Response to "Supply Constraints do not Explain House Price and Quantity Growth Across U.S. Cities" by Louie, Mondragon, and Wieland

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[1]The author thanks John Mondragon, Johannes Wieland, Tyler Cowen, Kevin Erdmann, Arpit Gupta, and Michael Wiebe. All errors are his own.

Introduction

Man bites dog: economists find that housing supply elasticities barely differ among U.S. metro areas. If true, this means that San Francisco is just as capable as Sarasota of absorbing a large increase in housing demand. If San Francisco has not grown, it is because demand has not grown. And if that's true, then zoning reform advocates are wasting their time.

Of course, nobody should change their views entirely based on a single paper added to a pile of hundreds, and it is reasonable to expect mixed evidence about a complex social phenomenon. I'm completely comfortable advocating for policy solutions which have the support of 80 percent of the high-quality academic work.

Although I think their paper contains errors, Schuyler Louie, John Mondragon, and Johannes Wieland deserve commendation: it takes courage to put out unpopular ideas, and they surely knew they'd face a higher level of scrutiny and a potential pile-on. Science can only advance when people take this risk.

TL;DR

Louie et al. (2025) use total income to measure demand for housing. But total income is mostly determined by population growth, which is co-determined with housing supply growth, which is jointly determined by supply and demand for housing. Thus, what they call demand is in fact the equilibrium of supply and demand. An analogy: *number of sales at taquerias* would be an excellent predictor of the *number of tacos sold.* But we wouldn't include it in the demand function for tacos.

Because their model is poorly grounded, its core mechanism cannot match the data, which show rising prices in highly-constrained metros. Their regressions imply that those metros

have unexplained downward supply shocks and upward demand shocks together causing a price increase of at least 0.5 percent per year.

Paper summary

Louie et al. use a simple supply and demand model. They construct their paper as a test of the dominant view that the price elasticity of housing supply differs a lot across U.S. metros. They find that supply elasticities do not differ much across metros. They interpret this finding to mean that changes in land use regulation will not lower housing prices appreciably.

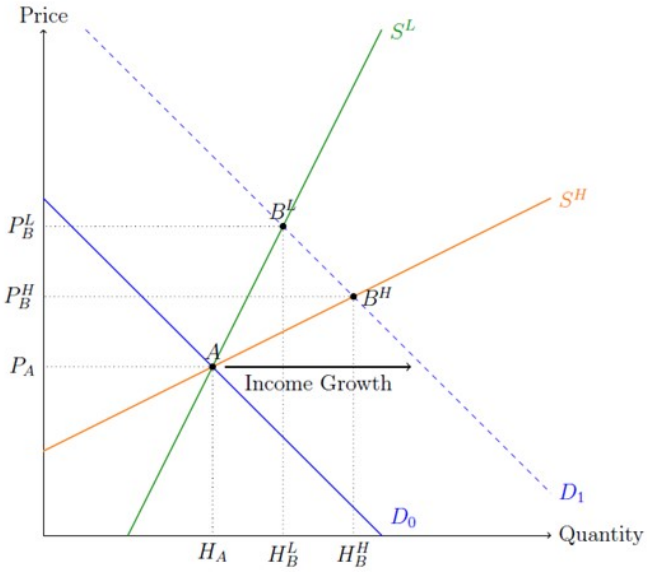

FIGURE I
The Differential Effect of Income Growth on House Prices and Quantities When Supply Elasticities Differ Across Cities

Figure 1: Reproduced from Louie et al.

They frame the issue by considering two metros facing the same growing demand for housing ($D_0 \rightarrow D_1$), the price (P) and housing quantity (H) would grow differently depending on the supply elasticity. A constrained metro (L for low-elasticity[1] ... or for Los Angeles)

[1]The nomenclature is a bit tricky. The authors often refer to "high-" or "low-elasticity" metros - meaning those that previous authors have identified in that way - but their own finding is that the elasticities do not

has higher price growth and lower housing growth than a high-elasticity place (H for high or Houston).

To test whether U.S metros in fact follow this pattern, the authors assume that total metro income (that is, the population times the average income) is housing demand and then use ordinary least squares to estimate terms derived from the key parameters. [2] In a similar context, Allen and Arkolakis (2023) called this the "bronze medal error" in looking for the elasticities between price and population variables.

In the estimations, they divide their sample according to one of four previous estimates of local constraints or supply elasticity. Each regression includes at least 268 U.S. metros. They split each sample into more- and less-constrained halves. A given metro might end up in the more-constrained half in one set of regressions, but the less-constrained half in another set.

They run a battery of regressions of outcomes (such as price and housing stock growth) on income growth, an indicator variable for less-constrained metros, and the interaction between those two variables. They find that:

- Prices grow more in constrained metros
- Housing stock grows about equally in both groups of metros
- Prices and housing both increase with income growth
- But less-constrained metros do not respond to income growth any differently than more-constrained metros

They interpret this to mean that, although some metros are more expensive than others, the supply curves are all pretty similar.

differ. I'll use variations of the phrase "constrained", which Louie et al also use, but doesn't imply a finding about the elasticity.

[2] In the regressions behind Tables IV and V, the authors use two-stage least squares, but with an instrument - total income growth - that is obviously endogenous and fails the exclusion restriction. Later in the paper, they consider a promising and plausibly exogenous demand shifter - the post-COVID work from home shock. But this yields large standard errors. The authors cannot reject that annual permitting is 1 percent higher in less-constrained metros that experienced a demand shock in 3 of 4 specifications (Table VI, Panel C). The authors misinterpret the lack of statistical difference from zero as "show[ing] that none of the constraint measures had any affect on quantity of permits issued."

Indicator estimates imply strangely correlated shocks

The first two points above - large differences in price growth but not quantity growth between more- and less-constrained metros - show up in indicator coefficients that Louie et al estimate.

Their key regressions estimate the following two equations:

$$\hat{P}_i = \alpha + \beta_1 \hat{Y}_i + \beta_2 \mathbb{I}(\text{Less Constrained}) + \beta_3 \hat{Y}_i \times \mathbb{I}(\text{LessConstrained}_i) + e_i$$
$$\hat{H}_i = \delta + \gamma_1 \hat{Y}_i + \gamma_2 \mathbb{I}(\text{LessConstrained}_i) + \gamma_3 \hat{Y}_i \times \mathbb{I}(\text{LessConstrained}_i) + v_i$$

The authors focus, reasonably, on the elasticities β_3 and γ_3. But their estimates of β_2 and γ_2 are also informative: they summarize the differences in demand and supply shocks between less- and more-constrained metros. Tables II and III report that $\beta_2 =\approx 0.5$ and $\gamma_2 \approx 0$.

That is, supply and demand shocks together lead to systematically higher prices in more-constrained metros, but do not lead to any differences in quantities. That can only happen via systematically larger demand shocks and smaller supply shocks in more-constrained metros.

Visually, that could look like Figure 2. For simplicity, I've assumed no shocks in Houston. For Los Angeles, in addition to the demand shift from total income growth ($D_{2000} \rightarrow D_{2020-a}$), demand must shift further to D_{2020-b} to support the higher observed prices. At the same time, supply must have shifted leftward, to S_{2020-L}.

The authors suggest that amenities grew more in more-constrained metros or that quality adjustments are somehow wrong (p. 4). But rising amenities shift only demand, not supply. And if price indices are so wrong that large gaps are opening up between metros with similar rates of construction, then the entire paper (and all papers using ACS or CoreLogic price data) is unreliable.[3]

Another possibility is that Louie et al's novel demand specification left a lot of unexplained variation; the intercept soaked it up.

[3]In private correspondence, the authors point out that unmeasured quality improvements would increase the per-unit demand and decrease the per-unit supply curves. This is a useful observation and worthy of further research.

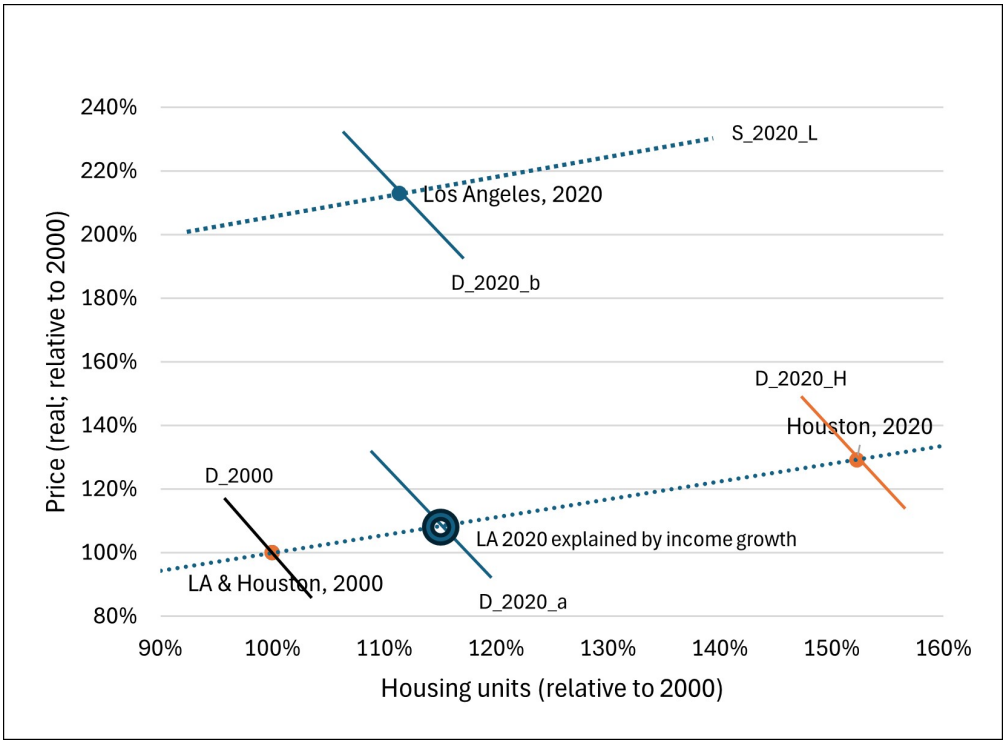

Figure 2: Two metros with parallel supply curves.

Total income is an unconventional measure of housing demand

A core flaw in Louie et al's approach is the curious choice to use total income in the demand function rather than some measure of wages or average income:

$$\hat{H}_i^D = \epsilon_y \hat{Y}_i - \epsilon_p \hat{P}_i + \hat{\theta}_i$$
$$\hat{H}_i^S = \psi_y \hat{P}_i + \hat{\sigma}_i$$

$\hat{H}_i^D$ and $\hat{H}_i^S$ are the growth in housing demanded and supplied in metro i. Change in price is $\hat{P}_i$, change in amenities is $\hat{\theta}_i$ and supply shocks are $\hat{\sigma}_i$. The income and price elasticities of demand are ϵ_y and ϵ_p . The price elasticity of supply is ψ_y.

Change in total income is $\hat{Y}_i$, which is just the sum of the percentage changes in population $\hat{N}_i$ and average income $\hat{\bar{y}}_i$). Let $\hat{r}_i$ denote the growth in the number of rooms per

person. Then the demand function can be rewritten as:

$$\hat{N}_i + \hat{r}_i = \epsilon_y(\hat{N}_i + \hat{\bar{y}}_i) - \epsilon_p \hat{P}_i + \hat{\theta}_i$$

Population growth is on both sides of the equation. If one accepts that population and housing growth are closely codetermined (through migration), then this effectively means that every change in the quantity of housing immediately changes the demand curve itself.

The workhorse models of urban economics - Alonso-Muth-Mills and Rosen-Roback - imagine that populations grow as each potential in- and out-migrant compares the wage level w, amenities, and housing plus commuting costs of each city:

$$\hat{H}_i^D = \epsilon_y \hat{w}_i - \epsilon_p \hat{P}_i + \hat{\theta}_i$$

Housing supply is not independent of total income

Housing demanded and supplied must be equal in equilibrium. Thus Louie et al's hypothesized demand function is partly a function of the supply curve. Formally:

$$\hat{H}_i^D = \epsilon_y(\hat{H}_i^S - \hat{r}_i + \hat{\bar{y}}_i) - \epsilon_p \hat{P}_i + \hat{\theta}_i$$
$$\hat{H}_i^D = \epsilon_y(\psi_y \hat{P}_i + \hat{\sigma}_i - \hat{r}_i + \hat{\bar{y}}_i) - \epsilon_p \hat{P}_i + \hat{\theta}_i$$

Is this a serious problem? If there were a lot of variation in rooms per capita and average income and little variation in population growth, the issue might be secondary. But Louie et al's Table I implies that population growth varies more than rooms per person and total income growth.[4] Practically, the population growth component is going to dominate in estimates.

The slow population growth of expensive coastal metros is a direct outcome of their slow housing stock growth. If Boston had built more homes, more people would live there.

[4]In personal correspondence, the authors confirmed that about 2/3 of the variation in income growth is from population growth.

Using that constrained population growth (plus the small variation in average income) as a measure of demand will understate demand growth and leave the observed price changes unexplained.

Happily, there are ready solutions to this problem. The first is to move to the conventional demand curve. The second is to find demand shifters that are uncorrelated with the supply elasticity, such as the work-from-home shock that Louie et al already exploit or Bartik shift-share instruments.

Narrow the focus

My final criticism of Louie et al's approach is expositional. Their preferred specifications split the sample into equal numbers of metro areas. The more-constrained half of their samples contains about 75 percent of the population. In the less-constrained half (for the Saiz metric), the median 2000 population was 184,000 people (Lake Charles, Louisiana).

The 50/50 split maximizes statistical precision. But it makes it harder to judge Louie et al's key policy claim, that the "prevailing view" may be wrong and "easing housing supply constraints may not yield the anticipated improvements in housing affordability." The economists and advocates who hold the prevailing view rarely, if ever, invoke the small, relatively poor metros in the bottom half of the distribution. Rather, they point out a small number of very restrictive metro areas with uniquely restrictive policy regimes. (For example, Duranton and Puga (2023) show a counterfactual relaxing planning regulations in just 7 metro areas.) If Louie et al stick to their 50/50 division, they should be honest with their readers and draw on examples that are more typical of each half of the distribution. For the Saiz (2010) data, metros near the median of the restrictive half of the distribution include Phoenix, Burlington (VT), and Lakeland.

The authors' argument will more clearly connect with its target, and the estimated magnitudes will be more meaningful, if they divide their sample between the most-constrained quartile of metros and the rest (similar to the quartile approach shown in Appendix Tables 1 and 2) or between population-weighted halves.

Interpretation: In an equal-elasticity world, upzoning might still lower prices

The authors interpret their finding of housing supply elasticity invariance as calling "for a reevaluation" of "policy prescriptions that hope to improve housing affordability primarily through the relaxation of housing regulations" (p. 23). That's a valid interpretation. But it's not the only one possible. If housing supply elasticities are, in fact, largely equal across metro areas, there are at least four ways that zoning reform could lower housing costs:

- Regulatory reform may lower prices in ways that do not involve the supply elasticity.
- Regulatory reform may create opportunities for lower-cost types of housing, such as townhouses. That would change the composition of the housing stock without changing the price per quality-adjusted square foot. Advocates in low-constraint Texas, for example, emphasize this channel.
- Housing supply elasticities could be equal because most metros are similarly regulated. In that case, decreasing regulation might still increase the supply elasticity.
- Housing supply elasticities could be in all but a handful of metros that are economically important but too few for statistical analysis.
- The true urban growth model could have both stock and flow features, as in DiPasquale and Wheaton (1994), such that supply growth responds to price levels as well as price changes, either of which might be inflated by regulation.

And if the authors' interpretation is correct, then the tall task remains of explaining why prices have risen so much more in the quartile of metros that previous authors have identified as constrained.

Keep challenging prevailing ideas

Before updating their priors significantly away from the prevailing view of housing supply, economists and advocates should demand stronger evidence. The prevailing view is grounded

in theory, supported by the balance of empirical economics, and aligned with the views of most policymakers and industry participants. It may have weaknesses, and - if correct - will be strengthened by meeting challenges from skeptics. It's worth remembering that the prevailing view is relatively new - it gradually ascended in the 2000s as urban economics drew more attention and American metros diverged in ways that previous narratives couldn't explain well.

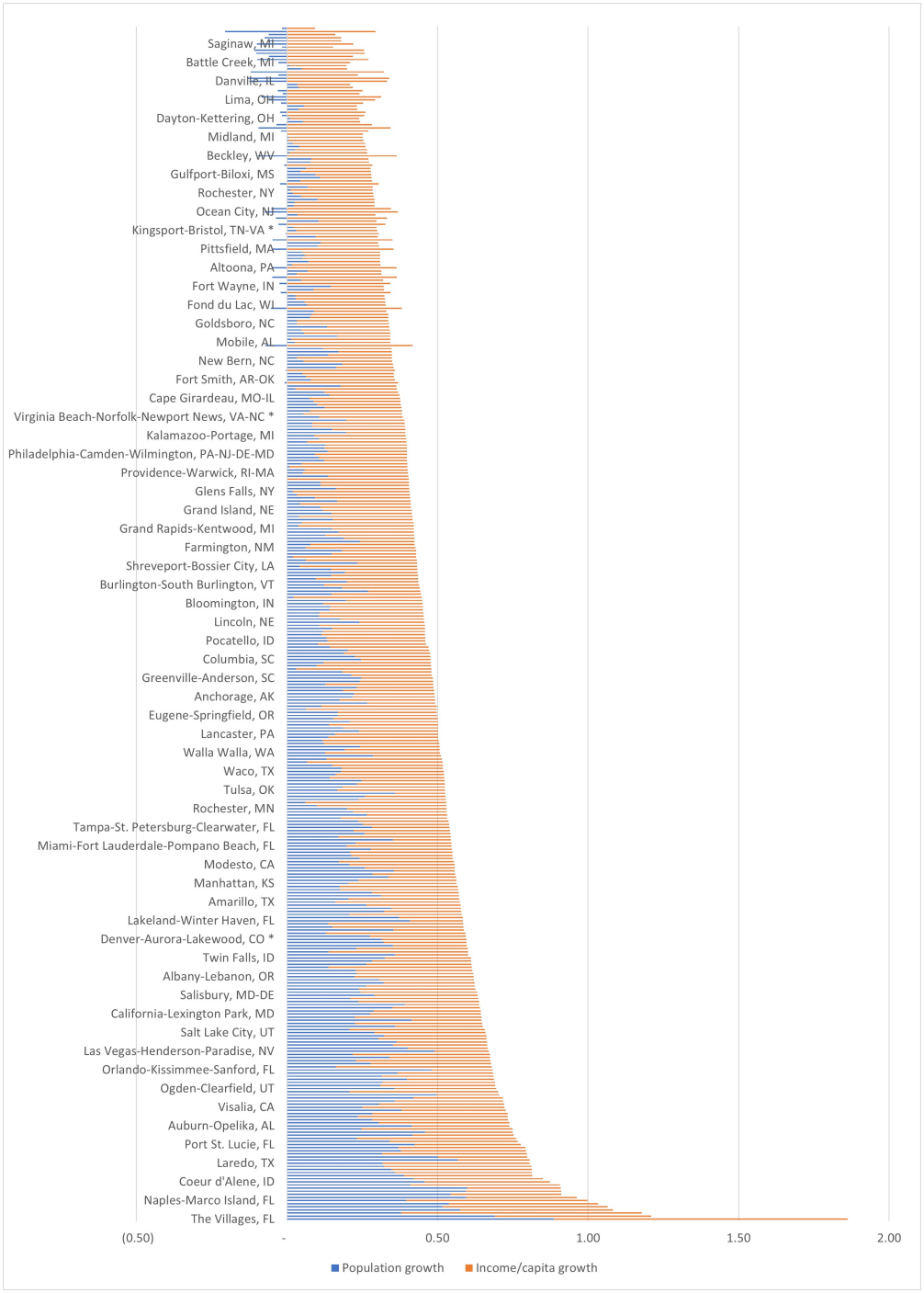

Figure 3: Total real income growth (ln) in 384 metros (BEA).

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