Script:

* PREFACE (OPTIONAL)
* I’m going to start you all out with an aerial view of a typical American community zoned for large lots and single-family housing.
* One strand of thought suggests that this structure preserves nice amenities and high quality of life—and that regulation is a necessary tool to preserve this structure.
* On the other hand, this structure is thought to be upheld only because rich households have political power and the incentive to exclude undesirable, usually poorer, neighbors.
* I’m interested in measuring the aggregate welfare impacts lot size regulations in a way that builds on an exciting and new literature.
* (SLIDE 2) Let’s motivate this paper more concretely. It builds upon two strands of literature:

1. On one hand, we know from the macro literature that housing regulation has real consequences for aggregate growth; primarily by limiting the size of productive cities.
2. On the other hand, there is micro evidence suggesting that a particular type of regulation—the minimum lot size—places disproportionate burden on low-income households who cannot afford to purchase large lots. This regulation is ubiquitous across the United States.
3. The minimum lot size is shown to plausibly cause strong residential sorting on income at the neighborhood level. This mechanism is missing from the macroeconomic literature.

* I ask the following (READ). There is no previous work that joins these two perspectives in a general equilibrium framework. I argue there is very good reason to do so.
* (SLIDE 3) DO NOT READ SLIDE.
* (FIRST POINT) Firstly, I argue that the income sorting mechanism caused by lot sizes have important implications for the macroeconomics of housing regulation.
* The standard story is that regulations slow aggregate growth by preventing labour from accessing productive local technologies that are responsible for the growth
* However, loosening restrictions in expensive cities when those regulations cause income sorting implies that high income, productive households leave. These forces offset each other, and I have a lot to say about this.
* Implicit in this statement is that lot size regulation is *more stringent* in expensive cities. I make this statement precise and provide evidence in the coming slides.
* This channel may be exacerbated by *endogenous amenities*, as has been a typical lesson in the recent urban literature.
* I’ll be more clear on how I model these amenities in the coming slides. The jist is that I allow these amenities to respond to the local income composition of a neighborhood.
* One interpretation is the idea that rich households may efficiently exclude poor households with these regulations to bolster their fiscal surplus, as argued in Hamilton’s classic work.
* I provide other interpretations as well.
* (SECOND POINT) Secondly, I provide observational evidence that heterogenous lot size regulation has altered the urban structure of expensive cities. In addition to cross-city migration, I argue that within-city migration is also crucial for assessing the welfare consequences of the model (READ)
* (SLIDE 4) How do I answer this question? (READ)
* (SLIDE 5) (DO NOT READ SLIDE)
* Big disclaimer: this is a big work in progress. Things may change.
* To start, I find that households of all incomes gain from deregulation, with the average benefitting approximately 10.2%. Households in this model *do not own land*, so these gains operate through labour wages, amenities and rents.
* The reason why the average gains are large is because they are extremely skewed toward very low income households.
* On the other hand, average landlord sees their land values rise by 5%. However, *strongly regulated neighborhoods before the policy change are the exclusive group of losers, and this result is driven entirely by endogenous amenities.* This result is consistent with the homevoter hypothesis in settings where housing regulation is decided by local governments.
* The following is one of my most surprising results: (READ ONLY HEADER)
* This should be surprising when thinking in the context of exclusionary zoning—rich households have less ability to exclude the poor. In the counterfactual, high income households actually face *better* amenities **on average** for two reasons:

1. Firstly, many high income households live *outside* of neighborhoods with large lots in the data. This makes sense—large lots exclude all types of households by restricting density.
2. Secondly, these high income households benefit when low income households *move in response to deregulation*.

* (SLIDE 6)
* (READ)
* Surprise Surprise—Across cities, (READ)
* Within cities, (READ)
* In other words, something that looks a lot like the recent gentrification of expensive cities *accelerates*; and the affluent households that stay in these neighborhoods benefit from that gentrification. This ties into the story for why endogenous amenities benefit all types of households.
* A formal welfare decomposition needs to be done to gauge the relative importance of all of these mechanisms. I am still thinking about this.
* (SLIDE 7) (READ)
* (SLIDE 8)
* Given the spatial scale of the model, I see this paper as firstly improving upon the literature that quantifies the macroeconomic impacts of housing regulation in ways I have already discussed.
* I see my paper as also building upon a literature that pays special attention to lot size regulation. I’ve discussed Song and Kulka’s JMPs before, so I want to make special note of Kulka et. al (2022). One of the main lessons is that lot size regulation and height restrictions are complementary—deregulation is effective when both are targeted.
* My paper is also related to recent literature that documents patterns of urban spatial sorting—including gentrification. However, I want to stress that it cannot explain these recent gentrification patterns, and instead speaks to an older literature on urban decay; including one that explains negative income sorting into downtowns (gleaser, kahn, rappaport 2009, Brueckner, thisse zenou 1999), nor can it explain how income sorting is shaped by patterns of filtering or housing cycles (Brueckner and Rosenthal, 2009).
* This paper is also closely linked to a literature which studies the role that zoning policy plays in the presence of Tiebout sorting and ad valorem property taxes. In my model, the externality that gives rise to urban spatial sorting can be interpreted in the context of some of these papers.

PART 2: FACTS

* ON MOTIVATING EVIDENCE SLIDE: As I alluded to before, I want to show you two brief facts that help explain both within and across city sorting of income on density, and how these sorting patterns relate to *direct* measures of the stringency of lot size regulation.
* (SLIDE 9) The first fact is that there is generally negative income sorting on density within cities; and that these sorting patterns are stronger in cities that are more expensive.
* How do I show this? (READ)
* Note that I use fixed effects here to compare only within-city variation in sorting patterns.
* (SLIDE 10): Y axis: log average income, x axis: the ranking of housing unit density. The curves for both the superstar sample (given in blue) and non-superstar (in red) are downward sloping. We also observe an approximate single crossing pattern—low density neighborhoods are relatively more affluent in expensive cities, and vice versa for high density neighborhoods.
* Why might these sorting patterns matter for welfare? To see this, let’s jump ahead a bit and ask what this curve would look like under the counterfactual equilibrium where we eliminated all lot sizes. (LINK)
* Things look a bit different. Now, most high density neighborhoods are relatively more affluent in expensive cities. Remember that high income households benefit from higher amenities in the counterfactual, and the sources of these benefits stem in part from the emergence of these relatively affluent downtowns.
* (SLIDE 11):
* Fact 1 begs an important question: How do we know that the model isn’t artificially set up to yield this pattern? It would be useful if we could link this to more direct measures of lot size stringency; I do so in Fact 2.
* I find that a similar single crossing pattern that characterizes income sorting also holds for this direct measure. I find that the low-density neighborhoods of expensive cities have relatively more stringent regulation, and vice versa for cheap cities.
* How do we show this? Under some very lax assumptions, the model yields a simple statistic (NAME): the cost to rent structure AT the minimum lot size in a block group indexed by i.
* The statistic is the product of two things—the minimum lot size l(i) and the value of housing per acre V(i) under the assumption that they are both uniform within a block group *i.*
* This statistic also makes clear how income sorting arises in the model—those will low income are forced to spend more on housing stock then what would be chosen in the absence of regulation. High income households are less likely to see this constraint bind.
* These are constructed using the 2015 assessment data. I go into more detail on how minimum lot sizes are measured later.
* (SLIDE 12) Just reiterate. Point should be driven home from there.
* Moreover, this graph masks variation in stringency *across* cities. I find that *expensive cities have approximately 3 times more expensive minimum lots.* This suggests that regulation causes some income sorting across cities; and surprise, surprise, this is a big theme of the paper.
* MODEL SLIDE: The purpose of the model is simple--to deliver welfare estimates of lot size deregulation in settings where households are heterogenous in their earnings, and can move both within and across cities to avoid (or follow) stringent regulation. This is motivated by the facts I’ve shown you.
* I presented this model before so I will move slightly fast here. Let me know if you have any questions
* (SLIDE 13): Just read this.
* (SLIDE 14):
* READ + EXPLAIN NOTATION.
* READ. This makes sense—the minimum housing stock is just the housing supply per unit of land multiplied by the regulated minimum amount of land per housing unit.
* *This constraint will enter directly into the problem of the household.*
* Our lot size stringency measure I\*(i) used in the facts is recovered by multiplying the amount of housing stock on the minimal lot by the price per unit of housing stock.
* (SLIDE 15): (READ)
* I model differing education to open up the possibility that workers of different incomes may not be perfectly substitutable. It turns out that this mechanism not to mater much, so I don’t emphasize it.
* An important caveat is how I model households who cannot meet the constraint. I assume they spend all of their income on housing and receive a utility of zero. I’ll explain why in the next slide.
* (SLIDE 16):
* Households are going to receive a neighborhood-skill specific amenity b(i, z). Allowing these to be as flexible as possible allows the model to rationalize any distribution of household types we see in the data.
* (READ)
* Rho(z) and theta(z) are the within and across city semi-elasticities, respectively, and are allowed to vary by type.
* A consequence of the Gumbel structure is that there will be a potentially positive measure of households wherever there are positive amenities--including households who cannot afford to rent the minimal lot. This feature grapples with the reality that the types of households whom the model predicts would be priced out of the housing market ***actually show up in observation*.** This can be for many reasons, including observed government transfers and unobserved permanent income. I want the model to be able to fit any distribution of households that show up in the data so that comparisons with the counterfactual equilibrium make sense.
* A caveat from all this is that I may be grossly underestimating the utility of low income households who choose regulated neighborhoods—and potentially overestimating the welfare gains.
* (SLIDE 17) (READ)
* Other interpretations include:

1. Willingness to pay for high income households
2. Peer effects (i.e. through Raj Chetty’s work)

* Omega will be estimated, and I will need your feedback on that.
* (NEW SECTION) I provide a brief schematic for how I estimate and calibrate parameters
* (SLIDE 18) (READ—ZONING DISTRICTS)
* (READ FIRST POINT). The idea of a “zoning district” in her paper is some geographic boundary for which regulation is approximately uniform. She constructs these “zoning districts” in instances where direct data on zoning codes are missing from the assessments, hence the use of quotes.
* For this draft, I use this methodology for the entire dataset.
* (READ)
* (SLIDE 19) (ZONING DISTRICTS PART 2):
* Within each zoning district, I take the (smallest) mode of the lot size distribution as a measure of regulation. *I find that it works better to measure discontinuities than her method.*
* (READ). As an example, duplexes are two housing units on a lot—so I divide the minimum lot size by 2 in order to arrive at the appropriate density restriction.
* *Additional cleaning.* There are two issues with using these modes as a measure of lot size regulation.

1. Firstly, lot-level exemptions from regulation (or *variance*) are sometimes granted, and the frequency by which they are granted cannot be observed in the data. I make some adjustments to deal with these scenarios.
2. Secondly, if the minimum lot size were binding, we would *not* expect that the land use, if all housing units were built at the minimum size, to exceed some measure of total residential land use. I set the regulation to be zero in these cases (they tend to be in downtowns).

* What is reassuring is that Fact 2 is invariant to the choice of parameters used in this cleaning process.
* MEASUREMENTS

1. This is the empirical CDF of the minimum lot sizes across the sample. About 30% of block groups are assigned zero regulation, and a large majority of block groups have lot sizes below one acre. And we see that quite a few neighborhoods have a one acre minimum lot size.
2. Here is a map of the measured density restrictions in San Francisco. The block groups in the northeast (corresponding to the CBD) are correctly assigned no lot size restriction. Neighborhoods near the glen park area (south) are also assigned correctly to 2,500 square foot single family lots. The model underpredicts lot size regulation in Richmond and Sunset in west and northwest.

* (SLIDE 20): READ
* (NOTE ABOUT MIGRATION ELASTICITIES: Some corrections need to be made to this adjustment, and these may change the results.
* (SLIDE 21): READ equation. The idea is to estimate Omega after choosing a fixed value of kappa from the literature.
* Identification is challenged by a reverse causality bias. It may be the case that unobserved neighborhood demand shocks contained in epsilon will *exacerbate income sorting*. An IV should be able to predict local incomes *but not be correlated with anything that enters neighborhood demand.*
* Something that is good at predicting income per capita are terrain slopes—this has long been recognized in the housing literature. However, they very likely enter directly into the demand function.
* (SLIDE 22):
* As a workaround to this, I propose a “donut” style instrument, following BFM (2007) in spirit. (READ)
* I don’t have data on income at the household level, so I may to have to link the assessment files with Home Mortgage Disclosure Act data as Song and Kulka have done before.
* A simpler (but not exactly correct) approach would also be to replace income per capita with average property values; with Cobb-Douglas preferences these correspond exactly for households whom the lot size constraint does not bind. (OPTIONAL)
* (SLIDE 23):
* Point 2 and 3 operate through across and within city sorting.
* I argue that 1, 3 and 4 matter, but the Hsieh-Moretti channel does not.
* (SLIDE 24) (WELFARE BY HOUSEHOLD TYPE)
* Let’s look at the broad welfare gains across households of each type.
* Recall that a household type is a combination of education status and effective units of labour they can supply (which can be interpreted as the income they can earn in an average city after parsing city fixed effects)
* These are measured in equivalent variation (and are reported in percentage terms).
* The baseline model is on the left (with endogenous amenities).
* We see very large welfare gains for households who make <$25,000 a year.
* However, we still see substantial welfare gains for all types—even the richest bin (containing those who make $200,000 or more in an average city), still gain roughly 2%.
* Moreover, comparing the left and the right panel shows us that endogenous amenities account for large gains across *all* income groups. This must be because (and I confirm) that higher income households face better amenities in the counterfactual on average.

(LINK TO FRAMEWORK)

* (SLIDE 25):
* (BEFORE TRANSITION): My second result is that the Hsieh-Moretti channel shuts down completely. That is, average output per household changes less than a hundredth of a percent—and you can contrast this with 3%-8% productivity gains from counterfactuals in other macro papers that are less ambitious.
* (TRANSITION: EXPLAIN) To make sense of this result, I plot the growth rate in the average household type against the growth rate in the number of households across MSAs in transition to the counterfactual.
* I find a clear negative relationship. That is, the expansion of certain cities in terms of the number of households is offset by the outward migration of high income households. This type of sorting keeps *the actual labour supply to productive cities unchanged.*
* Note that the types of cities that tend to be in the lower left quadrant tend to be more productive, as is shown by the color difference.
* (SLIDE 26):
* We should be quite worried if deregulation signalled a Pareto improvement, as such an equilibrium could never be supported by voting. I show that the landowners in previously regulated neighborhoods lose substantially in the counterfactual, and that this effect only occurs when amenities are endogenous.
* Introduce graph, talk about line of best fit for endogenous vs exogenous.
* (SLIDE 27): (TALKED ABOUT THIS BEFORE).
* (SLIDE 28): JUST READ (CONCLUSION)