City and County of San Francisco

Office of the Controller - Office of Economic Analysis

Potential Effects of Limiting Market-Rate Housing in the Mission

September 10, 2015

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Main Conclusions

The Office of Economic Analysis (OEA) was requested by Supervisors Mark Farrell and Scott Wiener to prepare a report on the effects of a temporary moratorium, and an indefinite prohibition, on market-rate housing in the Mission district of San Francisco. As requested, this report focuses on the effects of such actions on the price of housing, the City's efforts to produce new housing at all income levels, eviction pressures, and affordable housing. It also addresses some potential benefits of a moratorium, including reducing tenant displacement, discouraging gentrification, preventing nearby existing housing from becoming unaffordable, and preserving sites for permanently affordable housing.

The City currently has extensive controls regarding the location and scale of new housing construction. There are several neighborhoods in the city where no market rate construction is planned or feasible. In the Mission, however, several thousand new units are planned. An 18-month moratorium in the Mission has been placed on the November 2015 ballot. No legislative proposal has been made for an indefinite or permanent moratorium.

Concern over new market-rate housing in the Mission has intensified with the pace of social and economic change in the neighborhood. Home to a Latino community since the 1930s, the Mission's Latino population has declined from 60% of the area's total population in 2000 to 47% over the 2008-12 five-year period. During this period, the overall Latino percentage of the population in San Francisco has remained steady. The change in the Mission's ethnic composition has occurred at the same time as a decline in the neighborhood's number of lower-income households, and families with children, and a rising number of upper-income households without children. These trends have also been more strongly felt in the Mission than in the rest of San Francisco.

The report assesses a number of potential costs, and benefits, of temporary and indefinite moratoria. In terms of the potential costs, the report finds that a temporary, 18-month moratorium would lead to slightly higher housing prices across the city, have no appreciable effect on no-fault eviction pressures, and have a limited impact on the city's ability to produce affordable housing during the moratorium period. At the end of the moratorium, these effects would be reversed, through a surge of new building permits and construction, and there would be no long-term lasting impacts of a temporary moratorium.

In terms of the potential benefits, the report finds no evidence that a temporary moratorium would prevent the demolition of existing housing and direct displacement of current residents, discourage upper-income households from moving into the Mission, or ease rising rents and housing prices in the neighborhood. It would temporarily preserve sites that could later be acquired for affordable housing, but it is highly unlikely that it would reduce the cost of any such site.

Over an indefinite period, a prohibition on market-rate housing in the Mission would, in general, affect more sites, place greater upward pressure on city housing prices, and reduce affordable housing resources to a greater extent. On the other hand, there would also a reduced risk, over the long term, of residents being evicted and existing homes being demolished. The report finds no evidence that even a permanent prohibition on market-rate housing would reverse the trend of upper-income households moving into the neighborhood. The report also finds that new market rate housing tends to lower, rather than raise, the value of nearby properties, and therefore a moratorium on market-rate housing would not protect nearby existing housing from rising prices.

Finally, the report concludes that the strategy of using an indefinite market-rate housing moratorium to create sites for affordable housing is likely to be significantly more costly than alternative approaches, such as increasing affordable housing subsidies, and liberalizing land-use controls in the Mission and elsewhere in the city.

The findings related to costs and benefits of are summarized in the table below.

Potential Costs		Short-Term Moratorium	Indefinite Moratorium
	Higher housing prices	Slight over the moratorium period, diminishing to none afterwards	Moderate
	Loss of affordable housing	Slight over the moratorium period, diminishing to none afterwards	Moderate
	More No-Fault eviction	No evidence of more evictions	No evidence of more evictions

Potential Benefits		Short-Term Moratorium	Indefinite Moratorium
	Reduced direct displacement	None	Some
	Reduced gentrification	None	None
	Reduced indirect displacement	None	None
	Sites for affordable housing	None	Some, though economic costs would be high relative to other approaches

INTRODUCTION

Purpose of this Report

In May, 2015, the Office of Economic Analysis was requested by Supervisor Farrell and Supervisor Wiener to conduct an analysis of the impact of limiting new market area housing development in the Mission district of San Francisco.

Specifically, the Supervisors requested:

> *the Chief Economist, through the Controller's office, to produce an economic report and analysis on what the effects of a moratorium on market-rate housing in the Mission District would be for an indefinite and two-year period:*
>
> *• The effect the moratorium will have on housing and rental prices in the Mission and across San Francisco*
>
> *• The effect on the City's efforts to produce more new housing at all income levels*
>
> *• The effect the moratorium will have on eviction and buy-out pressures for tenants and homeowners*
>
> *• A detailed analysis on the amount of resources that the City would lose for affordable housing production.*
>
> *• Other areas deemed important for the public interest and good.*

This report is the Office's response to this Supervisorial request. To prevent confusion with an upcoming ballot measure, discussed below, this report assesses the impact of a temporary moratorium that lasts 18 months, instead of two years.

Temporary Moratorium and Indefinite Prohibition

The City currently has extensive controls regarding the location and scale of new housing construction. There are several neighborhoods in the city where no market rate construction is planned or feasible. In the Mission neighborhood, however, several thousand new units are planned, as a result of the Eastern Neighborhoods planning effort concluded in 2008.

A 18-month moratorium on new market-rate housing development in the Mission has been placed on the City's

November 2015 ballot.

As outlined above, the two Supervisors also requested that this report consider the impact of an indefinite prohibition on market-rate housing development in the Mission. The proposed ballot measure *does not* include such an indefinite prohibition, and only provides for an extension of the moratorium for up to a total of 30 months. *No legislative proposal has been made for an indefinite moratorium on market-rate housing in the Mission.*

However, nothing legally prevents the City, in the future, from changing land use controls to effectively prohibit new market-rate housing in the Mission indefinitely. Because of that fact, and the Supervisors' request, this report considers an indefinite as well as a temporary moratorium.

SOCIAL AND ECONOMIC CHANGE IN THE MISSION, 1970-2012

Background

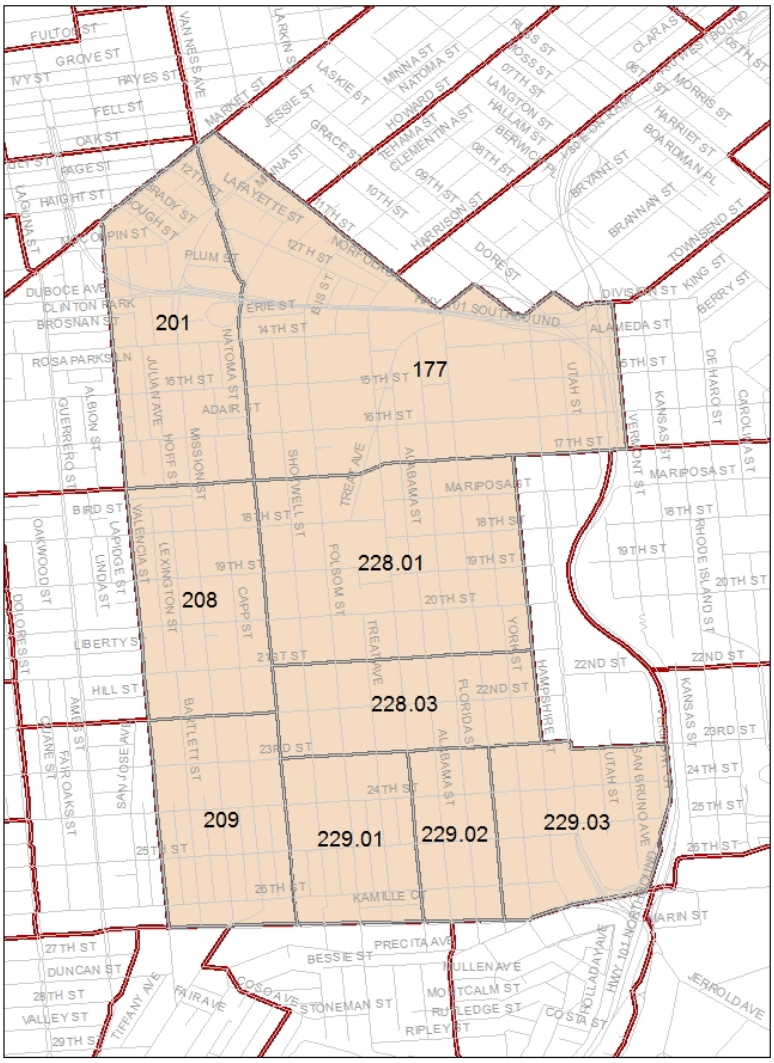
Concern over new market-rate housing in the Mission has intensified with the pace of social and economic change in the neighborhood.

20th century Mexican immigration to San Francisco began in earnest in the 1930s. By 1940, the first year that Census tract-level information is available for the city, natives of Mexico comprised about a quarter of the population in what was once the primarily industrial areas of western SoMa south of Harrison Street, and the Mission north of 17th Street.

1960 is the first year that the Census uses a Latino ethnic category in its tract-level data for the city. The 1960 Census map for San Francisco shows Latinos forming over a third of the population in the Mission, and over 15% of the population in a wide area reaching from SoMa to Portola, and Duboce Triangle, the Castro, and Noe Valley east to the Bay.

This section reviews later Census data, from 1970 to 2012, for a set of Census tracts that closely correspond to the Planning Department's definition of the Mission District. These tracts (as they are used in the 2010 Census) are shown in Figure 1 below. Their boundaries have not changed during the 1970-2010 period, which facilitates a review of different socio-economic indicators over time. To provide context, the same indicators are also detailed for the City as a whole.

FIGURE 1 **Mission Census Tracts Used in This Report**



Population by Ethnicity

According to Census data from 1970 through 2008-2012[1], the Latino population of the Mission increased through the 1970s and 1980s, reaching 60% of the total population in both the 1990 and 2000 Censuses. Since 2000, the decline in the area's Latino population has been rapid, with 47% reported as Latino in the 5-year American Communities Survey for 2008-12. By contrast, the city's overall Latino population has remained relatively steady, at 12-15% of San Francisco's population since 1970.

[1] The 2008-2012 period here refers to the 5-year American Communities Survey, produced by the Census Bureau.

TABLE 1	Latino Percentage of the Population: Mission Census Tracts, and Citywide, 1970-2012	
	Mission census tracts	Entire City
1970	50%	14%
1980	53%	12%
1990	60%	14%
2000	60%	14%
2008-12	47%	15%

Source: U.S. Census/Social Explorer

Household Structure

The Mission has also changed more rapidly than the city in terms of the structure of its households. In 1970, 34% of households in the area were families with children, compared to 24% for the city as a whole. By the 2008-2012 period, only 20% of Mission households had children, roughly the same as the average for the city as a whole.

TABLE 2	Households with Children Under 18 as a Percent of All Households, 1970-2012	
	Mission census tracts	Entire City
1970	34%	24%
1990	38%	21%
2000	31%	19%
2008-12	20%	19%

Source: U.S. Census/Social Explorer

Income Inequality Trends

Citywide trends in income have also been more strongly felt in the Mission than in other parts of San Francisco. Table 3 below shows the distribution of household income, in constant 2015 dollars, for the Mission census tracts and the city as a whole. In 1980, over half of the households of the Mission earned less than $50,000 (in today's dollars), compared with 33% in the city as a whole. By the 2008-2012 period, only 37% of Mission households were in that category.

For San Francisco as a whole, the percentage of households in the lowest income category has actually not changed from 1980 to 2008-12. Citywide, the more notable trend has been the decline of middle-income households and the growth of upper-income households. In the Mission, however, both low-income and (to a far lesser extent) middle-income households have declined,

as the number of upper-income households have grown.

In the Mission and across San Francisco, the growth in the number of upper income households may reflect both relocation patterns, and increases in the real incomes of residents. However, the far greater decline in low-income households in the Mission than in the rest of the city suggests that it is the movement of low-income households out, and upper-income households in, that is accounting for the bulk of the change in that neighborhood.

TABLE 3 **Distribution of Households by Household Income (in $2015), 1980-2012**

	Mission census tracts			Entire City		
	<$50k	$50-150k	$150k+	<$50k	$50-150k	$150k+
1980	53%	45%	3%	33%	54%	13%
1990	50%	44%	5%	37%	49%	14%
2000	41%	49%	17%	28%	43%	28%
2008-12	37%	41%	22%	33%	43%	28%

Source: U.S. Census/Social Explorer

Change in the Area's Housing Stock

Although the composition of the Mission's population has evidently experienced considerable change since 1970, the neighborhood's housing supply has not. From 1970 to 2000, the Mission actually saw a net decline in housing units, while the city added 36,000 units during the same period. Only since 2000 has appreciable amounts of new housing been built in the Mission, with the housing supply growing by about 193, or 1.3%, per year (2000 – 2010).

TABLE 4 **Number of Housing Units, 1970-2012**

	Mission census tracts	Annual Growth Rate	Entire City	Annual Growth Rate
1970	13,742		310,406	
1980	13,715	-0.02%	316,274	0.19%
1990	13,335	-0.28%	328,471	0.38%
2000	13,539	0.15%	346,527	0.54%
2008-12	15,464	1.34%	375,861	0.82%

Source: U.S. Census/Social Explorer

According to data from the Planning Department, the new housing in the Mission over the 2001-2013 period has been split roughly 50:50 between market-rate and affordable.

TABLE 5 **Housing Development in the Mission Neighborhood, 2001-2013**

Market Rate Units	721
Affordable Units in Market Rate Projects	97
Units in 100% Affordable Projects	646
Total units constructed	1,464
% affordable	51%

Source: San Francisco Planning Department, *Annual Housing Inventory*, various years

Population Change and Frequency of Movement

Rather than the construction of new and demolition of old housing, the population change in the Mission since the 1990s has largely occurred through changes in the occupancy of the existing housing stock. The Census reports the number of tract residents who lived in the same house one year previously. Since everyone who did not live in the same house moved from another location (which is generally specified in the Census), this data can provide a sense of the population churn in the neighborhood and in the city.

The most recent 5-year Census data, collected over the 2009 to 2013 period, shows that 87% of Mission residents lived in the same house one year previously, and 13% moved from another location. More than half of the movers – 8% of the total in the Mission, moved from somewhere else in San Francisco into the Mission[2]. While this rate of population churn is somewhat lower than the citywide average – 16% of San Francisco residents lived in their current house less than a year – it does indicate the movement of 5,000 new residents to the Mission per year, out of a population of 37,976. As discussed above, the neighborhood has only been adding 193 new housing units per year since 2000.

[2] the Census does not report how many moved within the Mission itself, only from somewhere within the city to a Mission tract.

TABLE 6 **Population by Residence One Year Previously, 2009-2013**

	Mission census tracts	Entire City
Living in same house 1 year previously	87%	84%
Lived elsewhere in San Francisco 1 year previously	8%	8%
Lived elsewhere in California 1 year previously	3%	4%
Lived elsewhere in the U.S. 1 year previously	1%	2%
Lived elsewhere in the World 1 year previously	1%	2%
New residents as percent of current population	13%	16%
Annual number of new residents	5,095	128,712

Source: U.S. Census, *American Communities Survey*

PLANNED HOUSING DEVELOPMENT IN THE MISSION

Current Development Pipeline in the Mission

Estimating the economic impact of an 18-month moratorium must begin with estimating the number of market-rate housing units that might be constructed in the Mission over that period in the absence of any moratorium. In order to do this, in this section we examine data on planned housing projects provided by the Planning department's pipeline report, for the 2nd quarter of 2015.

Housing construction projects must receive permits from the Planning and Building Inspection (DBI) departments before construction can begin. The pipeline database classifies projects into six main stages:

- Application filed with Planning
- Projects approved by Planning
- Application filed with DBI
- Projects approved by DBI
- Projects issued a building permit
- Projects under construction

The units under construction, or that have already received a building permit, would not be affected by a moratorium, but the other projects could be. Based on the pipeline data through June 30th, 2015, there are 2,117 such units in the Mission.

However, given the length of the approval process, a project that is not been approved may still not be affected by an 18-month moratorium. The issue is made even more complex because the length of time between project initiation and construction is not only a function of the City's permitting process, but also the state of the housing and capital markets, and the developer's strategy.

Consequently, the number of those projects, and the housing units they would produce, cannot be estimated with certainty. Considering the number of units in the pipeline in the Mission, when each project entered the pipeline, and a range of potential approval periods, we estimate the number of affected units will range between 752 (delayed by an average of 10.1 months) and 807 (delayed by an average of 17.3 months).

Development Capacity in the Mission

Considering a longer-term, indefinite prohibition of market-rate housing requires going beyond the projects currently in the pipeline, to the totality of future projects that could be built, given the zoning controls in place in the

neighborhood.

The Mission was one of four city neighborhoods that underwent major rezoning through the Eastern Neighborhoods Planning Process, which concluded in 2008. Many parcels in the area received significant increases in allowable heights, and loosening of density controls, while land use controls on other parcels were tightened. Parcels where development capacity was increased are likely to be redeveloped as housing in the future.

Notwithstanding the rapid rise of housing prices in the city in recent years, and the relatively large amount of new housing that has been developed in the city, only a small fraction of the planned development capacity in the Mission is currently in the development pipeline.

The Eastern Neighborhoods planning process provided for 15,005 new housing units in the Mission, of which approximately 500 are either under construction or have been built since 2008, when the Plan was passed.

The remaining 14,500, which would be the maximum number of housing units not built in the event of an indefinite prohibition of market-rate housing, represents 3.8% of the city's current housing stock.

POTENTIAL COSTS OF A MORATORIUM

Introduction

This section estimates the costs associated with the short-term and long-term removal of market-rate housing from the city as detailed in the previous section. It considers three potential costs:

1. Higher housing prices
2. Lost resources for affordable housing
3. Higher risk of evictions

Impact on Housing Prices

The assessment of the impact of a moratorium on housing prices begins by estimating a housing price index for San Francisco, and then statistically assesses how that index would change if the future housing supply was constrained during the period of a moratorium.

One of the most challenging things about studying the economics of housing is the fact that every house is different. Economics tries to explain and predict how and why prices change - but because every house is different, the price of every house are generally different as well - even in the same city at the same time. .

The solution that economists have developed to study the price of housing is to start by recognizing that a given housing unit offers many things that consumers are willing to pay for: space for living, structural features like bedrooms, bathrooms, and appliances, a location that is more or less accessible to jobs and other trip destinations, a neighborhood with amenities, etc.

The sales price of a house, or the market rent of a vacant apartment, will reflect the house's quality along all of these dimensions, to the extent that consumers value them and are willing to pay for them.

An econometric technique called hedonic price analysis can be used to break down the value of a house into the values of its constituent characteristics, and in, in so doing, reveal their market prices. The OEA employed this method along with data from the real estate analytics firm CoreLogic. More details about the methodology, and the results, can be found in the Appendix.

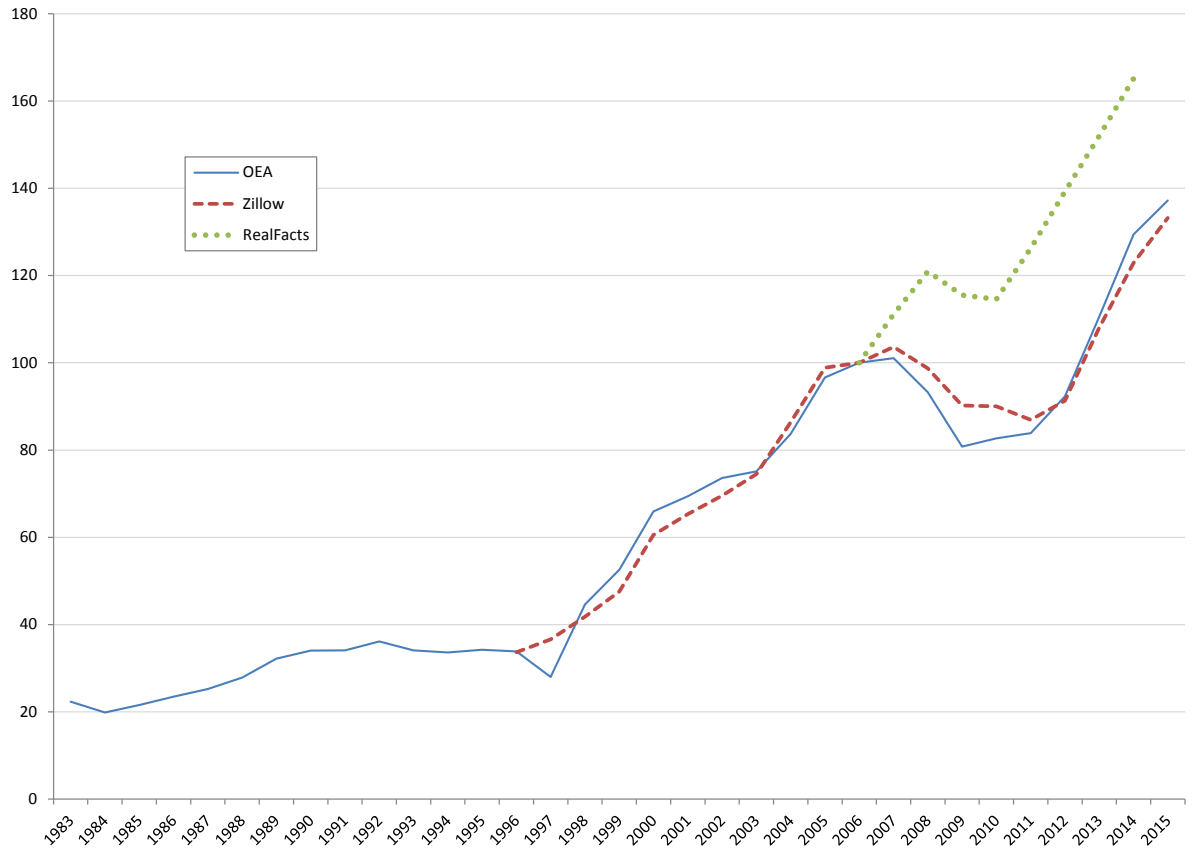
Among the characteristics that affect housing prices, the most ones that for this report concern the housing unit's year of sale. Similar to the way that a change in the consumer price index creates a measure of the inflation rate, the coefficients on time variables in an hedonic price

analysis can create a housing price index.

Figure 2 below indicates the price index that resulted from our analysis. For the sake of comparison, a housing index provided by Zillow for owner-occupied housing, and one generated from RealFacts data for residential rent, are also provided. The OEA index, like Zillow's, is drawn from home sale data, so these two indices are fairly similar. The RealFacts Index is constructed from annual changes in the asking rents of vacant units listed on RealFacts, a consistent sample of residential properties in San Francisco that are surveyed over time. While the RealFacts index generally moves in the same direction as the two indices based on home sales, its rises are faster and its drops are less steep, indicating a generally hotter market for rentals than homes for sale.

The data we have acquired from CoreLogic, which has comprehensive sales information dating back to the early 1980s, allows more historical perspective on San Francisco housing prices than Zillow's index, which only dates from 1996. It was around that year, in fact, that San Francisco began the period of rapidly-rising housing prices that it is still experiencing. Over the 14-year period from 1983 to 1997, city housing prices grew by only 1.6% per year – less than the rate of inflation. Since 1997, the OEA's housing price index has grown at 9.2% per year – more than 3 times the rate of inflation.

FIGURE 2 **Housing Price Indices for San Francisco: OEA-Generated, Zillow, and RealFacts (2006=100)**



Source: Zillow, RealFacts, OEA analysis based on CoreLogic data (see Appendix)

Impact of Constraining the Housing Supply on Housing Prices

With an understanding of San Francisco's housing price trends, and of how a moratorium and indefinite prohibition would constrain supply, we can investigate the role that these potential changes in housing supply would have on housing prices.

The simplest point that can be made about housing prices, in economic theory, is that they reflect what consumers are willing to pay for housing. When there are more people in a housing market, or they have more income, they are likely to bid up home sales prices and rents.

However, if we were to control for the number and income of consumers, another factor that is thought to affect the price of housing is the supply available in the market. In particular, according to economic theory, if there was an increase in the supply because of new construction, home-seekers would have more choice, and the housing market would be more of a "buyer's market", and prices would be lower than they otherwise would be.

Conversely, if a policy change, such a moratorium or prohibition on market rate housing, restricted the supply of housing on the market, then the market would become more of a "seller's market". Housing prices would be higher in this case; sellers would receive higher-prices, landlords would reap higher rents, and home-seekers would pay more for housing.

This line of reasoning is fairly simple economic theory. But is there any evidence to support it? Our statistical analysis, discussed in the Appendix, leads us to the conclusion that there, in fact, is a clear relationship between the supply of housing in San Francisco, and what households are willing to pay for it.

As shown in Table 7 below, given the number of housing units involved in a moratorium or indefinite prohibition, the sensitivity of consumer's willingness to pay, to constrained supply, can be expected to lead to a 0.3% increase in housing prices from a moratorium, or a 5.5% increase in prices from an indefinite prohibition.

TABLE 7 **Impact on Housing Prices of a Moratorium and Indefinite Prohibition on Market-Rate Housing in the Mission**

	Number of Units Affected	% Change in the City's Housing Stock	Impact on Prices
18-Month Moratorium	752-807	-0.2%	0.3%
Indefinite Prohibition	15,005	-3.9%	5.5%

Source: San Francisco Planning Department, Pipeline Data, OEA Analysis

The impact of a moratorium would be significantly less than an indefinite prohibition for two reasons. First, most of the development capacity in the Mission is not far advanced in the pipeline, and we project that only between 752 and 807 units would be affected in the next 18 months.

Secondly, the vast majority of those units that are affected would be delayed for less than 18 months, so at the expiration of the moratorium, the housing supply would increase and prices should quickly return to their pre-moratorium level. The 0.3% price effect would be a temporary phenomenon, and there would be no longer-term impact on prices. In fact, the expiration of the moratorium would lead to a surge in building permits being issued, most likely followed by a surge in construction, higher supply, and a return to the status quo ante situation.

An indefinite prohibition, on the other hand, would lead to longer-term price increase that would be much larger than the temporary one created by a moratorium, because it would affect more sites for a longer period of time.

What does this projected price increase mean in tangible terms? Over the 2006-13 period, an average of 50,685 households reportedly lived in their their unit for less than a year, according to Census data, meaning they had recently either purchased a house or began renting a vacant place. This represents between 12 – 15% of all households in the city, depending on the year.

When a household moves, either to the city or within the city, it faces the prices set by the housing market. As shown above, a constraint of housing supply raises these prices. Table 8 below quantifies the higher out-of-pocket expense that a household moving into a vacant unit would face because of the price effects detailed in Table 7.

TABLE 8 **Impact on Aggregate Housing Costs of a Moratorium and Indefinite Prohibition on Market-Rate Housing in the Mission**

	Number of households moving annually	Annual housing costs (2015 estimate)	Additional annual payment due to price effect	Aggregate ($M)
18-Month Moratorium	50,684	$32,542	$96	$4.1 - $7.0
Indefinite prohibition	50,684	$32,542	$1,794	$91 p/a

Source: US Census/IPUMS[3], OEA Analysis

A moratorium can be expected to lead to an increased annual housing payment of $8 per month, for every household that moves into a new residence.

In aggregate, given that we the average project delay will range between 10.1 and 17.3 months, these higher housing costs will lead moving households to pay an aggregate of $4.1 million and $7.0 million, while the moratorium is in effect. At the end of the moratorium, all of the housing that had been delayed would move forward, the housing supply would expand, and there would be an equivalent decline in housing expenses, for households seeking a house in the period after a moratorium.

In other words, people moving within the city during a moratorium would suffer higher housing costs, while those moving immediately after a moratorium would benefit from the surge in construction and, in effect, from the moratorium itself.

Under an indefinite prohibition scenario, because more units would eventually be affected, the price effect would be much larger, rising to $1,794 per household per year, or $91 million per year in aggregate. This effect wouldn't materialize immediately, because not all 15,005 potential market-rate units in the Mission will be built immediately. Instead, this number should be seen as a long-term annual impact that would phase in over time, and, once it does, higher prices would last as long as the prohibition.

It is also important to state that these estimates are based on today's housing prices, which will likely rise in the future based both on inflation, and the underlying imbalance between supply and demand that has led to the city's

[3] IPUMS-USA, University of Minnesota, www.ipums.org.

housing prices to rise much faster than inflation since the mid-1990s.

Impact on Resources for Affordable Housing

Under the City's inclusionary housing program, market-rate housing developers are required to either dedicate a certain percentage of the project's units as affordable, builld affordable units off-site, or pay an in-lieu fee to the Mayor's Office of Housing for affordable housing[4].

In the Mission, sites that are zoned as Urban Mixed Use (UMU) also received an additional affordable housing requirement. For UMU parcels that received no right to add additional stories (known Tier A pacels) under the Eastern Neighborhoods rezoning, the affordable housing requirement increased from the city-wide 12% to 14.4% for on-site or 23% for off-site units. If the UMU parcel was given the right to add 1 or 2 stories (Tier B), the affordable requirements was raised to 16% or 25%, and if the parcel would given the right to add more than 2 stories (Tier C), the requirements were set at 17.6% and 27% respectively. At present, all of the UMU parcels in the development pipeline are Tier A, according to information provided by the Planning Department.

Table 9 below indicates what the total on-site or off-site affordable housing requirements would be, for the 752-807 units in the Mission that we project would be affected by a temporary moratorium. The temporary moratorium would delay the provision of between 97 and 104 on-site affordable units, or 122 to 131 off-site units, depending on developers' decisions.

[4] Some projects additionally have the option of meeting their affordable housing requirement through a middle-income or land dedication option. Since information on the choices made by each project sponsor is not available, the use of these options is not estimated. Additionally, since unit sizes in the pipeline are not comprehensively known, in-lieu totals cannot be calculated.

TABLE 9 **Affordable Housing Requirements for Projects in the Mission Affected by an 18-Month Moratorium**

		Requirement		Affordable Units	
	Units	On-Site	Off-Site	All On-Site	All Off-Site
Urban Mixed-Use					
Tier A	286-306	14.4%	23.0%	41-44	66-70
Tier B	0	16.0%	25.0%	0	0
Tier C	0	17.6%	27.0%	0	0
Other Zoning	466-501	12.0%	12.0%	56-60	56-60
Total	752-807			97-104	122-131

Source: San Francisco Planning Department, OEA Analysis

Impact on Eviction Pressures

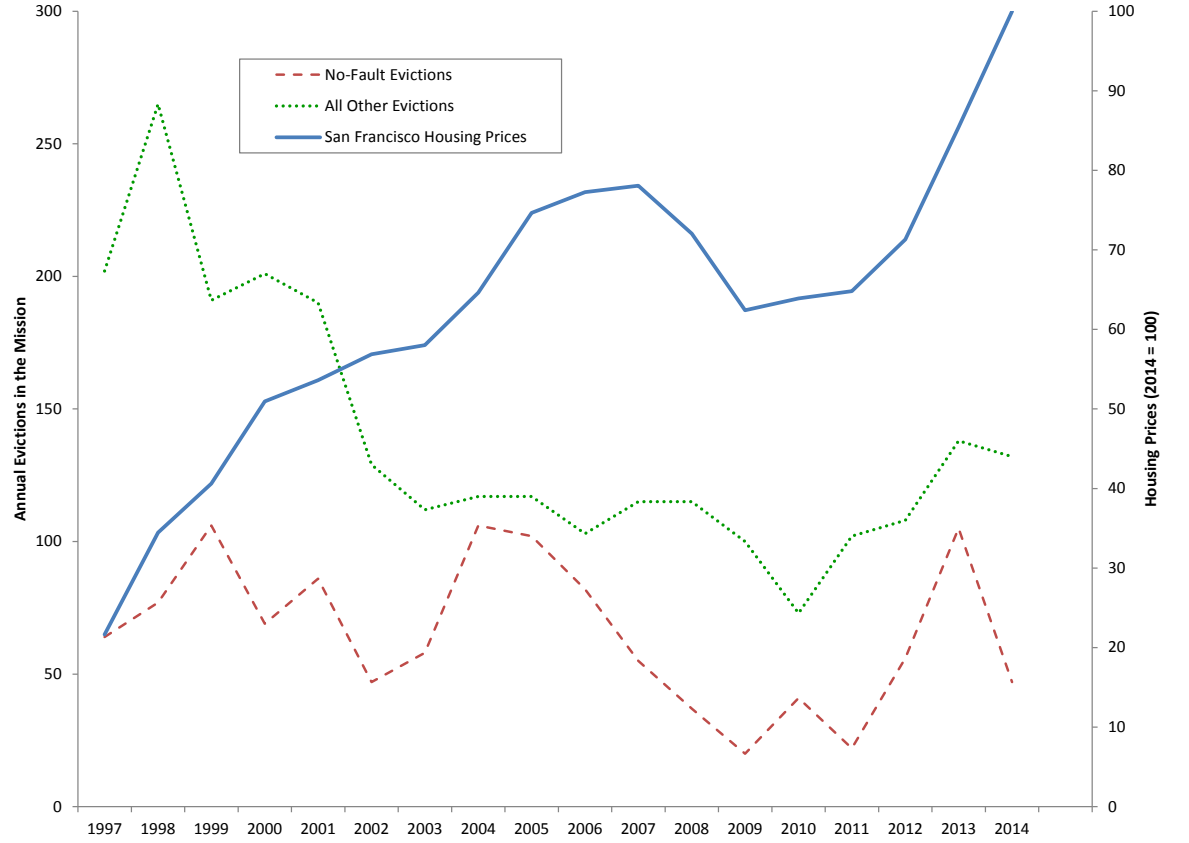
This report was requested to also consider the impact of a 2 year or indefinite moratorium on eviction pressures. The potential that fewer people might be evicted because of a moratorium is considered in the next section.

It is often believed, reasonably, that eviction pressures rise along with housing prices. The more a house is worth or can be rented for, the greater the financial incentive for an owner to evict the current tenant and sell the property, find a new tenant able to pay market-rate rents, or change the property's use.

Despite these beliefs, which reflect common-sense economics, our analysis do not find statistical relationship between housing prices and evictions, in the Mission or in the city as a whole. As Figure 3 shows, while housing prices have risen rapidly, and fairly consistently except for the 2007-2010 period, no-fault evictions in the Mission have been volatile, and other evictions have shown a general downward trend. The citywide trends are similar.

This lack of statistical correlation not necessarily mean the basic intuition is incorrect. There are many other things affecting eviction numbers in the city during this time period, particularly changing regulations, that cannot be accounted for statistically. It does mean, however, that we cannot use the estimate of higher housing prices above to estimate an increase in evictions in this report.

FIGURE 3 **Housing Prices Compared to No-Fault Evictions, and Other Evictions, in the Mission 1997-2014**



Source: San Francisco Rent Board, OEA Analysis

Summary of Potential Costs of a Moratorium

To summarize, it is likely that a moratorium on market-rate housing development in the Mission would slightly raise housing prices during and briefly after the period that it was in effect. We project that households renting or buying new housing during this period would pay an average of $8 per month, leading to aggregate increase in housing payments of between $4 and $7 million across the city. After the expiration of a moratorium, housing production in the Mission can be expected to begin to grow at elevated levels, as the pent-up demand in the pipeline is worked through. Households moving into a new house after the moratorium expires can be expected to pay relatively less for housing, because of this expanded supply. Over the long term, a temporary moratorium on market-rate housing would not affect the supply or price of housing in San Francisco.

An indefinite prohibition on market rate housing would lead to higher housing prices for a longer period of time. While

it would take several years for the full impact to materialize, if the city never built the 15,005 new units that are zoned for development in the Mission, future renters and homeowners could pay up to $1,794 per year for housing, on average.

An 18-month moratorium is also estimated to defer between 96-131 affordable housing units, depending on the precise number of market-rate units affected by the moratorium, and how developers choose between on-site and off-site production. Like the market-rate construction, these resources would become available at the expiration of a temporary moratorium.

Lastly, while it is reasonable to believe that higher housing prices caused by a temporary or an indefinite moratorium could lead to greater eviction pressures, we find no statistical evidence that the two are closely related. Consequently, we do not project any greater number of evictions associated with a temporary or indefinite moratorium.

POTENTIAL BENEFITS OF A MORATORIUM

Introduction

The previous section of the report dealt with the potential costs of limiting market-rate housing in the Mission. This section addresses and attempts to evaluate some potential benefits.

Four potential benefits of a moratorium and indefinite prohibition on market-rate housing in the Mission are considered in this section:

1. Preventing the displacement of existing residents
2. Discouraging gentrification
3. Preventing indirect displacement
4. Preserving sites for affordable housing development

Preventing Direct Displacement

By "direct displacement" we mean the no-fault eviction of a household in order to demolish its housing unit, so that new market-rate housing may be constructed on the parcel. If new market-rate housing development could only proceed after an occupied residential building was demolished, then the cost of eviction imposed on tenants would need to be weighed against the benefits outlined in the previous section.

Evictions for the purposes of demolishing a unit do occur in San Francisco. Of the 3,835 eviction notices that have been filed for properties in the Mission since 1997, 96, or 2.6% have been for the demolition of the unit. The citywide percentage of evictions for demolition is somewhat higher, 3.5%.

The City's eviction data does not permit a direct association of evictions with projects in the development pipeline, but it is possible to gain an upper-end estimate of potential eviction risk by examining the project's descriptions in the pipeline, and assessing how many involve the demolition of existing housing.

Based on a review of the 2015, 2nd quarter pipeline data from the Planning Department, the 752-807 new housing units that would be affected by an 18-month moratorium would not require the potential demolition of any existing residential units. Moreover, regardless of whether a pipeline project would be affected by an 18-month moratorium or not, we could not identify any new housing development project in the Mission awaiting a building permit that would require the demolition of a housing unit.

On this basis, we conclude that an 18-month moratorium

on market-rate housing development in the Mission would not lead to reduced direct displacement of existing residents.

For an indefinite prohibition on development, we examined the Planning Department's "soft sites" database, which contains Planning's estimates of the potential development capacity associated with every recently rezoned parcel in the city, and its relatively likelihood of redeveloping in the near future.

An indefinite prohibition would, of course, prevent new market rate anywhere in the Mission. But the soft sites database is important because it is Planning's estimate of what would actually develop under reasonable market conditions.

The database indicates that 8,885 new housing units could be built in the Mission on sites that Planning sees as relatively ripe for development. These sites currently contain 1,233 housing units, at least some of which would likely need to be demolished to produce the new units.

Both demolitions, and residential mergers that result in the loss of a unit, require Planning Commission approval. Moreover, tenants evicted for demolition, like other no-fault evictions, are entitled to a relocation payment.

Notwithstanding these requirements, however, demolition evictions do occur, and when they do they impose a cost on tenants that likely far exceeds the value of their required relocation payment. It is, therefore, fair to say that, over the longer term, continued market rate housing development in the Mission does carry the risk of further evictions for demolition, as has been seen, to some extent, in the past.

Discouraging Gentrification

Market-rate housing development often attracts opposition, particularly in low-income neighborhoods, because it is perceived to change the composition of the neighborhood, in ways that are undesirable or threatening to existing residents. As upper-income households have increasingly preferred an urban lifestyle to a suburban one, low-income neighborhoods have become subject to gentrification. Over time, as neighborhoods become more attractive to upper-income residents, new businesses arise to serve them, rents rise, and low income residents are pushed out, priced out, or forced to find a new community.

The Census data examined earlier clearly demonstrate that this process has happened in the Mission, particularly over the past ten to fifteen years. But what is the relationship between gentrification and new market-rate

housing development?

In an earlier section, we noted that the upper income population in the Mission has risen more quickly than it has in the city as a whole, over several decades, despite very low levels of market-rate housing construction. This fact alone could cast doubt on the idea that market-rate housing is largely responsible for the clear evidence of gentrification that the neighborhood has experienced.

In San Francisco, a large swath of the city's rental housing stock is rent controlled, and the region's knowledge-based economy has attracted many upper-income migrants from other cities and regions. When market rents rise rapidly, the benefits of staying in a rent-controlled unit rise as well, creating a greater incentive for tenants to remain in these units and potentially reducing the rental vacancy rate. Yet it is precisely during these economic boom periods that demand from upper-income movers to the area is high.

It is sometimes argued, on this basis, that new market rate housing, which is generally only affordable to upper-income households, actually creates housing vacancies for those upper-income households that would otherwise not exist, because current tenants have such an incentive to stay in their unit. If this were true, new market-rate housing would promote gentrification, by housing more upper-income residents than could be accommodated by the existing housing stock.

More detailed Census data from the I-PUMS system allows us to directly examine who lives in new housing in San Francisco, in terms of their income and when they moved to the city. Table 10 below cross-tabulates existing city residents, new upper-income movers, and other new movers based on the age of the housing that they live in.

Upper-income movers are somewhat more likely to live in new housing, which is unsurprising because, by definition, they are looking for housing and are more likely to find new housing affordable than lower-income movers. Nevertheless, over 97% of upper-income movers to San Francisco do not move into new housing. They instead occupy units from the existing housing stock, whose natural turnover process creates far more vacancies than the production of new housing does.

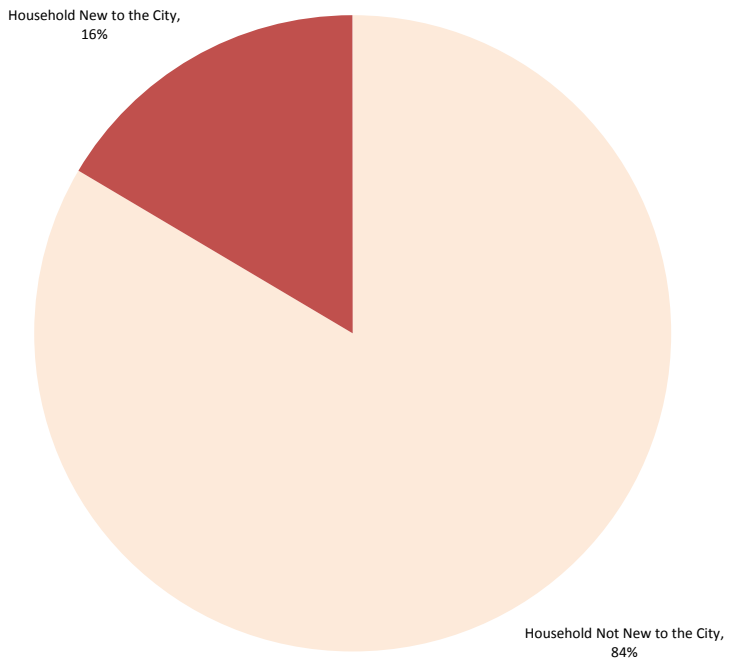
TABLE 10 **Existing San Francisco Residents, Upper-Income Newcomers, and Other Newcomers, by Age of Their House**

	Households living in SF more than 1 Year	Households new to SF - High Income	Households new to SF - not High Income
% Living in Existing Housing	99.6%	97.1%	99.5%
% Living in New Housing	0.4%	2.9%	0.5%
Total	100%	100%	100%

Source: US Census/IPUMS

To look at the question the other way, new movers to the City are not actually the primary occupants of new housing. As Figure 4 shows, the vast majority of the people who *do* live in new housing in San Francisco are not new residents of San Francisco – whether high-income or otherwise. 84% of the occupants of new housing lived in another residence in San Francisco one year previously.

FIGURE 4 **Occupants of New Housing in San Francisco**



Source: US Census/IPUMS

While this data is not available for the specific Census tracts in the Mission that we examined earlier, given the lower levels of new housing construction in the Mission compared to the rest of the city, the percentages for the Mission are likely to be at least as high as for the city as a whole.

Market-rate housing probably has contributed to gentrification in many cities in the past. But the data shows clearly that, in San Francisco in 2015, market-rate housing development is not accommodating upper-income movers who would otherwise be somehow shut out of the city's housing market. On the contrary, the overwhelming majority of wealthy new residents do not live in new housing, and conversely, the vast majority of new market rate construction creates housing opportunities for existing city residents.

For this reason, we find no reason to believe that either a temporary moratorium, or an indefinite prohibition, of market rate housing will reduce the number of upper-income residents in the Mission, or slow the process of gentrification that the neighborhood has been experiencing.

Preventing Indirect Displacement Effects

Another potential benefit of a housing moratorium could be to prevent "indirect displacement", or housing price inflation caused by the development of new housing. It is sometimes argued that the construction of new market rate housing raises the price of nearby housing. This might happen if, for example, the new housing was of higher quality than the existing housing, or offered amenities that were available to the entire neighborhood, or, as discussed above, attracted wealthy new residents that otherwise would not move into the neighborhood.

Alternatively, it is also sometimes claimed that new construction reduces the value of nearby housing, because it affects the quality of life in neighborhoods, increases congestion, or otherwise affects the local environment in a negative way.

To our knowledge, the issue has never been directly studied in San Francisco. In this section, we present the results of a second round of hedonic price analysis, that analyzes the effects that new market-rate developments, have had on the sales prices of nearby housing units. More details on the analysis are provided in the Appendix.

These models added to the hedonic price analysis discussed earlier an indicator that reflects the relative proximity of each existing home sale to new market rate

developments in the Mission built between 2001 and 2013.

3 models were run, with different lag periods. In the first, the impact of proximity to market-rate housing built in Mission in the previous year on home sale was tested for its impact on home sale prices. In the second and third models, the impact of proximity to market-rate housing built in the Mission 2 and 3 years previously was examined.

The results were consistent: proximity to market-rate housing had a statistically-significant negative effect on housing prices, in all three models[5].

The effects, while significant, were not large. A property 250 feet from 75 units of new market rate housing would have, at maximum, a 5.9% lower price (2 years after construction), and this effect would decline to 4.1% in the subsequent year.

The reason for this finding of a negative impact of market-rate housing development on home sales is not immediately obvious, and would require investigation that goes beyond the scope of this report. It is possible that increased population leads home buyers to perceive a lower neighborhood quality. The City charges impact fees to new development to offset environmental impacts that may negatively affect property values. It is also possible that, with a long enough time horizon, analysis would reveal this negative effect diminishing or reversing. This might happen if the neighborhood investments that are funded by impact fees improve the area, and restore or enhance buyers' valuation of homes in the area.

Regardless of the reason for the negative impact, the data is clear that new market-rate housing did not make nearby housing more expensive, in San Francisco during the 2001-2013 period. For this reason, we conclude that preventing indirect displacement would not be a benefit of either a 18-month housing moratorium, or an indefinite prohibition.

Maintaining Sites for Affordable Housing

One of the stated reasons for proposing a market-rate housing moratorium is to preserve sites in the Mission for affordable housing. Given the pace of gentrification in the neighborhood, affordable housing is an obvious priority, and affordable housing developers have to compete with market-rate developers to obtain sites on which to build affordable housing. In June, the Board's Budget and Legislative Analyst issued a report that identified five sites

[5] The analysis was then repeated using all market-rate construction in the city, not just new market-rate developments in the Mission. Again, the results showed statistically-significant negative effects on housing prices.

in particular that are at risk for market-rate development, that would be suitable for affordable housing.

On its face, it is clear that a moratorium on market-rate development would prevent market-rate development during the period is in effect. In that sense, it would preserve soft sites for potential development as affordable housing.

It is far less clear that a moratorium would actually induce a property owner to sell to an affordable housing developer, however. An 18 month moratorium would increase a developer's cost of holding developable land during that period. But, at the same time, housing prices may well continue to rise faster than construction and carrying costs anyway during the period. If that happens, the owner of a developable parcel may well be better off after a moratorium, and even less inclined to sell to an affordable housing developer at a pre-moratorium price.

Over the longer term, decisions would likely change. With an indefinite prohibition of market rate housing, land values would be likely to decline, since new market rate housing is the highest and best use in many cases.

New affordable housing has powerful effects on affordability for low-income residents, both those low-income households that receive a unit, and those others that face less competition in the private housing market, because new affordable housing has absorbed some of that demand.

The benefits of investing in affordable housing are clear. What is less clear is the relative costs of different approaches to funding it. The root of the issue is why affordable housing developers cannot compete with market-rate developers for sites. The City currently subsidizes new affordable housing to the tune of approximately $200,000 per unit. Presumably, there is some additional subsidy that could be provided that would allow affordable housing developers to compete on a level playing field with market-rate developers, if that was a policy priority for the City. Is that additional subsidy more, or less, than the fiscal and economic cost of using land use policy to drive down land values to the point where affordable housing can compete with current levels of subsidy?

At this point, the OEA lacks sufficient data on site acquisition costs by market-rate and affordable housing developers to fully quantify this trade-off. But there are three reasons why we believe it is very unlikely that

prohibiting market rate housing, as opposed to increasing affordable housing subsidies, is the most economical way to produce more affordable housing:

1. First, market rate housing construction drives down housing prices and, by itself, increases the number of housing units that are affordable.
2. Market rate housing also generates funding for affordable housing, through the inclusionary housing fee.
3. Perhaps most importantly, affordable housing developers do not only compete for sites with market-rate housing developers. They must also compete with an existing land use, which is, in the vast majority of cases, generating income and rents for the property owner. If an affordable housing developer cannot offer more than the land is worth at the current use, then it will not be used for affordable housing, whether market-rate housing is permitted or not.

This last point is critical, because it suggests that a prohibition will not lead to a one-to-one replacement of market-rate housing with affordable housing at the same time. Rather, it would most likely slow down the overall production of housing in the city, potentially in a way that causes the city's housing affordability challenges to get worse.

Summary of Potential Benefits of a Moratorium

After reviewing four the potential benefits of a temporary moratorium on market-rate housing in the Mission, we find little evidence that any of them would materialize. The 752-807 housing units that could potentially affected by a moratorium would not require the demolition of any existing housing units. Thus, we find no evidence that anyone would be evicted so that market-rate housing could be built in the Mission over the next 18 to 30 months.

Our research further finds no reason to believe that upper-income people are moving into the Mission because market-rate housing is being built; on the contrary, the overwhelming majority of upper-income movers to the city move into vacancies in the existing housing stock, created by the 15% of city residents who move each year.

We further find no evidence that new market-rate housing contributes to indirect displacement in the Mission, by driving up the value of nearby properties. On the contrary, both in the Mission and across the city, new market rate housing tends to depress, not raise, the value of existing properties.

Finally, while a moratorium would preserve sites for affordable housing development, it is unlikely that it would provide any greater incentive to a property owner to sell to an affordable housing developer.

In the case of an indefinite prohibition, the evidence is somewhat more mixed. Evictions for the purposes of housing demolition do occur, and the soft sites in the Mission do contain existing housing units that could be lost through demolition in the future. Absent policy changes, those evictions would impose a cost on tenants that almost certainly exceeds their mandatory relocation payment. Additionally, an indefinite prohibition could depress land values to the point where more affordable housing could be financially feasible without additional subsidy. However, it is likely that it would be far less costly, financially and economically, for the City to expand the amount of affordable housing by relaxing land use controls and increasing funding, and not by prohibiting market rate housing.

APPENDIX: HOUSING PRICES AND SUPPLY

Hedonic Price Analysis

An hedonic pricing model statistically breaks down the observed price of a heterogeneous good like housing into the separate prices of its constituent parts.

For housing, we begin with presuming that the sales price of a single-family residence is a function of its size (in square footage of living area), age (years since construction), whether the unit is a condominium, its number of bedrooms and bathrooms, the neighborhood it was located in, and the year it was sold. Using linear regression, we can estimate separate values for each of these characteristics.

To estimate the parameters in the hedonic mode, we acquired a data set from the real estate firm CoreLogic, which consists of sales of condominiums, and single family homes in San Francisco, from 1967 to 2015. Each sale record also includes information about the property, including its address, square footage of living area, number of bedrooms and baths, type (single-family or condominium), along with the sales price, and the date of sale.

Using the City's Enterprise GIS system we were able to geo-locate each address into a city neighborhood, as defined by the Planning Department. We could then estimate a multiple regression equation that estimates the parameters. The results are shown in Table 11. The model was specified in logarithmic form, so the different effects need to be multiplied together to get a housing price estimate: the examples following the table illustrate how this can be done.

TABLE 11 Hedonic Prices for San Francisco House Sale Characteristics

Baseline	$8,949

Base variables (exponential):

Square feet	0.657
Age in years	-0.036

Structure Modifiers:		Neighborhood Modifiers:		Year of Sale Modifiers:	
Single-family	36%	Bayview	-44%	1983	-84%
Studio	-4%	Bernal Heights	-9%	1984	-86%
2 bedroom	9%	Castro/Upper Market	33%	1985	-84%
3 bedroom	5%	Chinatown	42%	1986	-83%
4 bedroom	-1%	Crocker Amazon	-33%	1987	-82%
5 bedroom	-2%	Diamond Heights	-12%	1988	-80%
6 bedroom	-7%	Downtown/Civic Center	5%	1989	-77%
2 baths	9%	Excelsior	-30%	1990	-75%
3 baths	13%	Financial District	79%	1991	-75%
4 baths	9%	Glen Park	11%	1992	-74%
		Haight Ashbury	24%	1993	-75%
		Inner Richmond	17%	1994	-76%
		Inner Sunset	0%	1995	-75%
		Lakeshore	-4%	1996	-75%
		Marina	64%	1997	-80%
		Mission	0%	1998	-68%
		Nob Hill	-21%	1999	-62%
		Noe Valley	34%	2000	-52%
		North Beach	51%	2001	-49%
		Ocean View	-30%	2002	-46%
		Outer Mission	-22%	2003	-45%
		Outer Richmond	-3%	2004	-39%
		Outer Sunset	-17%	2005	-30%
		Pacific Heights	64%	2006	-27%
		Parkside	-15%	2007	-26%
		Potrero Hill	7%	2008	-32%
		Presidio	273%	2009	-41%
		Presidio Heights	80%	2010	-40%
		Russian Hill	66%	2011	-39%
		Seacliff	78%	2012	-33%
		South of Market	20%	2013	-19%
		Twin Peaks	14%	2014	-6%
		Visitacion Valley	-40%	2015	0%

Starting with the baseline, the variable modifiers in the table above can be used to estimate the sale price of any particular housing of a specified size, type, neighborhood, and year sold.

For example, consider a 3 bedroom, 1 bath single family house, built 60 years ago in the Outer Sunset, that had 1,100 square feet of space. If it sold in 2014, the price could be estimated at:

$8,949	Baseline
x 1,100^(0.657)	Square feet
x 60^(-0.036)	Age
x (1 + 36%)	Single-family house
x (1 + 5%)	Three bedroom
x (1 – 17%)	Outer Sunset
x (1 – 6%)	Sold in 2014
$861,931	Sale price estimate

As another example, a 1 bedroom, 1 bath condo in the South of Market, with 700 square feet, built 7 years ago and also sold in 2014, would be priced at:

$8,949	Baseline
x 700^(0.657)	Square feet
x 7^(-0.036)	Age
x (1 – 17%)	South of Market
x (1 – 6%)	Sold in 2014
$641,863	Sale price estimate

Among these regression coefficients, the ones that are most important for the questions in this report are the ones dealing with the year of sale. Note that if both homes sold in 2015 instead of 2014, the respective sale prices would be $911,512 and $740,903, respectively. In both cases, the estimated sales prices would rise by 6%. This 6% is the change in the housing price index referred to in the report; it is annually change in that part of the sales price which depends on the year sold.

Impact of Constrained Housing Supply on Housing Prices

In a market for a simpler commodity, like orange juice, it's relatively easy to look at the connection between the amount of orange juice that the market supplies, and how much consumers are willing to pay for it. Adjusting for consumer characteristics, and accounting for how suppliers react to price changes, the relationship between supply and price can be used to estimate how much the price per gallon of orange juice will change, when the supply of orange juice changes.

But because housing is heterogeneous, it is harder to study. How do we know much "quantity" of housing is on the market? We know the number of housing units in the

city, of course, but based on the previous section, we also know that all housing units are not economically the same.

The hedonic price analysis can be provide an answer. Because the housing market creates a "price" for each of the features of the house, the actual sales price of a house - or the market rent of an apartment - represents a product of those hedonic quantities and prices that the housing unit contains, in the same way that an expenditure on a carton of orange juice equals the volume of juice, multiplied by the price per ounce.

To put it more succinctly, the sales price of a house is a function of three things:

1. the quantity of the characteristics that the house contain (square feet, number of bedrooms, neighborhood, etc.), which vary from house to house.
2. The hedonic prices of those characteristics, which are constant.
3. The housing price index, which is the same for every house in every year, but varies from year to year.

In other words, while we can't simply statistically relate the housing price index to the quantity of housing to see how supply affects prices, we can relate sales prices to something close: that quantity of housing, a set of constant hedonic prices for structural characteristics, and the housing price index.

This makes the math slightly more complicated, but modeling how transaction prices affect price indices is very similar to modeling how quantities affect prices. A standard demand function—that might be used to model a simple commodity—is:

$$Q_d = \propto p^{\beta} y^{\gamma}$$

Where Q_d is the quantity demanded, p is the price, y is consumer income, and β is the price elasticity of demand. In this case, we can't observe Q_d because housing is a complex good, but we do have data on the housing sales price.[6] Based on the above discussion, $S = phQ_d$, where S is the sales price and h is the constant structural prices, then by multiplying both sides of the above equation by p,

[6] Through the Census, we have both the owner's estimate of the value of their home, or the contract rent paid by renting household. In either case, the sample is restricted to households that moved to their home within the previous year, so their reported totals will closely reflect the market.

it is mathematically identical to:

$$S = phQ_d = h \propto p^{\beta+1} y^{\gamma}$$

Since we have a housing price index and can obtain household income and individual housing values from the Census public micro-data, this equation can be modelled using linear regression, once both sides are logged, and we can estimate $\beta + 1$ and hence β, the elasticity of demand for housing.

The OEA used individual household Census returns, retrieved through the I-PUMS system, to relate the amounts paid for housing, housing price indices, and household income. To account for the fact that most homes are purchased with a mortgage, and mortgage rates affect how much a home-seeker can bid for a house, we also included mortgage rates in the model for owner-occupied housing.

Specifically, we created two logarithmic regression models:

1. For owner-occupied housing, the first model examined the relationship between the OEA home price index for the year in question, the home value and household income reported to the Census, and the average 30-year fixed mortgage rate for the year. This model was restricted to households that owned their home.

1. For rental housing, the second model examined the relationship between the RealFacts Rent Index, and the household's reported monthly rent payment and annual household income.

Both models used annual Census data for the 2006-2013 period. Also in both cases, the sample was restricted to households that moved into their house less than 1 year previously (and thus were paying market prices for housing), and reported non-zero household income.

As above, with this data we can estimate the elasticity of demand. However, we are interested in what economists call the *inverse elasticity of demand*: how much does a consumer's willingness to pay for something increase with a 1% increase in the quantity in the market? The equation above can be re-arranged show that the inverse elasticity is simply one divided by the elasticity.

The results of the two regressions, shown in Table 12 below, indicate that, in both models, a 1% reduction in supply, due to constraining change in land use policy, would lead to approximately a 1.4% increase in price.

TABLE 12	Results for the Two Housing Demand Models	
Owner model		
Dependent Variable:	Home Value	
		Variable Exponent
Independent Variables:	Annual Household Income	0.25
	OEA Price Index	0.30
	30-year fixed mortgage rate	-0.04
Price elasticity of demand = Price Index Exponent - 1 =		-0.70
Inverse price elasticity of demand = 1 / price elasticity =		-1.44
Renter Model		
Dependent Variable:	Monthly Rent	
		Variable Exponent
Independent Variables:	Annual Household Income	0.28
	RealFacts Rent Index	0.42
Price elasticity of demand = Price Index Exponent - 1 =		-0.72
Inverse price elasticity of demand = 1 / price elasticity =		-1.39
% of households renting		64%
Weighted inverse price elasticity of demand		-1.41

Supply Effect Elsewhere in the City

An increase in the price of a commodity generally leads to producers to supply more of it. In housing terms, this means that the increase in households' willingness to pay for housing, created by restricting supply in one part of the city, can make development projects elsewhere in the city more feasible. This additional supply tends to dampen the price effect, and the loss of housing supply, resulting from a moratorium in one part of the city. Estimating this supply effect is an important part of understanding the full effect of a supply constraint.

Land use and new housing development is very heavily regulated everywhere in San Francisco, and the responsiveness of housing supply to price increases in the past has been extremely low. Using annual data, over the 1983-2014 period, on the number of housing units in the city from Moody's Analytics (based on Census and HUD housing completions data), the cost of building construction (based on an index from Engineering News Record), and the housing price index we created from the hedonic price analysis, we estimated the following equation:

$$\ln(Q_s) = \alpha + \beta \ln(p) + \gamma \ln(BCI)$$

Where Q_S is the quantity supplied, the number of housing units in San Francisco, p is the housing price index, BCI is the building cost index, and $\ln$ indicates the natural logarithm function.

The β represents the price elasticity of supply of housing: the percentage increase in housing that would be produced in response to a 1% increase in housing prices, holding construction costs constant.

The result, unsurprisingly, was a significant but very low level of price responsiveness of supply. A 1% increase in housing price leads developers to raise the supply of housing in the city by only 0.02%.

Thus, while the supply effect needs to be accounted for, it has a very small compensatory downward effect on housing prices.

Estimating the Price Effect

The ultimate price effect of a housing supply constraint is a function of three things: the size of the constraint, the degree to which consumers are willing to pay more for housing in the face of that constraint (the inverse elasticity of demand), and the degree to which developers will build more housing elsewhere in the city, given consumer's willingness to pay more (the elasticity of supply).

Where ε_s is the elasticities of supply and σ_d is the inverse elasticity of demand, we can write the relevant equation as:

$$\left(\frac{\Delta p}{p}\right) = \frac{\left(\frac{\Delta Q_s}{Q_s}\right)}{\varepsilon_s - \frac{1}{\sigma_d}}$$

The price effect is therefore a function of the percentage reduction in the city's housing stock ($\frac{\Delta Q_s}{Q_s}$), the price elasticity of supply (0.02, per the previous section), and the inverse elasticity of demand (-1.41, per the first section of the appendix). The price effect—the final percentage change in housing prices—equals the percentage change in housing supply, divided by 0.02 – (1/-1.41) or 0.73.

Impact of New Market-Rate Housing on the Sales Price of Existing Units

We tested for the effect of proximity to new market-rate housing on existing home sales prices by extending the hedonic price model discussed in the first part of the Appendix, added a variable expressing proximity to new market rate housing built in the Mission at different points in time.

For a home sale *i* occurring in year *t*, its proximity to market rate housing built in a year *(t-k)* that had *m(t-k)* market-rate projects built in the Mission, (*j = 1..m(t-k)*) is defined as:

$$P_{it;k} = \sum_{j=1}^{m(t-k)} \frac{u_j}{d_{ij}^2}$$

where:

u_j is the number of market-rate housing units in development j

dij is the distance (in feet) between the home that sold and development j

k is a lag variable, k = {1,2,3}

The proximity variable, like the other variable, was logged, and the model was run separately for each value of k.

For k = 1, the effect was significantly negative at the 99% level, with a coefficient of -.011.

For k = 2, the effect was significantly negative at the 99% level, with a coefficient of -.016.

For k = 3, the effect was significantly negative at the 99% level, with a coefficient of -.011.

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