# Beyond Density: Municipal Expenditures and the Shape and Location of Development

Online Supplement

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## Appendix A

### *Descriptive Statistics Details*

Referring to Table 1 within the main text, of the singular municipal expenditure categories, mean expenditures per capita on public works are the largest at $169. Total expenditures per capita range across Massachusetts municipalities from a low of $1,029 to a high of $6,824. The average number of residents per km$^2$ is 1,295 with a maximum density of 7,091 residents per km$^2$ within the city of Somerville. Proportion of land within a municipality that is developed ranges from 0.019 to 0.826 with a mean of 0.267.

Recalling that the concentration metric can be interpreted as the share of land use that would need to be redistributed in order to achieve a uniform distribution, on average low/medium-density residential is much less concentrated than both multi-/high-density residential and commercial. Multi-/high-density residential is more central than both low/medium-density residential and commercial use on average. low/medium-density residential is the most isolated use type with an average isolation value of 0.277. Commercial use tends to be less isolated than the two residential groupings on average. Interestingly, multi-/high-density residential displays a lower interaction value with respect to commercial as compared to low/medium-density residential and commercial. Average mean patch area varies across the different uses with multi-/high-density residential land use producing the largest mean patch at 0.047 km$^2$. Multi-/high-density residential also displays the largest mean perimeter to area ratio at 0.194 along with the largest variance.

Massachusetts municipalities range in population from 327 in Tyringham to 617,594 in Boston. Population growth over the 2000 to 2010 time period was 9.0% on average. The range for proportion of population under 5 years old is quite small, 0.018 to 0.084, whereas the proportion over 65 ranges from 0.074 to a high of 0.398 in the town of Orleans. Orleans also claims the maximum value for proportion white residents at 0.988. There is large variation in the proportion of population with a Bachelor's degree or higher, 0.11 to 0.793 with a mean of 0.388. The mean Republican vote share for the 2010 Gubernatorial election was 0.388. Homeownership within Massachusetts municipalities appears to be quite high with a maximum value of 0.975 and a mean of 0.779. On average, a small portion of homes within municipalities were built before 1940, 0.026. The number of jobs per resident ranges from 0.053 to 1.611. Income per capita also has a large range from $5,440 to $289,184. The mean level of state revenue per capita is $505.

Table A presents correlations between the traditional and multidimensional land use metrics. Focusing on the traditional metrics of density and proportion of land developed, strong correlations exist. Specifically, residential density is highly positively correlated with proportion of land developed. This is unsurprising given that municipalities with large proportions of developed land tend to be part of a metro area or sub-regional urban center where density is higher. Commercial concentration is also strongly related to density but inversely. As density increases, commercial use tends to spread more evenly across the municipality. Proportion of developed land exhibits high negative correlations with both multi/high-density residential and commercial concentration, implying that the concentration metric with respect to these uses is highly related to the proportion of land that is developed. In general, the multidimensional metrics show weak correlations with one another which is consistent with previous studies (Cutsinger et al., 2005; Frenkel & Ashkenzai, 2008; Jaret et al., 2009). However, a few relationships are notable. Not surprisingly, multi/high-density residential concentration and commercial concentration are highly positively correlated at 0.81. Multi/high-density residential concentration and the interaction of multi/high-density residential with commercial use displays a high negative correlation of -0.69. Similarly, commercial concentration and the interaction of multi/high-density residential with commercial use is also highly negatively correlated at -0.67. The correlation between the multi/high-density residential isolation and the interaction (or mixed-use) of multi/high-density residential and commercial use is moderately high at 0.59. This large positive value may seem counter-intuitive but likely is capturing the fact that grid cells that contain a large portion of multi/high-density residential use tend to also contain a small portion of commercial use. The high correlations highlighted here are kept in mind when assessing issues of multicollinearity within models with full sets of land use metrics (see Section 4 in the main text for more details).

Table B presents correlations between the control variables that are considered. There are a few relationships that have the potential to introduce issues of multicollinearity within regressions performed. A high negative correlation exists between the proportion of residents with a Bachelor's degree and the proportion of independent voters in the 2010 Gubernatorial election. Additionally, proportion of residents with a Bacholer's degree is highly positively correlated with log per capita income. Again, the high correlations displayed here are considered when constructing the set of controls to be used within the main regressions specifications.

**Table A.** Correlation Matrix of Land Use Measures

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (2) | 0.72 | | | | | | | | | | | | | | | | | | |
| (3) | 0.04 | -0.38 | | | | | | | | | | | | | | | | | |
| (4) | -0.65 | -0.85 | 0.38 | | | | | | | | | | | | | | | | |
| (5) | -0.71 | -0.84 | 0.25 | 0.81 | | | | | | | | | | | | | | | |
| (6) | -0.38 | -0.50 | 0.32 | 0.47 | 0.39 | | | | | | | | | | | | | | |
| (7) | -0.12 | -0.27 | 0.20 | 0.29 | 0.26 | 0.41 | | | | | | | | | | | | | |
| (8) | 0.07 | -0.21 | 0.20 | 0.18 | 0.22 | 0.35 | 0.54 | | | | | | | | | | | | |
| (9) | -0.10 | 0.05 | -0.03 | 0.07 | 0.05 | 0.19 | 0.21 | 0.10 | | | | | | | | | | | |
| (10) | 0.40 | 0.42 | -0.09 | -0.43 | -0.42 | -0.16 | 0.02 | 0.04 | 0.29 | | | | | | | | | | |
| (11) | 0.20 | 0.45 | -0.30 | -0.42 | -0.39 | -0.28 | -0.18 | -0.19 | 0.19 | 0.35 | | | | | | | | | |
| (12) | 0.25 | 0.34 | -0.25 | -0.26 | -0.29 | 0.10 | 0.18 | 0.11 | 0.08 | -0.15 | -0.03 | | | | | | | | |
| (13) | -0.30 | -0.13 | -0.35 | 0.23 | 0.14 | 0.25 | 0.16 | 0.15 | 0.21 | -0.22 | -0.27 | 0.40 | | | | | | | |
| (14) | 0.72 | 0.70 | -0.04 | -0.69 | -0.67 | -0.28 | -0.01 | 0.10 | 0.03 | 0.59 | 0.29 | 0.18 | -0.39 | | | | | | |
| (15) | 0.18 | 0.57 | -0.42 | -0.40 | -0.41 | -0.17 | -0.14 | -0.18 | 0.29 | 0.29 | 0.31 | 0.23 | 0.28 | 0.22 | | | | | |
| (16) | 0.51 | 0.49 | 0.12 | -0.36 | -0.41 | -0.25 | -0.06 | -0.01 | 0.08 | 0.34 | 0.13 | 0.09 | -0.27 | 0.57 | 0.15 | | | | |
| (17) | 0.05 | 0.36 | -0.32 | -0.17 | -0.21 | -0.20 | -0.10 | -0.16 | 0.25 | 0.22 | 0.67 | 0.02 | 0.03 | 0.14 | 0.45 | 0.19 | | | |
| (18) | -0.03 | -0.04 | 0.02 | 0.03 | 0.02 | -0.06 | -0.05 | -0.02 | -0.11 | -0.08 | -0.06 | -0.05 | -0.07 | -0.05 | -0.03 | -0.03 | -0.04 | | |
| (19) | 0.03 | -0.01 | 0.00 | -0.01 | 0.00 | 0.01 | 0.02 | 0.05 | 0.07 | 0.10 | 0.05 | -0.05 | -0.07 | 0.11 | -0.02 | 0.02 | 0.00 | -0.01 | |
| (20) | 0.05 | 0.08 | -0.05 | -0.08 | -0.13 | -0.01 | -0.01 | -0.05 | -0.06 | 0.00 | -0.03 | 0.09 | -0.01 | 0.11 | -0.01 | 0.15 | -0.02 | -0.01 | -0.01 |

(1) Residents per $km^2$ developed land (2) Proportion of land developed (3) low/medium-density residential concentration (4) Multi/high-density residential concentration (5) Commercial concentration (6) low/medium-density residential centrality (7) Multi/high-density residential centrality (8) Commercial centrality (9) low/medium-density residential isolation (10) Multi/high-density residential isolation (11) Commercial isolation (12) low/medium to multi-/high-density residential interaction (13) Commercial to low/medium-density residential interaction (14) Commercial to multi/high-density residential interaction (15) low/medium-density residential patch area (16) Multi/high-density residential patch area (17) Commercial patch area (18) low/medium-density residential perimeter to area (19) Multi/high-density residential perimeter to area (20) Commercial perimeter to area

**Table B.** Correlation Matrix of Control Variables

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (2) | -0.12 | | | | | | | | | | | |
| (3) | 0.26 | -0.01 | | | | | | | | | | |
| (4) | -0.14 | -0.14 | -0.51 | | | | | | | | | |
| (5) | -0.58 | 0.13 | -0.44 | 0.21 | | | | | | | | |
| (6) | -0.03 | 0.15 | -0.13 | 0.05 | -0.02 | | | | | | | |
| (7) | -0.15 | 0.35 | 0.29 | -0.28 | 0.25 | -0.01 | | | | | | |
| (8) | -0.04 | -0.10 | 0.12 | -0.20 | 0.10 | -0.69 | 0.04 | | | | | |
| (9) | -0.48 | 0.35 | -0.33 | 0.02 | 0.62 | 0.21 | 0.42 | -0.12 | | | | |
| (10) | -0.40 | -0.08 | -0.37 | 0.05 | 0.44 | -0.12 | -0.21 | 0.12 | 0.23 | | | |
| (11) | 0.24 | -0.05 | 0.16 | 0.16 | -0.31 | 0.19 | -0.03 | -0.22 | -0.33 | -0.36 | | |
| (12) | -0.07 | 0.12 | -0.05 | 0.02 | 0.07 | 0.82 | 0.29 | -0.59 | 0.34 | -0.14 | 0.18 | |
| (13) | 0.27 | -0.14 | 0.48 | -0.28 | -0.38 | -0.27 | 0.01 | 0.22 | -0.32 | -0.41 | 0.16 | -0.24 |

(1) Population (2) 2000 to 2010 population growth (3) Proportion under 5 years old (4) Proportion over 65 years old (5) Proportion white (6) Proportion with Bachelor's or higher (7) Proportion Republican Vote (8) Proportion Independent Vote (9) Homeownership rate (10) Proportion of homes built before 1940 (11) Log per capita number of jobs (12) Log per capita income (13) Log per capita state revenue

### *Visualizations of Multidimensional Land Use Metrics*

Figures A to F present visual comparisons of high and low values of each multi-dimensional metric.

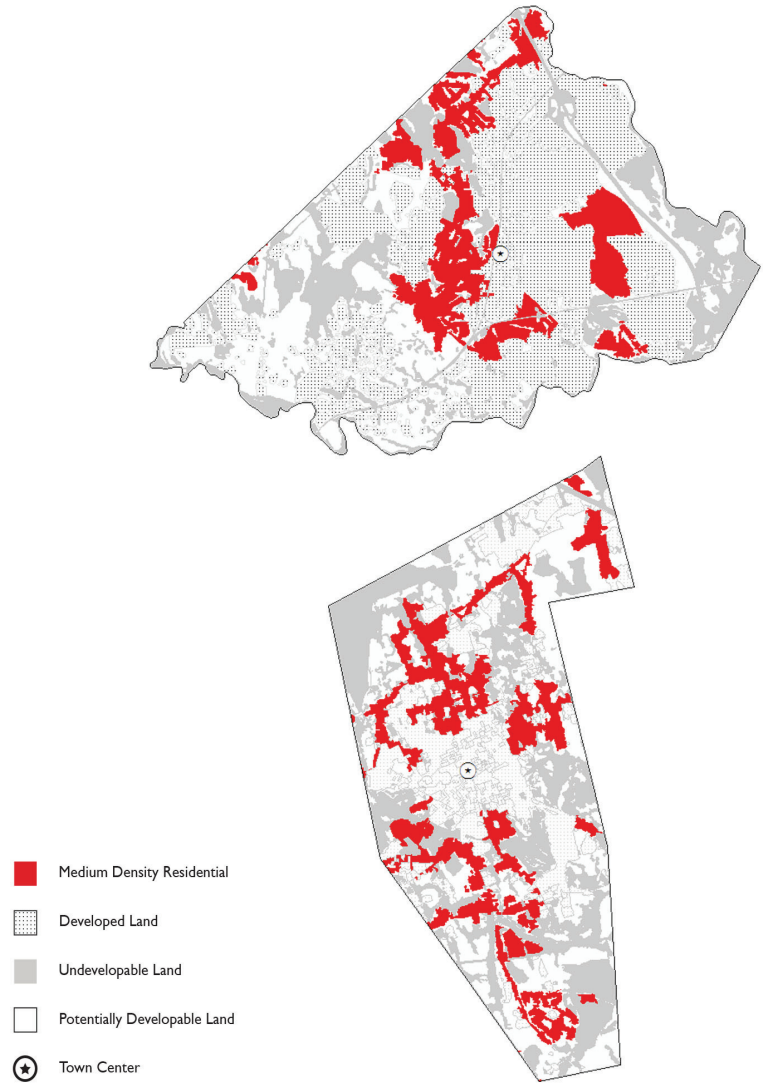


**Figure A. High vs. Low Concentration.** The high concentration of medium-density residential housing in the top figure highlights the limited coverage of this use type across the municipality. The municipality in the bottom figure (lower concentration) shows a more even distribution of medium-density residential use. (Top figure: Needham; Bottom figure: Rockland)

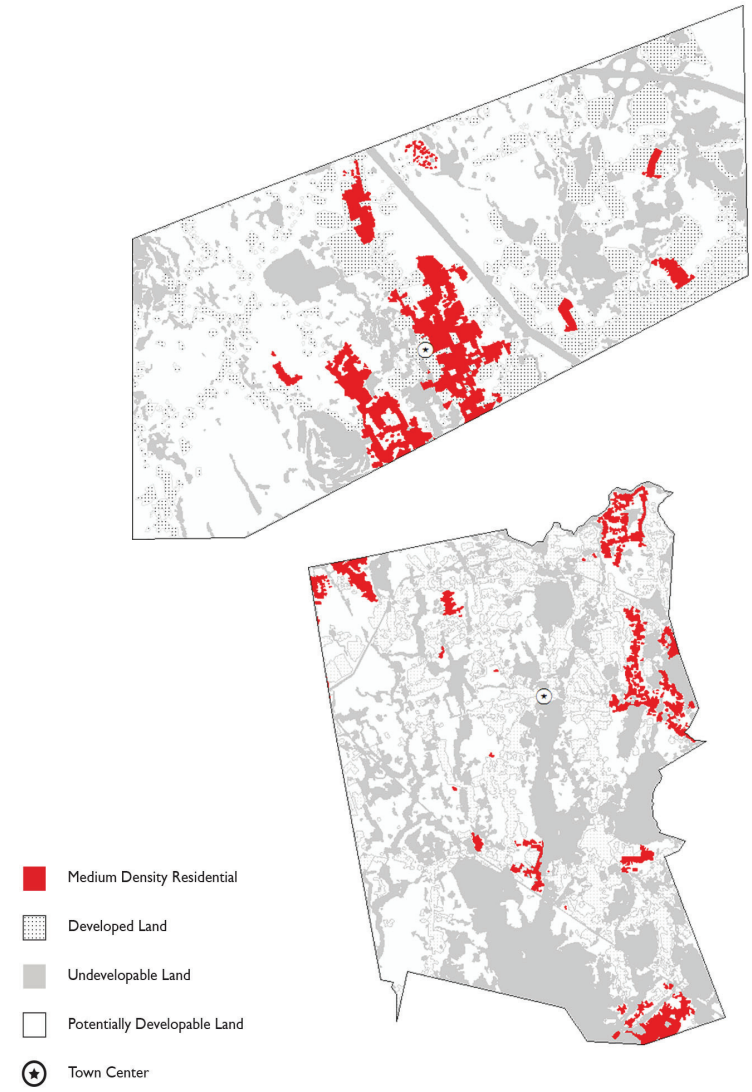


**Figure B. High vs. Low Centrality.** The higher centrality of medium-density residential is clearly demonstrated by the top municipality. This use type is much more decentralized in the bottom municipality. (Top figure: Plainville; Bottom figure: Hanson)

### *Single Land Use Metric Regressions*

Beginning with concentration, Table C presents results for all expenditure categories with the inclusion of controls.[1] Low/medium-density residential concentration is positive and significant at the 1% level with respect to public works expenditures; increasing low/medium-density residential concentration by a standard deviation increases public works expenditures per capita by 11.35%. The concentration coefficient within the fire expenditure specification is positive but not significant. This is in contrast to the large, significant effect of commercial

[1]Control coefficients qualitatively similar to coefficients presented in Table 2 in the main text and are suppressed for space reasons.

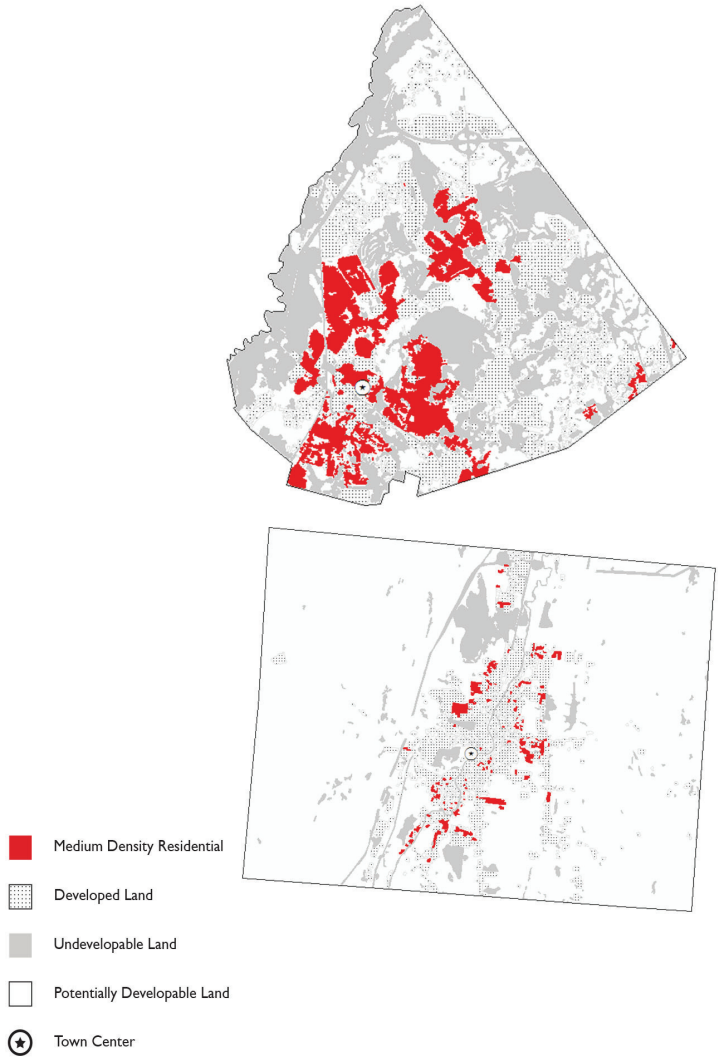


**Figure C. Isolation.** Higher levels of medium-density residential isolation are demonstrated by the top figure. Here, larger areas of unbroken land are covered by this land use type. The bottom figure shows a more sparse and isolated pattern of medium-density residential land use. (Top figure: Canton; Bottom figure: Adams)

concentration on fire expenditures. A one standard deviation increase decreases expenditures by 19.59%. Police expenditures per capita decrease by a somewhat significant 7.29% with a one standard deviation increase in low/medium-density residential concentration and exhibit a similar but more statistically significant decrease of 9.40%. The two concentration coefficients within the total expenditure specification are both somewhat significant but small in magnitude. A one standard deviation increase in low/medium-density residential concentration increases total expenditures per capita by 3.61% whereas the same increase in commercial concentration decreases expenditures by 3.73%. The centrality metric (Table D) does not display a strong significance with respect to any of the

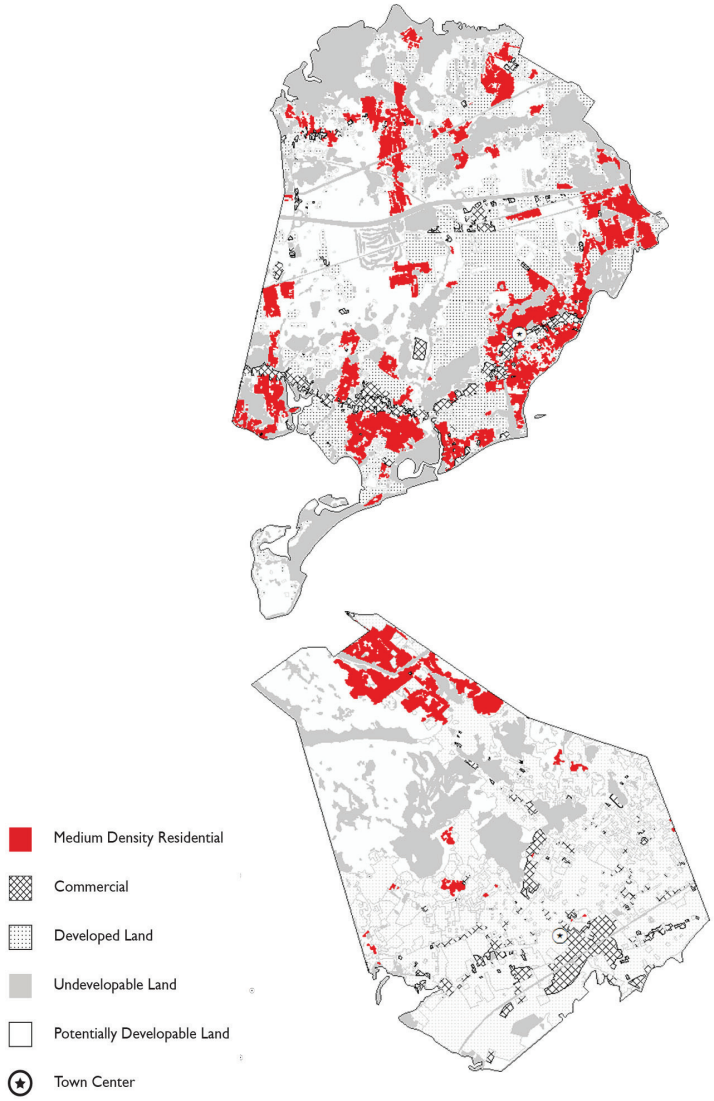


**Figure D. Interaction.** High levels of interaction between medium-density residential and commercial land use are seen in the top figure where the commercial land use is distributed in close proximity to the residential use. A nearly complete separation of the two uses is demonstrated in the bottom figure. (Top figure: Yarmouth; Bottom figure: Lynn)

expenditure categories.

The majority of the isolation coefficients across the four regressions are negative (Table E). There is limited to no significance for all isolation measures with multi-/high-density residential being a slight exception within the total expenditures specification. Here, a one standard deviation increase decreases expenditures by 3.05%.

Moving to the interaction metrics (Table F), both commercial to residential interaction metrics are somewhat significant within the public works specification. A one standard deviation increase in the commercial to low/medium-density and

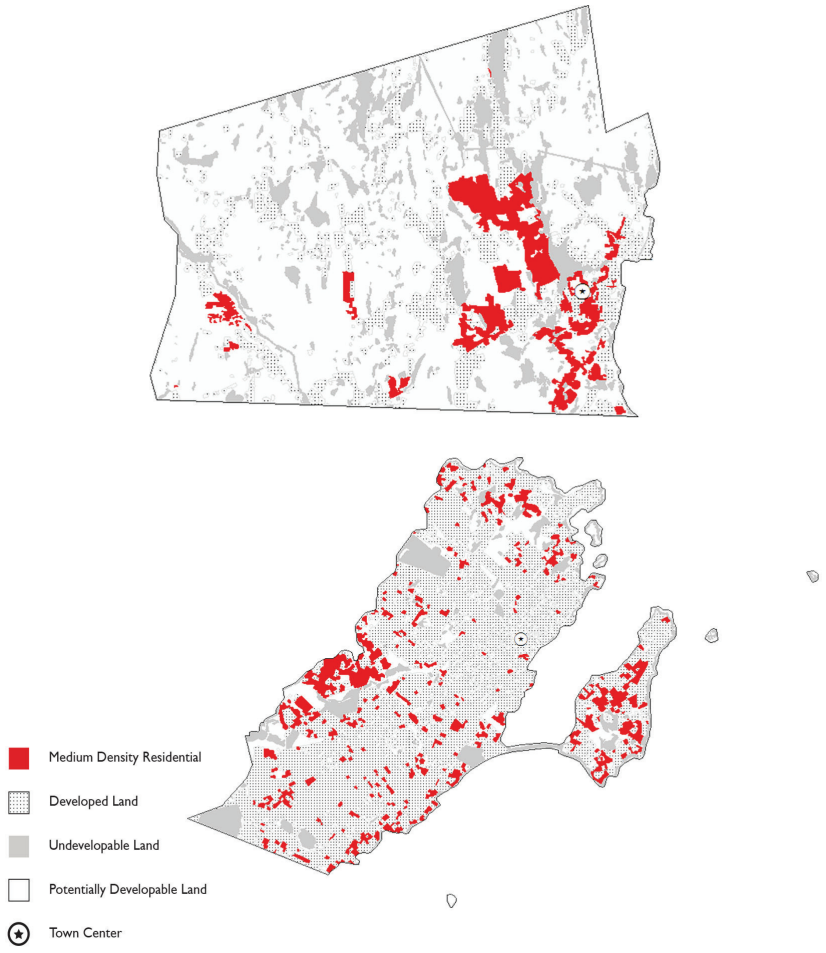


**Figure E. Mean Patch Area.** Larger medium-density residential patch areas are seen clearly in the top figure as compared to the small patches in the bottom image. (Top figure: Dudley; Bottom figure: Marblehead)

multi-/high-density interaction decreases expenditures by 5.96% and 8.912% respectively. Within the fire expenditure specification, these coefficients are larger in magnitude and positive with slight significance generating a percent increase in fire expenditures of 8.11% and 10.51%. Coefficients within the total expenditures specification are comparatively small in magnitude with only commercial to multi-/high-density residential interaction producing a somewhat significant coefficient implying a decrease in expenditures by 3.88% for a one standard deviation increase.

Mean patch area is not a strong predictor of the disaggregate expenditure categories, although low/medium density residential mean patch area does produce a somewhat significant positive coefficient for fire expenditures. Here, a one standard deviation increase increases expenditures by 6.28%.

The mean perimeter-to-area ratio proves to be a more statistically significant measure of fragmentation than patch area but its influence is minimal.

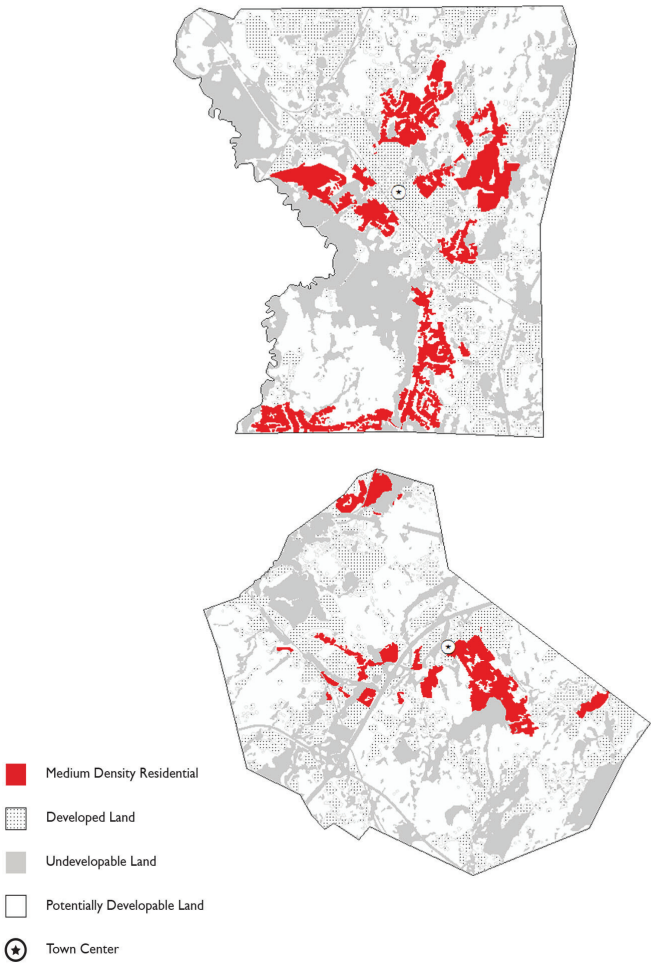


**Figure F. Mean Perimeter-to-Area Ratio.** The medium-density residential land use in the top figure shows a long a winding pattern especially in the developments toward the lower border. The lower figure on average contains less complex patches of medium-density residential. (Top figure: Medfield; Bottom figure: Littleton)

With respect to public works expenditures, a one standard deviation increase in low/medium and multi-/high-density residential perimeter-to-area ratio increases expenditures by 2.73% and 2.05%. Whereas a one standard deviation increase in the commercial ratio decreases public works expenditures by 2.00%. Fire expenditures increase by 3.99% and 3.48% when low/medium-density residential and commercial perimeter-to-area ratio increases by one standard deviation. Perimeter to area coefficients are not significant within the police expenditure specification. The multi-/high-density residential ratio coefficient is strongly significant within the total expenditure specification but has minimal impact. A one standard deviation increase increase expenditures by 1.53%.

Taking these results together, there are clear relationships between the various metrics and municipal expenditures, although some metrics prove to be inconsequential. A more thorough analysis is presented alongside the full regression

specifications.

**Table C.** Concentration: Low/Med. Density Residential & Commercial

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Low/med. density resid. concentration | 1.024*** | 0.258 | -0.721** | 0.338** |
| | (0.322) | (0.404) | (0.334) | (0.139) |
| Commercial concentration | 0.124 | -2.001*** | -0.906*** | -0.336** |
| | (0.346) | (0.449) | (0.305) | (0.157) |
| Constant | 1.373 | 1.694 | 5.027*** | 2.920*** |
| | (0.990) | (1.235) | (0.979) | (0.456) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.404 | 0.600 | 0.531 | 0.681 |
| Adjusted R-squared | 0.370 | 0.577 | 0.504 | 0.663 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table D.** Centrality

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Low/med. density resid. centrality | 0.022 | -0.257 | -0.033 | -0.128* |
| | (0.144) | (0.250) | (0.183) | (0.070) |
| Multi/high density resid. centrality | -0.009 | -0.047 | -0.031 | -0.015 |
| | (0.020) | (0.034) | (0.030) | (0.009) |
| Commercial centrality | 0.050 | 0.067 | -0.026 | 0.001 |
| | (0.037) | (0.076) | (0.051) | (0.019) |
| Constant | 2.439** | 1.909 | 4.267*** | 3.184*** |
| | (1.023) | (1.222) | (0.933) | (0.434) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.386 | 0.580 | 0.508 | 0.683 |
| Adjusted R-squared | 0.349 | 0.554 | 0.478 | 0.663 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

### *Controls for Full Regression*

Table I presents the control coefficients for the regressions contained in Table 4 in the main text. They are qualitatively similar to the control coefficients within the regressions containing no land use measures in the main text (Table 2 main text).

**Table E.** Isolation

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Low/med. density resid. isolation | -0.051 | -0.640 | -0.762* | -0.258* |
| | (0.366) | (0.436) | (0.434) | (0.156) |
| Multi/high density resid. isolation | -0.491* | 0.283 | 0.026 | -0.252** |
| | (0.272) | (0.373) | (0.267) | (0.123) |
| Commercial isolation | -0.808 | -0.041 | -0.087 | -0.363* |
| | (0.493) | (0.601) | (0.438) | (0.186) |
| Constant | 2.483** | 1.746 | 4.460*** | 3.308*** |
| | (1.017) | (1.216) | (0.909) | (0.431) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.398 | 0.576 | 0.510 | 0.689 |
| Adjusted R-squared | 0.361 | 0.550 | 0.480 | 0.670 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table F.** Interaction

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Commercial to low/med. density resid. interaction | -0.544* | 0.690* | 0.581** | -0.092 |
| | (0.327) | (0.388) | (0.245) | (0.128) |
| Commercial to multi/high density resid. interaction | -0.662** | 0.709* | 0.001 | -0.281** |
| | (0.295) | (0.384) | (0.231) | (0.117) |
| Low/med. to multi/high density resid. interaction | 0.011 | -0.526 | -0.021 | -0.072 |
| | (0.229) | (0.366) | (0.210) | (0.096) |
| Constant | 2.101** | 1.903 | 4.744*** | 3.163*** |
| | (1.008) | (1.204) | (0.929) | (0.444) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.398 | 0.581 | 0.511 | 0.680 |
| Adjusted R-squared | 0.362 | 0.555 | 0.481 | 0.660 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table G.** Mean Patch Area

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Low/med density resid. patch area | 0.354 | 2.100** | 0.798 | -0.326 |
| | (1.686) | (1.038) | (0.682) | (0.465) |
| Multi/high density resid. patch area | -0.318 | 0.335 | 0.015 | -0.082 |
| | (0.391) | (0.265) | (0.154) | (0.111) |
| Commercial patch area | -1.396 | -2.888 | -2.615 | -1.602 |
| | (3.201) | (3.602) | (2.677) | (1.191) |
| Constant | 2.308** | 1.958 | 4.450*** | 3.127*** |
| | (1.067) | (1.206) | (0.931) | (0.446) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.386 | 0.578 | 0.501 | 0.675 |
| Adjusted R-squared | 0.348 | 0.551 | 0.471 | 0.655 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table H.** Perimeter to Area Ratio

| | Public Works | Fire | Police | Total |
|---|---|---|---|---|
| Low/med. density resid. perimeter to area | 0.097** | 0.141*** | 0.040 | -0.018 |
| | (0.045) | (0.054) | (0.032) | (0.017) |
| Multi/high density resid. perimeter to area | 0.016*** | -0.004 | -0.002 | 0.012*** |
| | (0.006) | (0.007) | (0.004) | (0.002) |
| Commercial perimeter to area | -0.029** | 0.049*** | 0.012 | -0.007 |
| | (0.011) | (0.017) | (0.010) | (0.007) |
| Constant | 2.168** | 1.881 | 4.436*** | 3.172*** |
| | (1.027) | (1.216) | (0.920) | (0.443) |
| Observations | 298 | 287 | 297 | 298 |
| R-squared | 0.388 | 0.577 | 0.500 | 0.674 |
| Adjusted R-squared | 0.351 | 0.550 | 0.469 | 0.654 |

Controls in all specifications
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

**Table I.** Full Model Controls

| | Public Works | Public Works Quadratic | Fire | Fire Quadratic | Police | Total |
|---|---|---|---|---|---|---|
| Population (1000s) | 0.001 | 0.000 | -0.000 | 0.000 | 0.001*** | -0.000 |
| | (0.001) | (0.001) | (0.000) | (0.001) | (0.000) | (0.000) |
| 2000 to 2010 population growth | 0.098 | -0.108 | 0.079 | 0.087 | -0.202 | 0.189* |
| | (0.257) | (0.259) | (0.360) | (0.358) | (0.230) | (0.111) |
| Proportion under 5 years old | 9.815** | 8.342* | 9.365* | 9.803* | -4.761 | 1.686 |
| | (4.441) | (4.470) | (5.089) | (4.993) | (3.453) | (1.392) |
| Proportion over 65 years old | 3.986*** | 3.685*** | 1.309 | 1.173 | 0.682 | 1.491*** |
| | (1.226) | (1.112) | (1.331) | (1.298) | (0.965) | (0.499) |
| Proportion white | 0.119 | 0.057 | -0.743* | -0.782* | -0.099 | -0.213 |
| | (0.496) | (0.449) | (0.426) | (0.425) | (0.333) | (0.170) |
| Homeownership rate | 0.960** | 0.655 | -0.667 | -0.544 | -1.315*** | 0.287* |
| | (0.426) | (0.425) | (0.546) | (0.540) | (0.377) | (0.171) |
| Proportion Republican Vote | -0.909*** | -0.702** | 0.694* | 0.595 | 0.930*** | -0.404*** |
| | (0.304) | (0.320) | (0.397) | (0.395) | (0.261) | (0.145) |
| Proportion Independent Vote | 0.454 | 1.118 | 0.686 | 0.346 | -2.857** | -0.681 |
| | (0.889) | (0.933) | (1.486) | (1.476) | (1.206) | (0.454) |
| Proportion of homes built before 1940 | 5.756 | 4.523 | -13.158*** | -13.137*** | 0.933 | 3.473*** |
| | (3.560) | (3.268) | (4.479) | (4.344) | (3.107) | (1.273) |
| Log per capita number of jobs | 0.135* | 0.165** | 0.275*** | 0.239*** | 0.150** | 0.114*** |
| | (0.072) | (0.067) | (0.090) | (0.089) | (0.065) | (0.027) |
| Log per capita income | 0.215*** | 0.229*** | 0.438*** | 0.444*** | 0.172** | 0.396*** |
| | (0.069) | (0.072) | (0.103) | (0.103) | (0.074) | (0.035) |
| Log per capita state revenue | -0.054 | -0.068 | -0.066 | -0.054 | -0.002 | 0.175*** |
| | (0.044) | (0.041) | (0.059) | (0.059) | (0.036) | (0.017) |
| Barnstable County | 0.219 | 0.295 | 0.768*** | 0.800*** | 0.423** | 0.330*** |
| | (0.222) | (0.202) | (0.218) | (0.212) | (0.194) | (0.111) |
| Duke County | 0.832*** | 0.720*** | -0.501** | -0.450** | 1.130*** | 0.678*** |
| | (0.188) | (0.229) | (0.229) | (0.217) | (0.292) | (0.127) |
| Constant | 1.963* | 2.391** | 1.706 | 1.488 | 4.840*** | 2.973*** |
| | (1.056) | (1.052) | (1.305) | (1.300) | (0.993) | (0.455) |
| Observations | 298 | 298 | 287 | 287 | 297 | 298 |
| R-squared | 0.452 | 0.494 | 0.615 | 0.626 | 0.552 | 0.722 |
| Adjusted R-squared | 0.389 | 0.433 | 0.568 | 0.578 | 0.500 | 0.690 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1