Housing Productivity Commission Submission

An Optimized Incentive Structure for Local Governments to Increase Housing Supply

Introduction

Thus far, the most cogent discussions of the housing crisis have focused on issues of supply. Caplin and Joye (2003) have particularly noted that local governments have constrained housing supply beyond any reasonable concern for the environment or their constituents. More often than not, change resistant "NIMBY" elements in the community have been the primary agents resisting development. Their complaints range from the loss of amenity due to increasing building heights to crime, to increased congestion and infrastructure strain. The strain on transport infrastructure is particularly hard to ignore as added residents increase the demand for driving and thus congestion unless more is spent on mass transit. The higher rates of crime perceived in the inner city have driven middle class suburbanization in the US[1] but have been less significant in Australia. In order to create a decentralized incentive system for increasing housing supply this system must take account of the importance of transportation infrastructure as it is the most readily quantified and managed issue raised in opposition to increased urban density.

[1] Urban Flight, and the Consequences for Cities, Cullen, Julie; Levitt, Steven; National Bureau of Economic Research Working Paper: 5737. p 28. September 1996.

Structure Design

An incentive function is developed for local governments to determine how many more or less residents they can be expected to provide for in the next five years. The local government is then given the choice of meeting or exceeding this requirement, or, meeting it partly and taking a cut in its funding if it does not reach density targets. The local government can expect a bonus in the form of funding or extra transport provisions if it exceeds requirements.

Incentive Function Design

To design a simple incentive function a certain optimal density of development and optimal level of transportation infrastructure has to be nominated. Using Holtzclaw (2002) and his work on the cities of Chicago, San Francisco and Los Angeles it becomes clear that most of the benefits in terms of reducing congestion are achieved by the 4000 people per km^2 level of density. Similarly, using his definition of "transport"[2] most of the benefits are achieved by 2500. This is due to a fundamental difference in the preferences of different consumers with respect to transport. Most consumers optimize some function of time and cost in deciding how they get to work. Low income earners will generally take public transit because it is cheaper, whereas higher income earners will take

[2] The measure of *transit* accessibility is the zonal transit density (Tr), which is the daily average number of buses or trains per hour times the fraction of the zone within 1/4 mi of each bus stop (or mi of each rail or ferry stop or station), summed for all transit routes in or near the zone. There may be some double counting where stops are less than 1/4 mile apart, but correcting for this would not substantially alter the order of the TAZs nor the relative differences between zones. Therefore this measure provides an robust assessment of transit service. (**Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use---Studies in Chicago, Los Angeles and San Francisco, Holtzclaw).**

whichever is faster. There are, however, some irrational agents in most cities who refuse to take public transit one way or the other for a variety of reasons. As a result, beyond a certain level of transport the marginal use of transport becomes so small as to make the expenditure unjustifiable. What constitutes an optimal density and level of transport is subject to debate and the choice of these particular figures will be discussed later in this paper. Currently no work exists in evaluating this optimal density, though it may prove an interesting avenue of research in the future. For the meantime these approximate values will be used.

Having determined the optima, a simple polynomial function is developed that provides a bonus for beating the benchmark and a tax for failing to meet it. This function is a linear combination of a function of the deviation away from optimal density and a of a function of deviation away from optimum transport infrastructure. In generalized form:

$$I(Tr,\rho) = \Sigma_i^n [[(3000-Tr)^{(2i-1)}]/10^{(6i-5)}] + \Sigma^n_i [(4000-\rho)^{(2i-1)}]/10^{(6i-5)}$$

The legislative choice here is of i: a higher value will result in a much larger deviation in risk and reward for communities that are not at the optimal density and level of transport infrastructure, a lower value will result in much gentler incentives and thus a more gentle transformation of land use and planning in an area.

The local government could opt to either meet the targets, pay a tax in the form of reduced funding, or do both partially. To generate this, a tax function must be generated

to provide a penalty for these local governments which wish to pursue low density strategies above and beyond the penalties. The tax function would be:

$T(I_{NET})=k*I_{NET}$

Where: $I_{NET} = I - I_{\text{Fulfilled by density increase}}$

For the purposes of the later examples, I will show the effect of k at various levels.

The innovation in this incentive scheme is that the informal and generally unproductive bargaining between states and local governments would be formalized into a pricing structure: areas that wish to pursue low density strategies could expect to pay for the privilege, whereas higher density areas which exceed the optima could expect to receive greater funding.

Choice of Benchmarks

Choosing optimal density can be an inherently political exercise. A particular person's vision of what an ideal community is may not equate to someone else's. However, there are a few criteria by which one can justify 4000 people per km^2 being a good estimate aside from congestion concerns. The best way to do this is to examine areas in Sydney with a similar density.

Burwood and Woolahra may not have a great deal in common at first glance. However, they do have similar density levels (4396 and 4334 respectively) and their residents have a similar propensity to drive to work (46.7% and 46.1% of households)[3] despite very different average weekly incomes ($350 and $750). For many people in these two suburbs, public transit is both convenient and effective. But beyond the important but narrow concern of transport these communities could provide an appropriate benchmark for Sydney as a whole. They provide a mixed array of dwelling choices from freestanding homes to apartments and are capable of supporting local businesses in mixed developments. These areas combine the virtues of the "New Urbanist" movement of Jane Jacobs without being inimical to the housing needs of normal families. They both combine public parks and recreation areas and have a generally high level of infrastructure. Though no precise data is available for the Tr variables for these two areas, the driving demand is indicative of them being fairly similar though perhaps sub-optimal.

Comparing these areas to the super-dense areas of Sydney like inner Sydney and the super low density areas like Liverpool provide an interesting view of the costs of either extreme. Inner Sydney may be suitable place to live for young professionals who live in the area but does not offer a large number of medium density homes that would be suitable for large families despite the traffic reducing and public infrastructure spending reductions that are available at such density. Areas like Liverpool are extremely problematic though. In Liverpool two thirds of people drive to work, infrastructure is generally stressed and public transit is seldom available and when it is it is seldom competitive with driving. Low income households are generally forced out into these

[3] Census 2001, Australian Bureau of Statistics.

areas by a constricted housing supply closer to central Sydney and are then burdened with the cost of driving and making up for the lack of infrastructure in outer-Sydney housing developments. The .32 correlation[4] between housing density and income found in the Sydney region stands in sharp contrast to the work of Edward Glaeser[5] who found that urban sprawl was largely facilitated by falling transport costs and Levitt who found that the flight was triggered by crime[6]. In Australia the outward drift is more likely due to an almost complete inelasticity of supply in the inner ring of Sydney[7] as there are no signs of middle class flight nor any skewness in the distribution of crime as victimization rates in NSW as a whole are very similar to Sydney[8].

Scenarios

In this section I compare the reaction of two communities with similar densities but vastly different incomes to this legislation: Manly and Rockdale. Their likely density change requirements and tax liability are shown under different values for i and k. In the Manly and Rockdale scenario the residents of Manly would be likely to pay for their low density lifestyle and adequate transport by keeping their level of density more or less unchanged and paying higher council rates on the basis of higher disposable income. In contrast, the residents of Rockdale would allow greater density but in exchange for greater public transit provision as they would either not be willing to pay or could not afford to block more development by paying higher local government rates.

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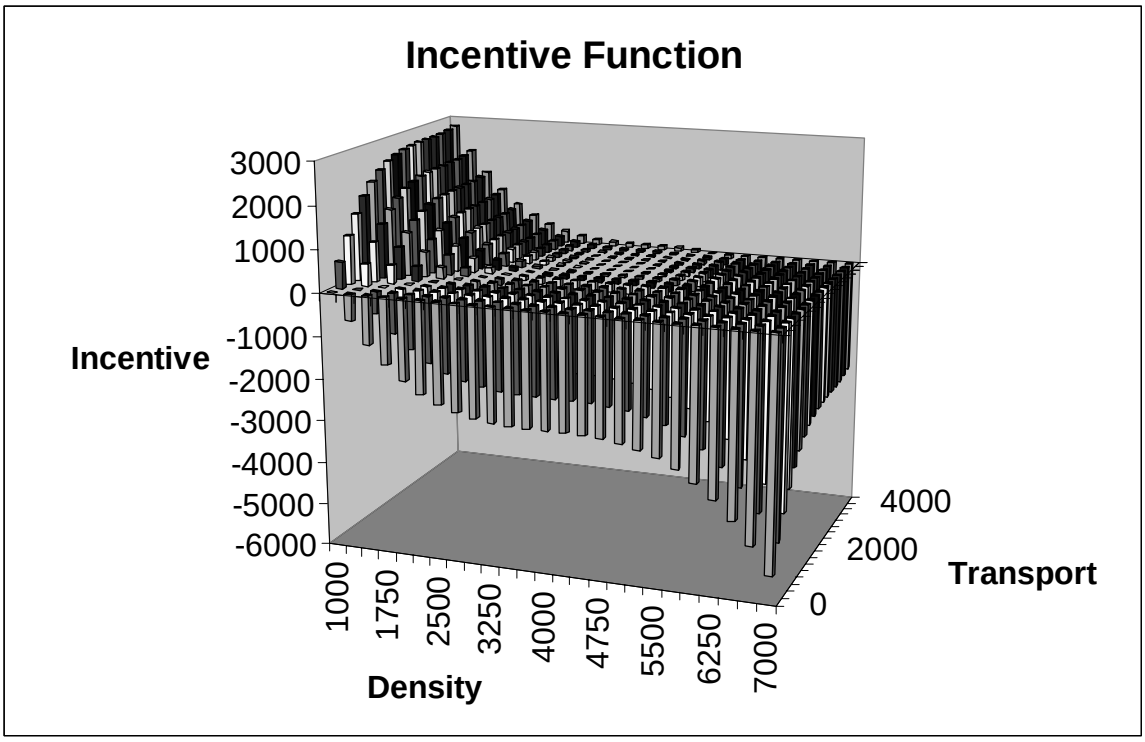
[4] Census 2001, Australian Bureau of Statistics. Correlation by local government area.
[5] "Is There a New Urbanism? The Growth of U.S. Cities in the 1990s", (2001) Edward L. Glaeser and Jesse Shapiro.
[6] Urban Flight, and the Consequences for Cities, Cullen, Julie; Levitt, Steven; National Bureau of Economic Research Working Paper: 5737. p 28. September 1996.
[7] get some residential pricing data

Assumptions				
Suburb	**Density**	**Transit**	**Income**	
Manly	2500	2500	$750	
Rockdale	2500	1800	$350	
Manly				
k / i	1	2	3	4
Required No of residents	30	194.7	705.243	2055.51867
Tax (as % budget cut)				
K	1	2	3	4
0.0001	0%	2%	7%	21%
0.00025	1%	5%	18%	51%
0.0005	2%	10%	35%	103%
0.00075	2%	15%	53%	154%
0.001	3%	19%	71%	206%
Rockdale	1	2	3	4
Required No. of Residents	30	194.7	705.243	2055.51867
Tax as % of Budget	1	2	3	4
0.0001	0%	9%	270%	8100%
0.00025	1%	5%	18%	51%
0.0005	2%	10%	35%	103%
0.00075	2%	15%	53%	154%

[8] Records of Crime 1998, The Australian Bureau of Statistics.

Below is shown the incentive function for i=2. As can be seen, the function permits requirements for more density to be offset by a lack of transport.



Incentive Values for All Sydney Statistical Areas

In this section I use the density figures and impute the value for Tr (Tr=1400/% Drive to Work) and thus calculate the incentive. Results indicate that very large amounts of urban consolidation need to be done in Sydney, and that development in some areas could be almost completely scaled back or removed.

Sydney Residential Data

Name	Population Density persons/km	Mean Income	% Drive to Work	Tr	Incentive
Wollondilly	15.2	$ 450.00	68.3%	2049.78	6241.52
Hwkesbury	22.8	$ 450.00	67.0%	2089.552	6215.714
Blue Mountains	54.1	$ 450.00	59.3%	2360.877	6117.71
Gosford	172.5	$ 350.00	59.6%	2348.993	5579.604
Wyong	185.5	$ 350.00	66.3%	2111.614	5480.14
Camden	237.8	$ 450.00	69.6%	2011.494	5228.483
Hornsby	334.6	$ 550.00	56.4%	2482.27	4910.645
Baulkham Hills	375.9	$ 550.00	68.7%	2037.846	4670.859
Penrith	440.7	$ 450.00	65.8%	2127.66	4442.757
Campbelltown	482.5	$ 350.00	61.8%	2265.372	4312.488
Liverpool	535.3	$ 450.00	66.1%	2118.003	4090.464
Sutherland Shire (West)	612.2	$ 550.00	62.2%	2250.804	3846.19
Pittwater	626.7	$ 550.00	64.3%	2177.294	3782.845
Sutherland Shire (East)	681.3	$ 550.00	63.4%	2208.202	3605.498
Blacktown (North)	709.9	$ 450.00	65.8%	2127.66	3495.07
Warringah	916	$ 550.00	61.4%	2280.13	2895.905
Ku-ring-gai	1266.8	$ 550.00	53.7%	2607.076	2035.739
Blacktown (South-West)	1438.8	$ 350.00	64.0%	2187.5	1626.444
Blacktown (South-East)	1587.5	$ 350.00	63.0%	2222.222	1357.062
Botany Bay	1693.3	$ 350.00	55.9%	2504.472	1215.196
Sydney © Inner	1834	$ 900.00	24.1%	5809.129	3232.932
Auburn	1853.9	$ 250.00	54.0%	2592.593	981.6768
Fairfield	1858	$ 250.00	67.6%	2071.006	902.6098
Strathfield	2124.4	$ 350.00	54.2%	2583.026	652.5629
Holroyd	2236.1	$ 350.00	62.1%	2254.428	507.3652
Bankstown	2256.7	$	63.7%	2197.802	478.1823

		350.00			
Hunter’s Hill	2355.1	$ 550.00	59.3%	2360.877	418.9531
Pararmatta	2429.8	$ 350.00	58.1%	2409.639	366.5615
Ryde	2455.5	$ 450.00	57.6%	2430.556	349.9722
Canada Bay - Concord	2479.3	$ 450.00	57.5%	2434.783	333.6092
Manly	2671.6	$ 650.00	48.4%	2892.562	234.2916
Willoughby	2790.5	$ 650.00	47.3%	2959.831	176.9301
Lance Cove	3044.8	$ 650.00	51.0%	2745.098	85.49689
Mosman	3205	$ 750.00	47.2%	2966.102	50.24209
Hurstville	3273	$ 450.00	55.1%	2540.835	28.74336
Rockdale	3304.5	$ 350.00	56.1%	2495.544	20.80553
Kogarah	3423.8	$ 450.00	56.3%	2486.679	5.604243
Randwick	3450.1	$ 450.00	49.7%	2816.901	16.01459
Canterbury	4074.6	$ 350.00	56.5%	2477.876	-14.2753
Canada Bay - Drummoyne	4212.3	$ 550.00	58.8%	2380.952	-24.68
Burwood	4296.2	$ 350.00	46.7%	2997.859	-2.5987
Woolahra	4334.8	$ 750.00	46.1%	3036.876	-3.74779
Marrickville	4630.4	$ 450.00	41.0%	3414.634	-17.9239
Ashfield	4871	$ 450.00	44.4%	3153.153	-65.7184
Leichhardt	5007.9	$ 650.00	44.3%	3160.271	-101.977
South Sydney	5068.2	$ 550.00	29.9%	4682.274	354.2044
North Sydney	5647.5	$ 900.00	36.6%	3825.137	-390.994
Waverley	6779.9	$ 550.00	44.8%	3125	-2148.07
Sydney © Remainder	8029.3	$ 550.00	22.7%	6167.401	-3364

Likely Long Run Changes in Supply

Sydney would be likely to become much more consolidated with those wishing to live in less dense suburbs paying a premium for their lifestyle and those willing to live in more

dense areas paying lower rates or being provided with superior services. One interesting fact is that at a density of 4000 people per square kilometer, Sydney could support 48 million people or shrink in geographical size. The upshot of such a change would be to cause a higher demand for new and convenient developments closer to the center of the city with a resulting fall in demand for outer suburb housing. Housing estates in outer suburbs would suffer massive falls in values as their costs in terms of density tax rates and lack of infrastructure become major purchasing factors. For this reason it would be best to prevent any further Greenfield development and to implement targeted densities over time – perhaps increasing from 2500 to 4000 over a period of five years. This would allow a much more gradual increase in densities without seriously interrupting property markets in outer suburbs. Such an interruption would cause a colossal decrease in the net worth of many low-income earning Sydney residents which live in outer suburbs and have much of their net worth locked up in their homes.