- **Greenfield** : 55 Projects labeled "mixed housing developments" which according to the Gauteng Department of Housing are basically the new wave of greenfield projects, where community centers, some rental housing, and some better quality housing are mixed in with standard greenfield houses
- **In-Situ Upgrading** : 54 Projects labeled "essential services" which from reading Marie Huchemeyer's article follow from a new, aggressive in-situ upgrading initiative complete with bulldozing and replacement of slums that was launched in the mid-2000s in Guateng
- **Other projects** : 198 Projects which I couldn't link any of the descriptions to any clear project definitions; from the results below, the appear to be most like the in-situ projects
- The other new thing is that the density plots now include squares that are empty both before and after projects, which turns out to matter quite a bit, as shown in the plots below
- Triple difference specifications are all identical
  - no project fixed effects, but clustered at the project level (unless otherwise specified)
  - "inside" project includes all areas within projects
  - estimate two spillover groups (0-300, and 300-600), which we can adjust later as need be
  - control distance is 600-1500, which we can also adjust

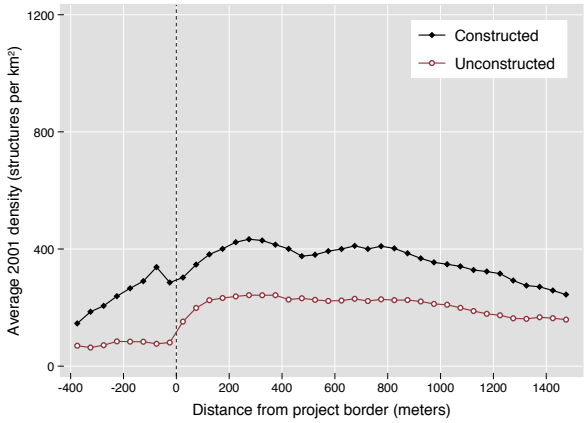
Table 1. Housing Project Areas Description

	All		**Greenfield**		**In-Situ**	
	Const.	Unconst.	Const.	Unconst.	Const.	Unconst.
Number of Projects	166	139	39	16	25	29
Area (km2)	1.20	1.18	1.59	2.93	1.60	0.88
Median Construction Yr.	2006	2006	2006	2005	2004	2006
Delivered Houses	298	0	124	0	557	0
House Price in 1 km (R[†])	200,919	230,175	202,436	208,205	184,126	223,127
Distance to CBD[‡] (km)	32.4	28.0	42.5	43.3	32.3	30.6

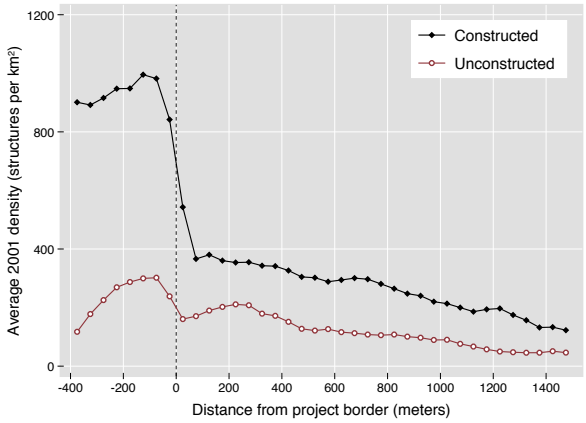
Const. refers to constructed projects and unconst. refers to unconstructed projects.
*Calculated from *expected* completion dates using Gauteng National Treasury budget reports.
† The USD averaged to about 7.70 Rands during the 2001-2011 period.
‡Measured as the average minimum distance with respect to Johannesburg and Pretoria CBDs.

Figure 1. All Projects

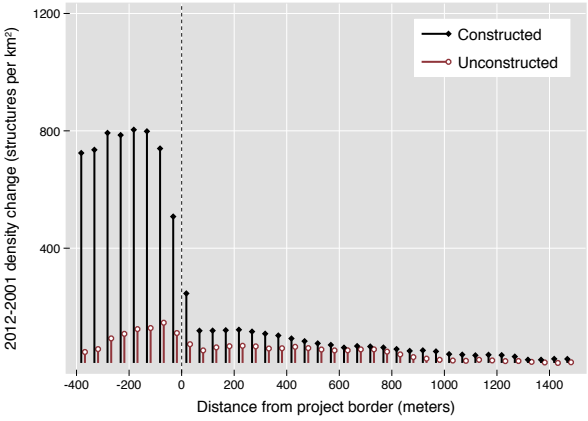
(a) Formal



(b) Informal



(c) Formal



(d) Informal

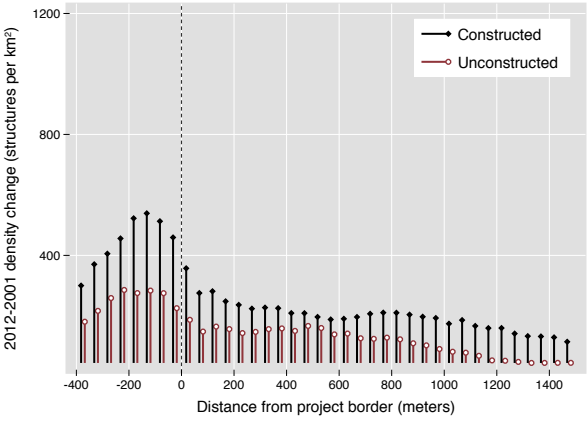
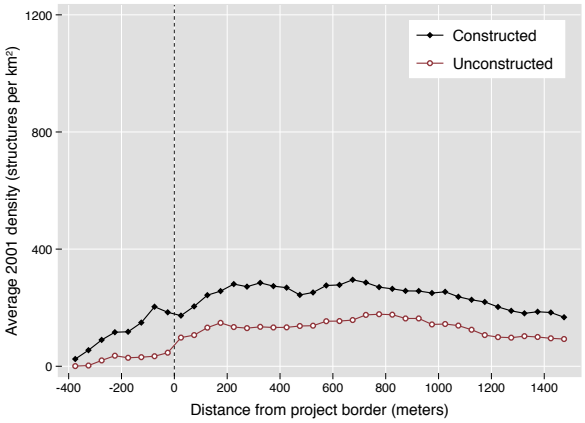
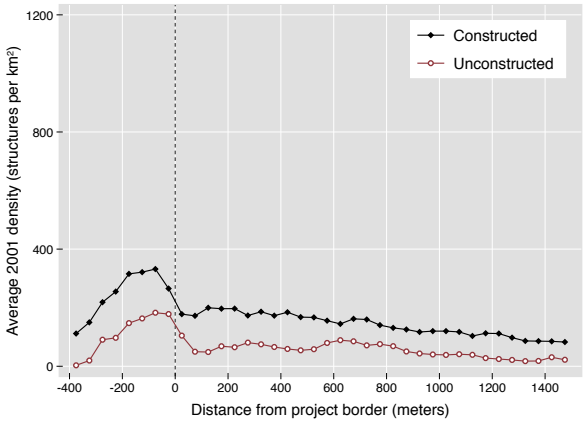


Figure 2. Separately by Project Type

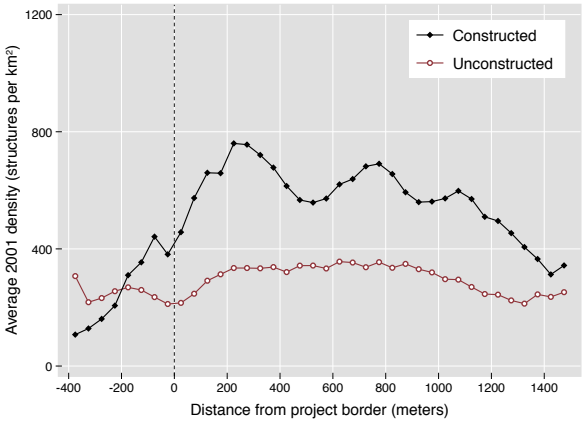
(a) Greenfield : Formal



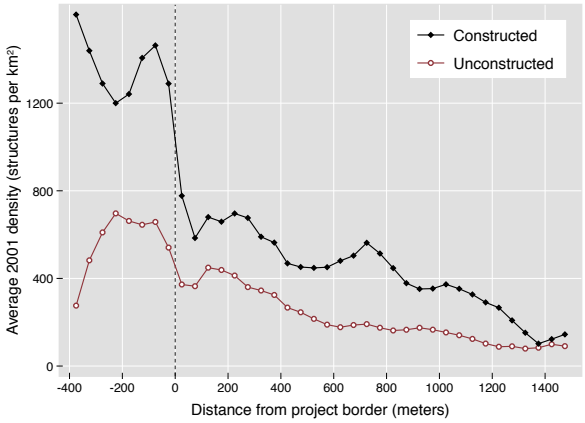
(b) Greenfield : Informal



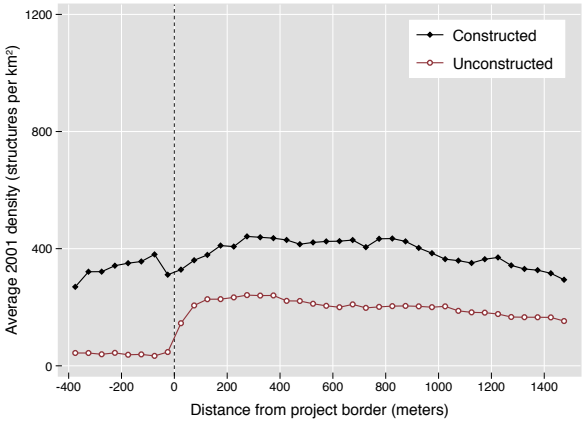
(c) In-Situ Upgrading : Formal



(d) In-Situ Upgrading : Informal



(e) Other : Formal



(f) Other : Informal

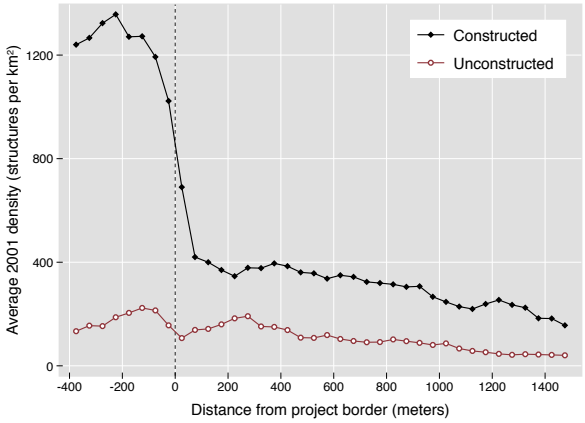
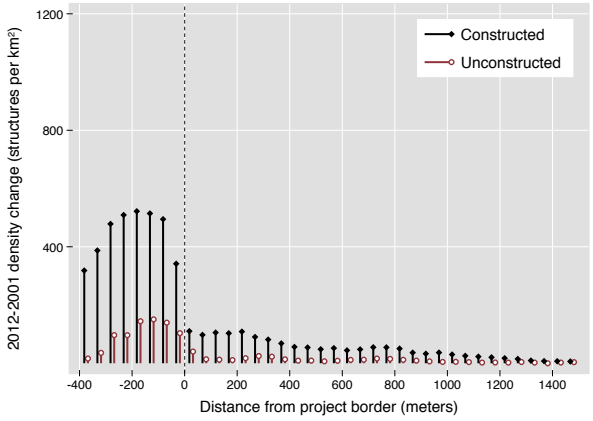
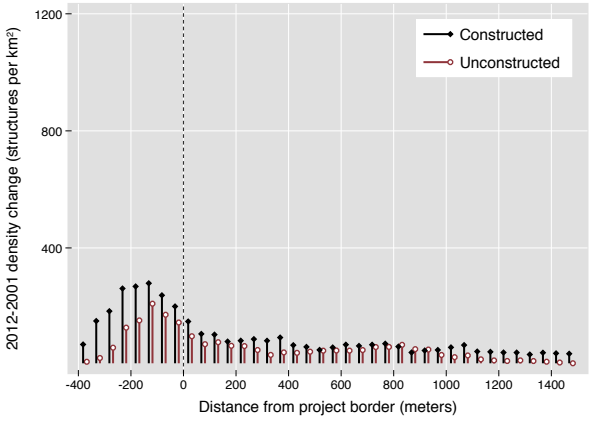


Figure 3. Separately by Project Type

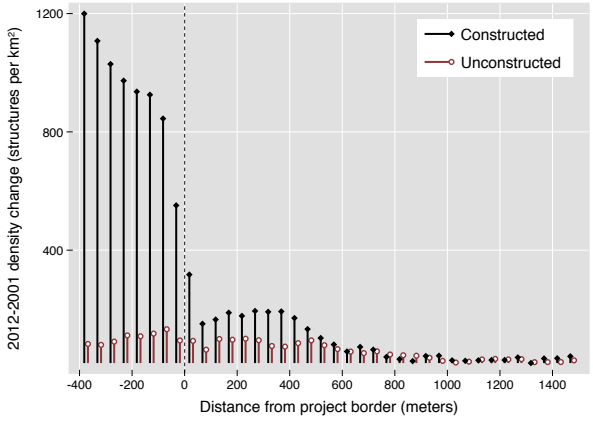
(a) Greenfield : Formal



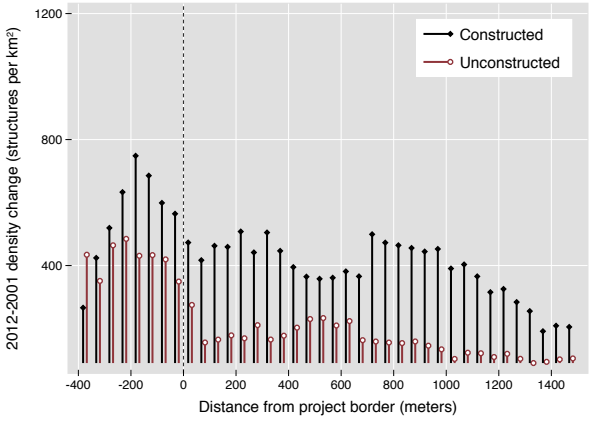
(b) Greenfield : Informal



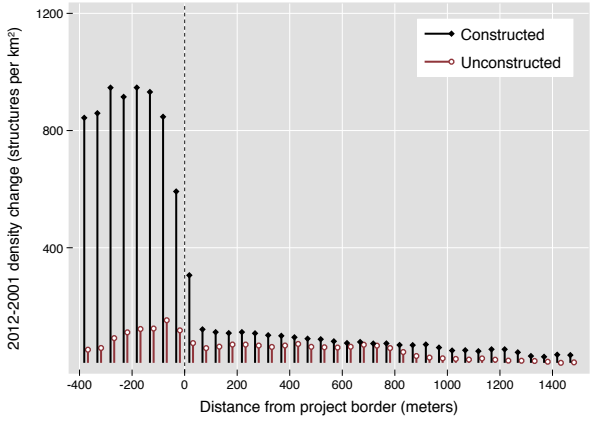
(c) In-Situ Upgrading : Formal



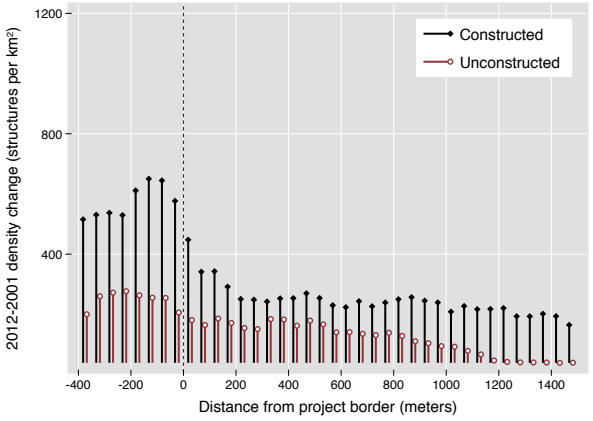
(d) In-Situ Upgrading : Informal



(e) Other : Formal

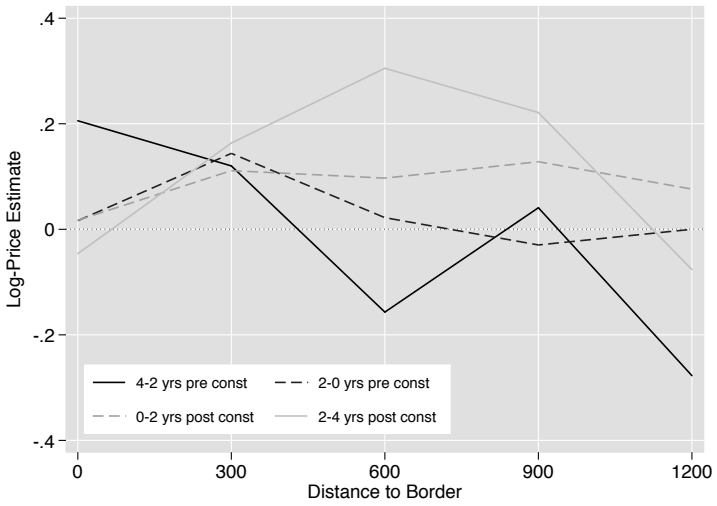


(f) Other : Informal



	(1) Total	(2) Formal	(3) Informal	(4) Informal Bkyd.	(5) Informal Non-Bkyd.
inside project	649.922[a]	578.443[a]	71.480	504.849[a]	-433.370[a]
	(142.583)	(74.803)	(109.399)	(103.801)	(87.272)
0-300m outside project	-4.615	34.561	-39.176	6.232	-45.408
	(43.547)	(24.463)	(35.468)	(31.659)	(28.679)
300-600m outside project	-93.284[b]	-4.618	-88.666[a]	-65.122[b]	-23.544
	(37.619)	(16.266)	(33.159)	(28.282)	(16.891)
Mean Outcome 2001	379.90	203.91	175.98	66.26	109.72
Mean Outcome 2011	584.70	281.66	303.04	192.77	110.27
R^2	0.095	0.064	0.079	0.059	0.052
# projects	308	308	308	308	308
N project areas	266,572	266,572	266,572	266,572	266,572
N spillover areas	501,926	501,926	501,926	501,926	501,926
N	2,721,910	2,721,910	2,721,910	2,721,910	2,721,910

Figure 4. Triple Difference Price effects over time and distance



	(1) Total	(2) Formal	(3) Informal	(4) Informal Bkyd.	(5) Informal Non-Bkyd.
Greenfield					
inside project	217.909	222.695[c]	-4.785	79.224	-84.009
	(213.941)	(119.653)	(111.448)	(124.833)	(62.730)
0-300m outside project	-44.056	9.956	-54.012	-43.341	-10.671
	(78.251)	(30.002)	(59.637)	(57.969)	(35.938)
300-600m outside project	-81.483[c]	-20.464	-61.019[b]	-45.399[c]	-15.620
	(46.495)	(26.880)	(30.145)	(23.782)	(19.042)
In-Situ Upgrading					
inside project	695.310[c]	921.289[a]	-225.979	700.269[b]	-926.248[a]
	(386.705)	(166.130)	(283.422)	(270.238)	(235.351)
0-300m outside project	178.887	200.068[c]	-21.180	70.923	-92.103
	(193.903)	(120.530)	(117.670)	(141.136)	(96.654)
300-600m outside project	111.841	176.224[c]	-64.383	-32.190	-32.193
	(141.919)	(94.980)	(85.051)	(97.611)	(70.292)
Other					
inside project	778.199[a]	659.434[a]	118.765	615.013[a]	-496.249[a]
	(190.566)	(85.015)	(166.248)	(133.791)	(93.505)
0-300m outside project	-171.670[b]	-24.877	-146.793[b]	-37.050	-109.743[a]
	(84.637)	(32.861)	(65.637)	(53.607)	(41.974)
300-600m outside project	-220.388[a]	-77.165[a]	-143.223[a]	-82.017[c]	-61.206[b]
	(69.087)	(27.133)	(54.004)	(47.646)	(25.964)
Mean Outcome 2001	379.90	203.91	175.98	66.26	109.72
Mean Outcome 2011	584.70	281.66	303.04	192.77	110.27
R^2	0.125	0.079	0.106	0.081	0.069
# projects	308	308	308	308	308
N project areas	266,572	266,572	266,572	266,572	266,572
N spillover areas	501,926	501,926	501,926	501,926	501,926
N	2,721,910	2,721,910	2,721,910	2,721,910	2,721,910

Table 2. Effect of Housing Projects on Socio-demographics

	(1) Age	(2) P.O.B. not Gauteng	(3) Unemployed	(4) Years of Education	(5) Monthly Income
inside project	0.349	-0.047	0.015	0.323[b]	1993.033[a]
	(0.372)	(0.032)	(0.018)	(0.138)	(604.916)
0-300m outside project	0.549	0.022	0.013	0.111	847.179
	(0.361)	(0.025)	(0.018)	(0.115)	(578.608)
300-600m outside project	0.027	-0.004	0.019	0.020	484.214
	(0.318)	(0.021)	(0.015)	(0.103)	(510.246)
Mean Outcome 2001	27.30	0.37	0.47	8.27	2,482.85
Mean Outcome 2011	28.29	0.43	0.33	9.68	4,512.03
R^2	0.188	0.106	0.199	0.377	0.172
# projects	314	314	314	314	314
N project areas	3,656	3,655	3,655	3,655	3,654
N spillover areas	4,201	4,197	4,196	4,197	4,195
N	12,733	12,726	12,725	12,726	12,722

Standard errors clustered at the project level in parenthesis. [c] p<0.10, [b] p<0.05, [a] p<0.01
P.O.B. means "place of birth." Monthly income is in Rands.

Table 3. Effect of Housing Projects on Socio-demographics by Type

	(1) Age	(2) P.O.B. not Gauteng	(3) Unemployed	(4) Years of Education	(5) Monthly Income
Greenfield					
inside project	-1.409[c]	-0.048	0.140[a]	-1.165[b]	-1486.342[c]
	(0.749)	(0.052)	(0.051)	(0.451)	(855.477)
0-300m outside project	-0.906	-0.100[b]	0.139[a]	-0.774[b]	-1189.553
	(0.718)	(0.044)	(0.047)	(0.365)	(1030.247)
300-600m outside project	-0.874	-0.058	0.043	-0.134	-974.465
	(0.905)	(0.046)	(0.057)	(0.344)	(1156.804)
In-Situ Upgrading					
inside project	0.434	-0.119[c]	0.017	0.321	1488.620
	(0.907)	(0.065)	(0.035)	(0.250)	(1572.224)
0-300m outside project	-0.246	-0.036	0.025	0.442	1706.076
	(0.870)	(0.058)	(0.042)	(0.277)	(1579.078)
300-600m outside project	-0.775	-0.004	0.034	-0.007	-593.232
	(0.920)	(0.052)	(0.037)	(0.271)	(1370.201)
Other					
inside project	0.564	0.014	-0.013	0.585[a]	2971.996[a]
	(0.557)	(0.041)	(0.032)	(0.209)	(960.085)
0-300m outside project	1.158[c]	0.069[c]	-0.015	0.163	1048.665
	(0.597)	(0.037)	(0.029)	(0.161)	(831.451)
300-600m outside project	0.593	0.023	-0.001	0.093	1389.669[c]
	(0.556)	(0.034)	(0.028)	(0.169)	(746.539)
Mean Outcome 2001	27.30	0.37	0.47	8.27	2,482.85
Mean Outcome 2011	28.29	0.43	0.33	9.68	4,512.03
R^2	0.201	0.154	0.206	0.395	0.185
# projects	314	314	314	314	314
N project areas	3,656	3,655	3,655	3,655	3,654
N spillover areas	4,201	4,197	4,196	4,197	4,195
N	12,733	12,726	12,725	12,726	12,722

Standard errors clustered at the project level in parenthesis. [c] p<0.10, [b] p<0.05, [a] p<0.01
P.O.B. means "place of birth." Monthly income is in Rands.

Table 4. Triple Difference Estimates on Log-Prices

	(1)	(2)	(3)	(4)
inside project	0.297	-0.210	-0.223	-0.403
	(0.536)	(0.322)	(0.312)	(0.458)
0-300m outside project	-0.218	-0.229	-0.182	-0.210
	(0.174)	(0.154)	(0.167)	(0.144)
300-600m outside project	-0.118	-0.166	-0.123	-0.170[c]
	(0.135)	(0.107)	(0.111)	(0.092)
Cluster FE		✓		
Cluster × Year FE			✓	
Lat.-Long. × Year FE				✓
r2	0.18	0.37	0.41	0.27
N	67,751	67,751	67,751	67,751

Standard errors clustered at the project level in parenthesis. [c] p<0.10,[b] p<0.05,[a] p<0.01

Table 5. Triple Difference Estimates on Log-Prices by Project Type

	(1)	(2)	(3)	(4)
Greenfield				
inside project	-0.031	-0.087	-0.192	-0.353
	(0.432)	(0.354)	(0.358)	(0.657)
0-300m outside project	-0.142	0.164	0.088	-0.265
	(0.343)	(0.233)	(0.264)	(0.281)
300-600m outside project	-0.184	-0.004	-0.038	-0.272
	(0.290)	(0.206)	(0.226)	(0.304)
In-Situ Upgrading				
inside project	0.351	0.299	0.165	-0.139
	(0.573)	(0.488)	(0.487)	(0.675)
0-300m outside project	-0.151	-0.282	-0.244	-0.314
	(0.398)	(0.367)	(0.384)	(0.315)
300-600m outside project	-0.225	-0.203	-0.209	-0.353[c]
	(0.231)	(0.258)	(0.271)	(0.198)
Other				
inside project	-0.039	-0.390	-0.379	-0.506
	(0.579)	(0.417)	(0.422)	(0.517)
0-300m outside project	-0.237	-0.275[b]	-0.198	-0.251
	(0.215)	(0.138)	(0.158)	(0.167)
300-600m outside project	-0.086	-0.200[c]	-0.111	-0.160
	(0.176)	(0.108)	(0.113)	(0.143)
Cluster FE		✓		
Cluster × Year FE			✓	
Lat.-Long. × Year FE				✓
r2	0.21	0.37	0.41	0.28
N	67,751	67,751	67,751	67,751

Standard errors clustered at the project level in parenthesis. [c] p<0.10,[b] p<0.05,[a] p<0.01

Table 6. Census Household-level Estimates

	(1) Flush Toilet	(2) Water Indoors	(3) Electricity Cooking	(4) Electricity Heating	(5) Electricity Lighting	(6) Number of Rooms	(7) Household Size	(8) Population Density
inside project	0.106	0.200[a]	0.239[a]	0.177[b]	0.109	0.301	0.143	-4146.910
	(0.081)	(0.048)	(0.081)	(0.078)	(0.085)	(0.206)	(0.119)	(2631.180)
0-300m outside project	-0.041	0.025	0.008	0.000	-0.021	0.061	-0.036	-1963.796
	(0.043)	(0.043)	(0.040)	(0.044)	(0.036)	(0.161)	(0.072)	(1588.057)
300-600m outside project	-0.001	0.035	0.020	0.025	0.001	0.023	0.024	-2128.511
	(0.030)	(0.035)	(0.032)	(0.034)	(0.030)	(0.148)	(0.067)	(1784.965)
Mean Outcome 2001	0.79	0.35	0.66	0.62	0.77	3.30	3.51	8,566.83
Mean Outcome 2011	0.83	0.54	0.81	0.72	0.82	3.56	3.18	9,823.82
R^2	0.104	0.149	0.189	0.172	0.103	0.099	0.095	0.014
# projects	314	314	314	314	314	314	314	314
N project areas	3,657	3,657	3,657	3,657	3,657	3,651	3,657	3,657
N spillover areas	4,200	4,200	4,200	4,200	4,200	4,192	4,199	4,201
N	12,732	12,732	12,732	12,732	12,732	12,709	12,730	12,734

All regressions include project Fixed-Effects. Standard errors clustered at the project level in parenthesis. [c] $p<0.10$,[b] $p<0.05$,[a] $p<0.01$

Table 7. Census Household-level Estimates By Type of Project

	(1) Flush Toilet	(2) Water Indoors	(3) Electricity Cooking	(4) Electricity Heating	(5) Electricity Lighting	(6) Number of Rooms	(7) Household Size	(8) Population Density
Greenfield								
inside project	-0.145	0.134	-0.052	-0.121	-0.139	0.008	0.240	-627.268
	(0.194)	(0.139)	(0.134)	(0.137)	(0.150)	(0.380)	(0.176)	(4267.123)
0-300m outside project	-0.090	0.110	0.001	-0.020	0.039	0.635	0.587[a]	-4160.659
	(0.109)	(0.165)	(0.084)	(0.099)	(0.068)	(0.434)	(0.155)	(3739.491)
300-600m outside project	0.010	0.068	0.054	0.026	0.102[b]	0.203	0.230	-4576.389
	(0.046)	(0.087)	(0.051)	(0.059)	(0.049)	(0.324)	(0.170)	(3817.024)
In-Situ Upgrading								
inside project	0.381[b]	0.198[c]	0.312[b]	0.292[b]	0.194	0.798[b]	0.449[c]	-9892.478
	(0.156)	(0.115)	(0.123)	(0.120)	(0.120)	(0.396)	(0.241)	(6057.963)
0-300m outside project	0.041	0.005	0.077	0.064	0.060	0.047	0.120	-4505.393
	(0.108)	(0.111)	(0.085)	(0.101)	(0.074)	(0.413)	(0.159)	(3981.673)
300-600m outside project	0.026	-0.001	0.046	0.076	-0.020	-0.147	0.051	-1981.773
	(0.073)	(0.097)	(0.078)	(0.084)	(0.071)	(0.441)	(0.132)	(3872.455)
Other								
inside project	-0.026	0.213[a]	0.208[c]	0.144	0.067	0.036	-0.108	-2095.538
	(0.095)	(0.065)	(0.110)	(0.104)	(0.120)	(0.280)	(0.158)	(1559.950)
0-300m outside project	-0.050	0.032	-0.022	-0.023	-0.060	0.055	-0.208[c]	-596.956
	(0.048)	(0.052)	(0.051)	(0.052)	(0.047)	(0.173)	(0.110)	(968.603)
300-600m outside project	-0.013	0.044	0.009	0.018	-0.010	0.039	-0.081	-1698.898
	(0.041)	(0.053)	(0.045)	(0.046)	(0.043)	(0.176)	(0.105)	(1107.395)
Mean Outcome 2001	0.79	0.35	0.66	0.62	0.77	3.30	3.51	8,566.83
Mean Outcome 2011	0.83	0.54	0.81	0.72	0.82	3.56	3.18	9,823.82
R^2	0.116	0.169	0.206	0.190	0.123	0.111	0.112	0.041
# projects	314	314	314	314	314	314	314	314
N project areas	3,657	3,657	3,657	3,657	3,657	3,651	3,657	3,657
N spillover areas	4,200	4,200	4,200	4,200	4,200	4,192	4,199	4,201
N	12,732	12,732	12,732	12,732	12,732	12,709	12,730	12,734

All regressions include project Fixed-Effects. Standard errors clustered at the project level in parenthesis. [c] $p<0.10$,[b] $p<0.05$,[a] $p<0.01$

1. My quick interpretation

- Buildings
  - within proj footprints: huge increase in formal structures across all types, most massive increases are in in-situ/other with more modest increases in greenfield; substitution away from non-bkyd to bkyd informal, some decline in total informal for in-situ/other projects
  - outside proj footprints: overall little net change, some crowding out of informal (maybe some growth in formal); in-situ seems to crowd in formal housing while other projects seem to crowd out informal housing
- HH Census
  - within proj footprints: huge improvements in housing quality for insitu-upgrading, more mixed results/declines in quality for greenfield and other projects
  - outside proj footprints: close to zero net change in quality; some gains in service quality for in-situ upgrading projects with decreases for greenfield and other projects (pretty much matches the building results)
  - noisy decrease in pop density both within and around projects
- Person Census
  - within proj footprints: greenfields attract younger, unemployed, less educated poorer people; in-situ and other attract slightly older, same edu, maybe a little richer people
  - outside proj footprints: greenfields again attract younger, poorer, less educated people; evidence is more mixed for in-situ and other
- Prices
  - unanimous price declines for all project types, distances, and controls; the effects attenuate somewhat with distance, they aren't very statistically significant
  - note: I include a few non-project houses within footprints to keep all specifications the same (can also remove later)
- Tentative Conclusion:
  - large increases in the total supply of housing and large improvements in housing quality within projects are not enough to crowd in substantial housing investments in areas around projects; instead, this housing supply increase may put downward pressure on local housing prices