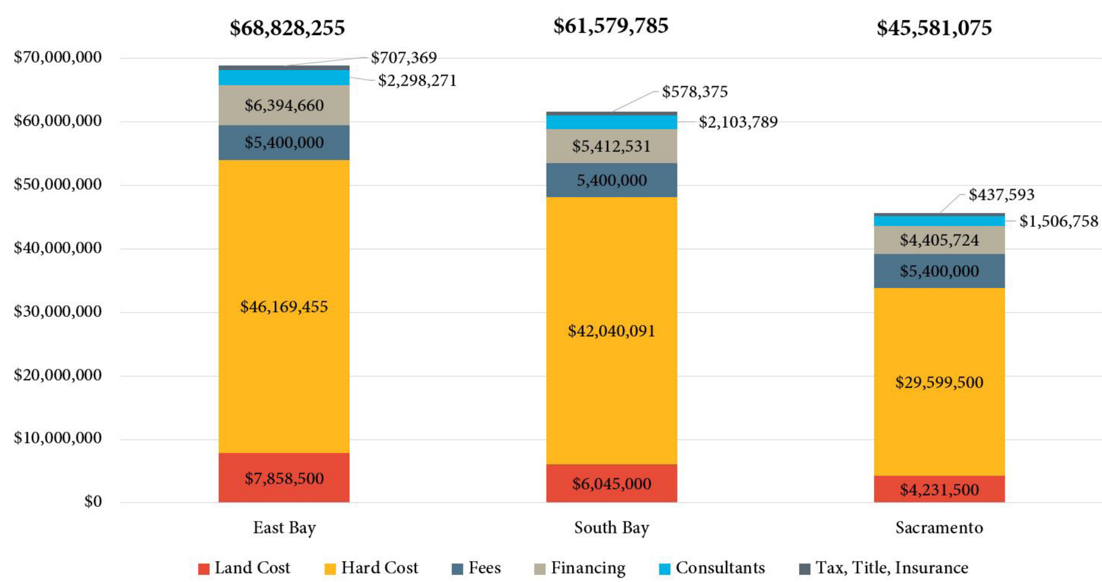
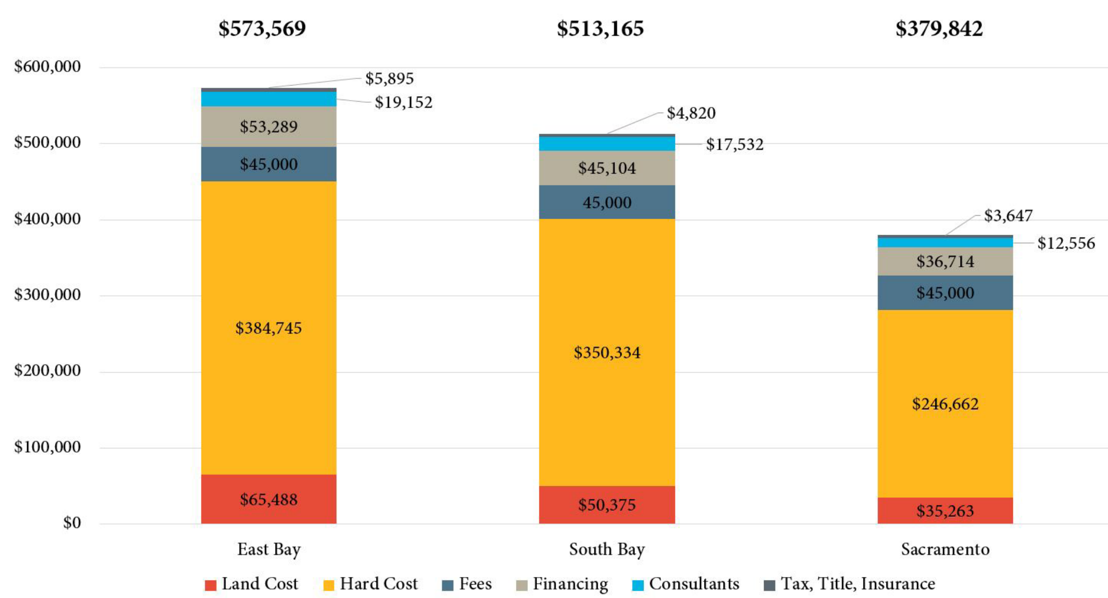


Figure 2: Total Per Unit Prototype Cost



Project Financing

To pay for the cost of these prototypes, a developer will obtain funding from two sources: debt and equity. Debt provides the bulk of project financing, while equity provides the balance. Both forms of funding have their own strict thresholds and requirements that a developer must meet in order to obtain money to build the project. These requirements also influence project feasibility, and can add to the overall costs of development.

Debt

Debt is provided in the form of a loan from a lender (generally a bank) and carries an interest rate which the developer pays back over time.[8] Interest rates vary across market cycles, but for the purposes of this brief, we've assumed a total interest rate of 5 percent across each prototype.

Lenders examine two components when considering whether or not to provide a loan to a particular development: the developer capacity and the details of the project.[9] Developers must show that they have a proven record of success in completing projects on time and on budget, and paying back debt. Lenders also often require a developer to personally guarantee the project loan, which puts tremendous risk on a developer, and severely limits developers who do not have the personal assets to sign such a guarantee. In other words, if the project doesn't succeed, the developer is often personally liable to repay the lender.

Lenders also require supporting documentation to ensure that the project will be successful, and will not agree to fund a project or release funding until this documentation is provided. This includes but is not limited to: market studies, appraisals, environmental documents, architectural documents, and approvals from localities and agencies that have jurisdiction over development in the project's location (Table 4). Developers must provide these at their own expense and risk before closing on project financing.[10]

In addition to assessing a developer's track record and a project's documentation, banks require a project to demonstrate the ability to meet certain financial benchmarks. These financial benchmarks help a bank to determine the likelihood a project will not go into default—that projected long-term income on the project will more than cover the payments on the loans that the bank would make on the development. While there are many benchmarks required by different institutions, we focus on two specific metrics: debt service coverage ratio (DSCR) and loan-to-cost ratio (LTC).

Table 4: Examples of Lender Documentation Requirements

Market Study Developers must provide a study by a reputable consulting firm demonstrating sufficient demand for housing at the project's projected rental prices.	**Environmental Documents** Lenders will request documentation identifying any existing environmental issues with the site, such as the potential for contaminated soil from an underground gas tank or well.
Appraisal The appraisal determines the project's market value upon completion.	**Architectural Documents** Lenders require architectural plans from the developer, including engineering and other technical documentation necessary to construct the building.
Approvals In order to close a construction loan, the project must have obtained all approvals from relevant governing bodies. This includes entitlements and building department approvals from the local municipality, but also any approvals required from other agencies with jurisdiction over development in the project's location (e.g. regional water quality control board, or air resources board).	

Debt Service Coverage Ratio (DSCR)

To mitigate risk, a bank requires a project to demonstrate that its income can support the monthly loan payments over the life of the loan. This metric is measured by a debt service coverage ratio (DSCR) and is calculated by dividing the project's net operating income (NOI)[11] by the anticipated loan payment. For example, a projected DSCR of 1.0 indicates that a project anticipates achieving exactly enough income to match what is required to pay its debt. However, banks require the DSCR to be higher than 1.0 for real estate lending to ensure that, if NOI projections are inaccurate, the developer can still meet their debt obligations. For instance, in the case of a DSCR of 1.0, any small change in NOI–such as higher than anticipated maintenance costs, or lower rent revenues–would put the developer in danger of not meeting their debt obligations. We have made the assumption that a lender would require a DSCR of 1.3, meaning that our projects must demonstrate an NOI 1.3 times the amount of debt issued. While this ratio is standard in California, it could be more or less depending on the specific lender's requirement.

Loan to Cost (LTC)

While the majority of funding for a standard market-rate project takes the form of debt, banks do not provide loans on the total cost of a project. To further minimize risk, banks require developers to bring in equity for the amount of the project that is not covered by the loan (described in detail in the following section). This is similar to a traditional home mortgage where a bank requires the buyer to make a down payment of 20 percent of the value of the house.

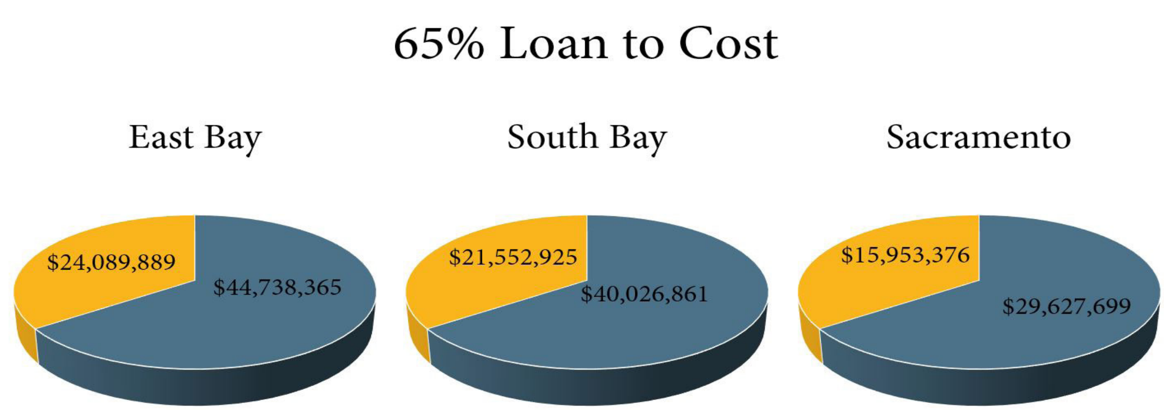
The amount that banks are willing to lend relative to the total project cost is referred to as the loan-to-cost ratio (LTC) (Figure 3).[12] Lower LTC ratios indicate lower confidence that a project will perform as anticipated given market conditions and trends, while higher LTC ratios indicate stronger confidence in project success. Typically, in California, lenders currently require an approximately 65 percent LTC ratio. We use this ratio in our analysis, but as with the DSCR, the LTC ratio can vary by region, project, or bank.

Equity

After determining how much debt can be obtained, each prototype is left with a "gap" between the total cost of development and how much of the project can be financed with loans. This gap is filled by equity, which comes from a project investor (as well as a smaller amount of equity provided by the developer). It is important to note that this form of capital is not specific to real estate, and can flow to wherever it can achieve the highest risk-adjusted rate of return.

Equity investors consider housing development a riskier investment when compared to traditional forms of investment such as stocks or bonds. Because of the length of time needed to develop before revenue is generated, as well as the myriad challenges that new housing faces (e.g., unpredictable costs, market cycles, construction delays), there are many variables that could lead a project to deliver below expectations or be derailed entirely. Investors in real estate account for these risks by requiring certain levels of

Figure 3: Amount of Debt Compared to Cost for Three Regions



return, and as a result developers must demonstrate that they can achieve sufficient returns to justify the risk.

Equity investors in residential real estate come in various forms, and are not exclusively private equity groups. Depending on the size and experience of a developer, private equity is obtained from insurance companies, foreign capital, and the pension funds of public sector employees and union members that utilize real estate development investments as "high return" options to round out their overall portfolios. This means developers are beholden to equity returns in the market, which are set as much by Wall Street as by local conditions, and often do not relate to how much profit a developer makes from a project.

A developer gains equity by contributing a portion of their own capital (in the case of larger developers), as well as through their time to develop and manage the project (also known as "sweat equity"). The percentage of developer equity is generally a much smaller percentage than that of the investors. Profits received by a developer are not realized until at minimum the loan payment has been made, and the investor has received their preferred return. In most cases, developers will not see profit until equity is fully returned to investors. This is a key point to understand as a developer is generally the last stakeholder to receive any profit from a new housing development, and most developers shoulder a significant amount of risk and cost even before any form of financing is secured.

Measuring Return

The form of equity financing is critical in determining whether a project gets built. Ultimately, a developer will make a decision to build or not based on whether they can achieve threshold return requirements that will allow them to attract equity. While there are several ways to measure return, the simplest metric is to compare a project's anticipated return-on-cost (ROC) to local area capitalization rates. The ROC can be used to compare returns across various investment types. With regards to real estate development, ROC measures the expected return after accounting for the cost to build and manage a new housing development. This metric is determined by dividing a project's anticipated NOI by total project cost. Capitalization rates, on the other hand, measure the return one can expect by purchasing a certain property. Essentially, by comparing ROC to capitalization rates, a developer is measuring the return of building a new project against the return of simply buying an existing building. If the project's ROC is reasonably above the capitalization rate, then a developer will move forward. To put it another way, a developer will not go through the time and expense of developing a new project if it will not yield a higher return than they would receive by buying an existing property in the area.

We use this ROC to capitalization rate comparison to determine feasibility for each of our projects. The extent to which a project ROC must surpass capitalization rates to achieve feasibility changes according to the region, project type, and investor (including their views on timing relative to the market cycle). To determine this variable, we spoke to developers, consultants, and architects in each region. Based on these conversations, we determined that a minimum spread of between 1.0 percent and 1.5 percent is needed for projects in the East and South Bay regions, while projects in Sacramento are moving forward at a spread of 1.5 to 2.0 percent.

ROC is determined by dividing a project's Year 1 NOI by total project cost. As illustrated in Figure 4, each project's ROC varied to a degree. However, these project ROCs all reach our threshold requirements for feasibility when compared to area capitalization rates.[13] For our East Bay project, the ROC is 1.16 percent percentage points higher than area capitalization rates for new buildings.[14] Similarly, our South Bay project achieved a spread of 1.14 percent between the project ROC and capitalization rates. For Sacramento, our project demonstrates a 1.51 percent spread between ROC and capitalization rates. While these three projects each reached the minimum threshold requirements as explained above, they fall on the low end for feasibility, with little to no room for additional cost increases.

Beyond ROC, investors use other metrics to determine their interest in a project. For example, another common metric is internal rate of return (IRR). IRR measures an investor's total anticipated return over the life of their investment (as opposed to the Year 1 return, as measured by ROC). Specifically, the IRR is calculated by summing the anticipated annual cash flow for the number of years an investor expects to hold the property (generally 10 years) with the anticipated value at sale. Depending on the type of investor, IRR requirements can fluctuate significantly. For example, some investors will only invest in projects whose IRRs exceed 20 percent (e.g., a high-yield investment fund) while other funds may be comfortable with projects with IRRs closer to 15 percent. The IRRs demonstrated by our projects are 15.4 percent for the East Bay, 15.2 percent for

Figure 4: Prototype ROC/Cap Rate Spread

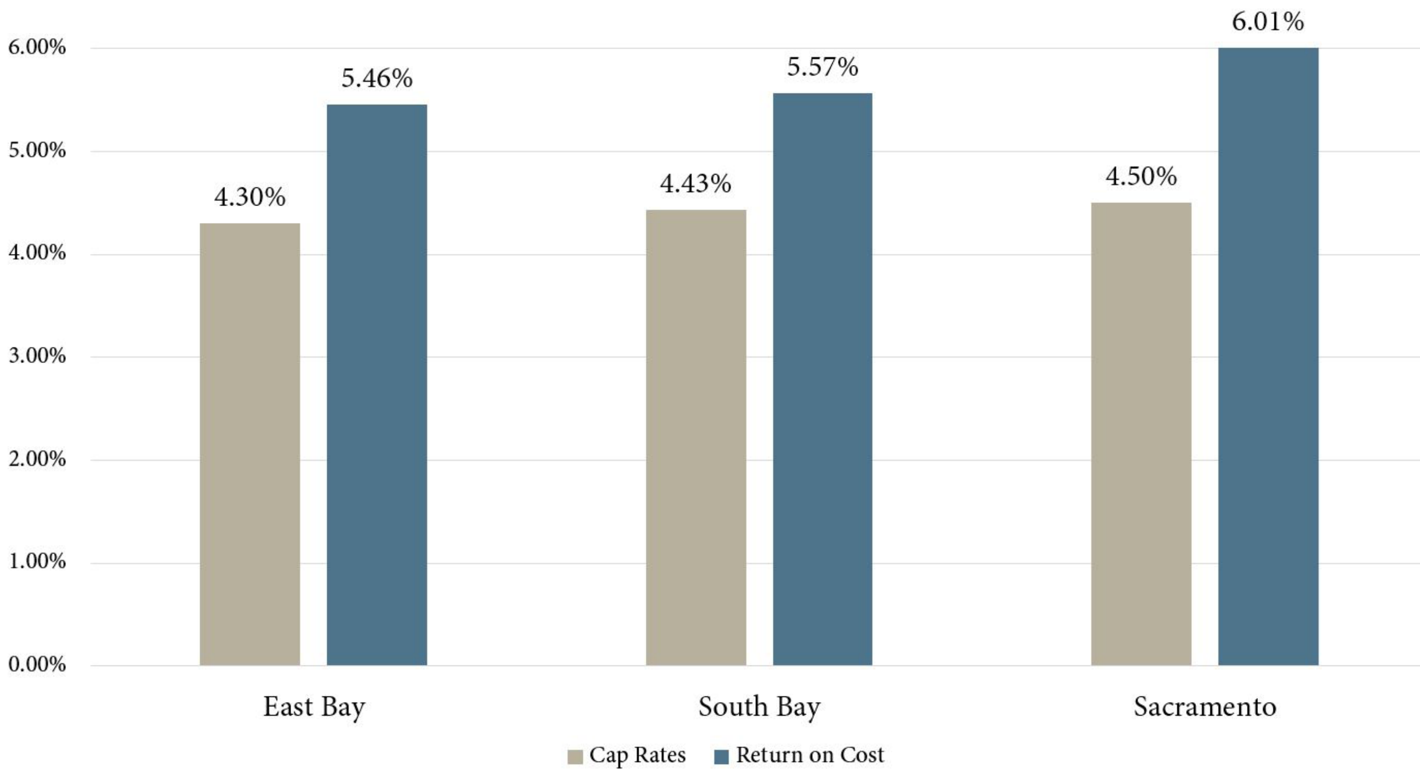
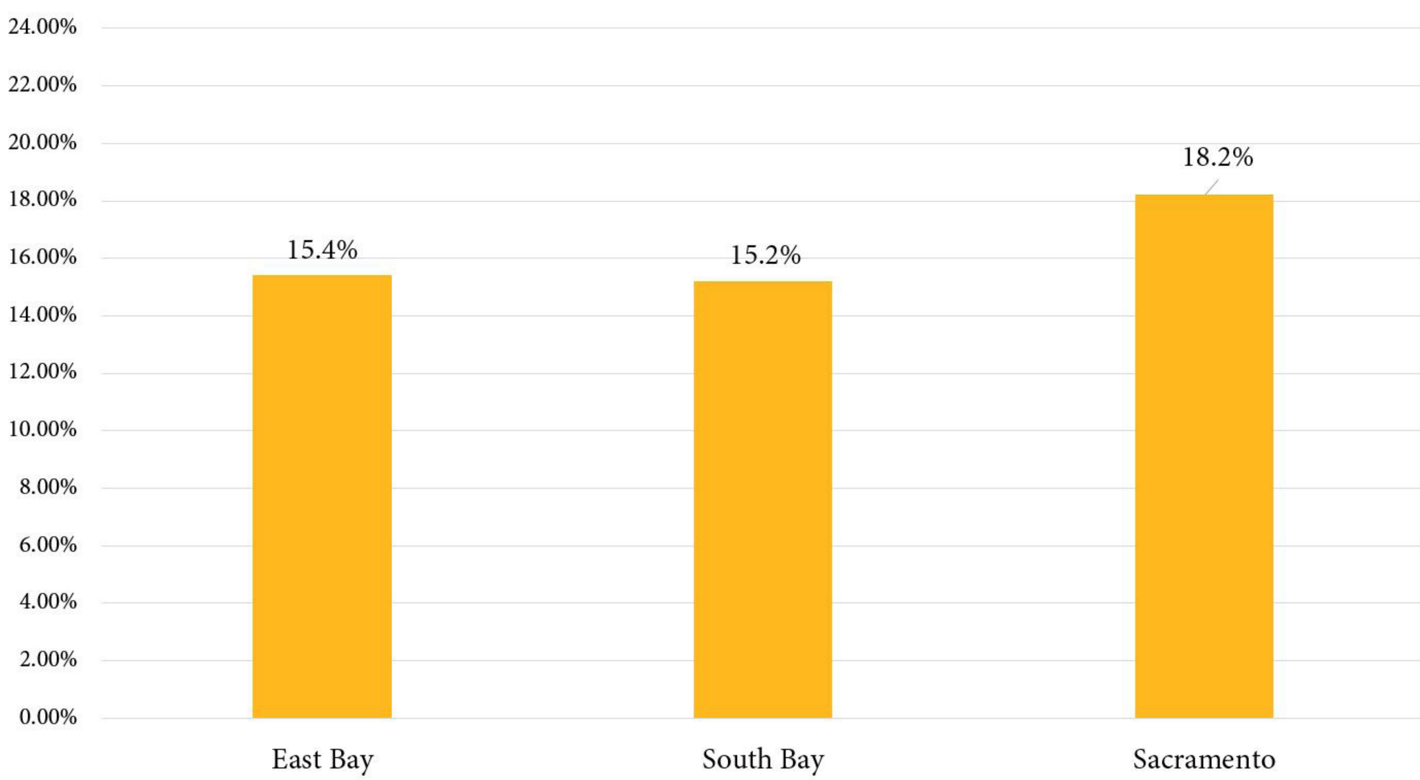


Figure 5: Prototype Internal Rate of Return



the South Bay, and 18.2 percent for Sacramento (Figure 5). These IRRs would be attractive to some investors, but not all, which limits the available pool of capital for the developer.

Project Rents

New developments derive the vast majority of their income from rents charged to tenants.[15] To determine rents in new projects, developers must commission a detailed market analysis from private consultants. These consultants use proprietary data sources to determine the demand for new housing in the project area as well as what a developer could expect to receive in rents. A developer uses these numbers to complete their pro forma and to prove to lenders and investors that their project will receive enough income from rents to justify their financing of the project. If developers cannot produce evidence that they can achieve rents high enough to satisfy both lender and investor requirements, they will not receive financing.

Rents for each of our projects were determined by assessing area rents in similar new projects. These rents are illustrated below in Figure 6. In each case, the rents required to make the project feasible are higher than what most renter households in each region can afford. When compared to income levels of renter households in each region, the minimum rents required for a two bedroom unit are only affordable to those with the region's highest incomes.[16]

Layering Requirements

What happens when projects face additional costs, either due to unknown cost factors (e.g., learning that the land has soil contamination that requires remediation) or local requirements, such as parking, inclusionary zoning, and development impact fees? Anything that drives up project costs will affect the pro forma calculations and influence whether the project is financially feasible.

To illustrate this dynamic, we have layered a handful of common requirements onto each of the three project pro formas. Specifically, we added three inputs: increased parking (2:1 ratio of parking spaces to units); higher fees (total of $60,000 per unit); and a 15 percent inclusionary zoning

Figure 6: Prototype Monthly Rents

requirement (at 60 percent of AMI). These variables were selected because they can have a significant impact on overall cost, and also vary widely across—and even within—cities. Cities have sole authority to determine these requirements (with the exception of development fees levied by other entities, such as school districts and utility districts). We compare the effect of these changes against the capitalization rate; as explained above, projects that fall close to or below an area's capitalization rate are unlikely to be built.

As demonstrated in Figure 7, the combination of these three requirements brings each project well below the minimum threshold for viability. In these cases, rents would need to be significantly higher in order to maintain viability. However, given that rents for the baseline prototypes are already only affordable to those with the region's highest incomes, it is likely that the market would not be able to support the rents necessary to absorb these additional requirements, and the project would not be built.

On the other hand, reducing costs in other areas can allow projects to "pencil" while achieving policy priorities. In other words, a priority like inclusionary zoning may become viable if, for example, a jurisdiction reduces parking requirements. To demonstrate this concept, we adjusted a handful of cost assumptions by: reducing total fees ($20,000 per unit); reducing parking requirements (0.5:1 parking spaces to units); and tax exempting affordable units. As illustrated in Figure 8, each project falls below the return on cost threshold for feasibility when a 15 percent inclusionary zoning requirement is layered onto each project's baseline pro forma. However, as offsets that help reduce overall costs are added, each project moves back towards feasibility to the point where project returns are actually healthier than the original pro formas without inclusionary units. By calibrating policy to account for the overall cost to build, policy makers can enable developers to build projects that meet important policy goals, such as including on-site affordability, without jeopardizing their ability to obtain financing. The options presented here are not the only opportunities to provide meaningful offsets as policies such as approval streamlining, which limits cost increases and holding costs (e.g., maintenance, property taxes, insurance), additional density or height bonuses that allow for more units, and flexibility on affordability (i.e. allowing higher AMIs for inclusionary units) can also impact project feasibility.

Conclusion

Building new housing is complex and costly, and understanding the process developers follow to build housing is important for determining appropriate policy responses. As demonstrated by our pro forma analysis, there are dozens of inputs and requirements that directly impact the cost to build new housing and the amount at which new housing can be offered to renters. Even where development conditions are favorable, the overall cost to build makes it difficult for developers to deliver housing at price points affordable to lower-, middle-, and increasingly upper-middle-class households in high cost regions in California.

Given the complexities and costs involved with creating new housing, policy makers at all levels of government should be cognizant of how requirements interact with the math behind housing development. While many requirements are intended to help achieve important policy objectives—creating deed-restricted affordable housing or expanding park facilities, for example—they may inadvertently push new housing into the red. Thoughtful approaches to balancing various priorities are required to ensure that these policies can work with new housing development rather than against.

The Terner Center has shown that broad tools can be created to provide these important insights. In addition to the pro forma analyses presented in this brief, the Housing Development Dashboard allows users to design a "prototype" project using various market and policy inputs. Using these inputs, the dashboard then determines the likelihood that the project will be built, using similar financial assumptions as presented in this brief.

As local, regional, and state policy makers consider various policies for increasing housing supply and affordability, tools such as the Terner Center Dashboard or other thoughtful and technical approaches should be utilized and expanded to provide insight into the relationship between new housing development and other important factors. Embedding this type of analysis is integral to understanding the potential outcomes of various policy choices. •

Figure 7: Cumulative Impacts of Additional Requirements on Prototype Pro Formas

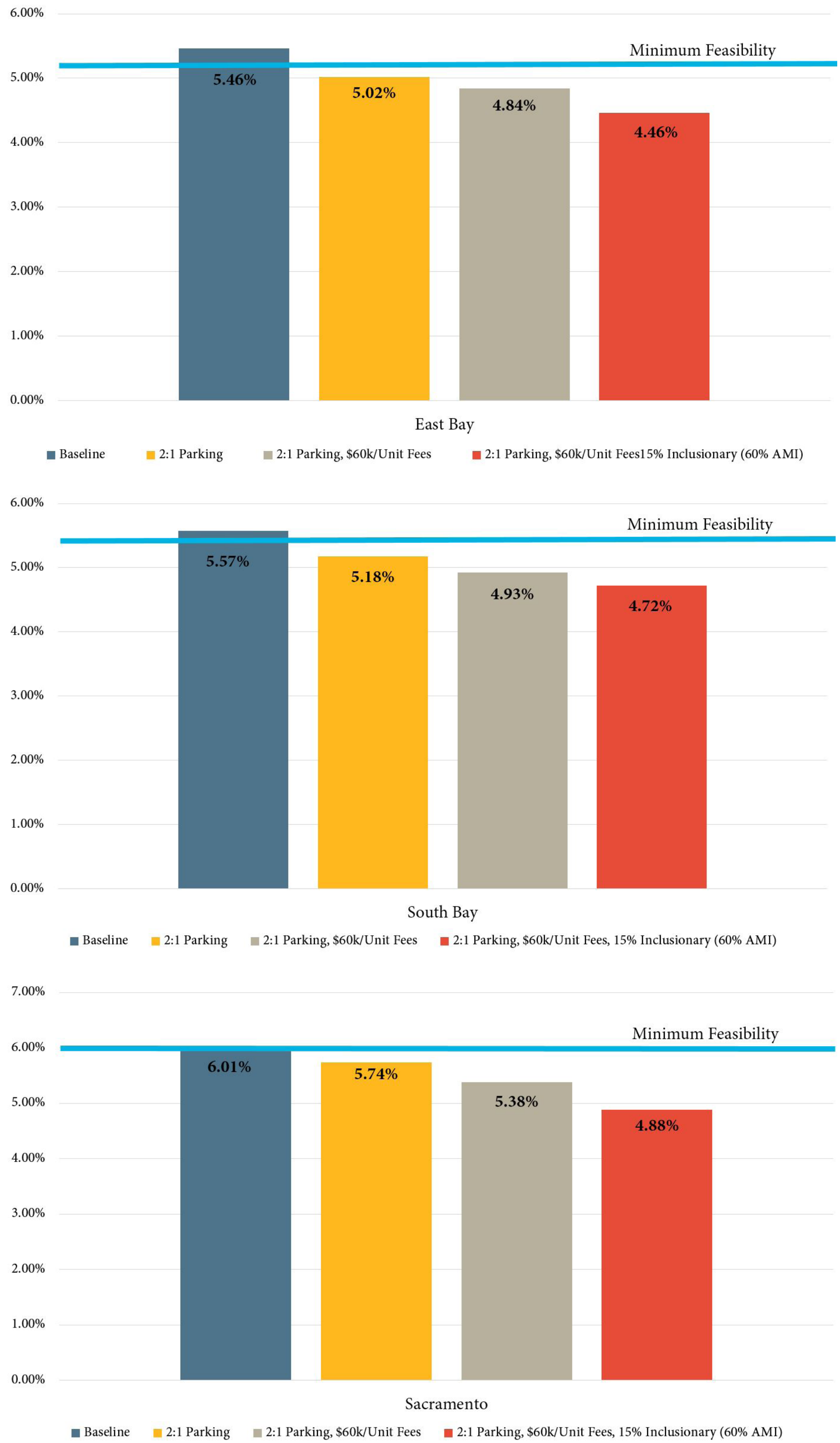


Figure 8: Cumulative Impacts of Inclusionary Zoning Offsets on Prototype Pro Formas

Endnotes

1. While this brief does not delve into the factors driving increasing construction costs, future Terner Center research will address this specific issue.

2. This type of construction is commonly referred to as "five-over-one".

3. The selection of the East Bay was driven by the Center's work with the Metropolitan Transportation Commission, specifically on the Committee to House the Bay Area (CASA) Initiative; the selection of the South Bay was driven by support from SV@Home; the selection of Sacramento was driven by support from the Sacramento Area Council of Governments.

4. Even within a similar building type, development characteristics are dictated by lot size and shape, as well as local city zoning standards, such as setbacks, lot coverage, and allowable density or height, among others.

5. Prevailing wage requirements mandate that any contractor working on a project pay a predetermined wage rate. These wages are generally required on projects that utilize public subsidies, such as with many affordable housing projects, or in instances where the developer has negotiated with local stakeholders to pay prevailing wages.

6. Mawhorter, S., Garcia, D., & Raetz, H. (2018). It All Adds Up: The Cost Of Housing Development Fees In Seven California Cities. Berkeley, CA: Terner Center for Housing Innovation. Retrieved from https://ternercenter.berkeley.edu/development-fees

7. Peiser, R. B. & Hamilton, D. (2012). Professional Real Estate Development: the ULI Guide to the Business. Third Edition. p. 213-214. Urban Land Institute

8. There are two types of loans necessary for rental housing projects: a Construction loan, which is the loan used to pay for the construction of the project, and Permanent debt, which is the long-term mortgage on a finished project. Once construction is complete, a lender will "take out" the construction loan (i.e. pay off) and replace it with a fixed-rate permanent loan. The permanent debt cannot be obtained until the project has been completed and reached financially sustainable occupancy at rent levels that support the debt.

9. Peiser, R. B. & Hamilton, D. (2012). Professional Real Estate Development: the ULI Guide to the Business. Third Edition. p. 64-65, 209. Urban Land Institute

10. The loan will also include a "not to exceed" amount, as well as contingency amounts for unforeseen issues (i.e. cost overruns).

11. Net Operating Income is defined as project income derived from rents minus expenses of operating the property (i.e. maintenance, leasing, property taxes, legal, staff) before paying debt.

12. Loan to Value is another metric by which banks will measure the amount they are willing to lend. While similar to LTC, LTV sizes the loan relative to the finished value of the project, rather than the project cost.

13. Capitalization rates for the East Bay and South Bay regions were determined through an analysis of Yardi data. Capitalization rates for Sacramento were pulled from CBRE's North America Cap Rate Survey, Second Half 2018.

14. These percentages are commonly referred to as basis points, or BPS.

15. Income is also derived from parking charges, retail rent, and other sources, if applicable.

16. "Affordable" is determined by calculating 30 percent of income for housing costs.

Acknowledgements

We would like to thank the Metropolitan Transportation Commission, SV@Home, and the Sacramento Area Council of Governments for the funding and support that made this work possible. The author would like to thank Charmaine Curtis and Dennis Williams for their insights, as well as Carol Galante, Carolina Reid, and Elizabeth Kneebone for their review.