

Spatial Economics – Assignment 1

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*The executable code that was used in compiling the assignment is available on GitHub at
<https://github.com/maxmheinze/spatial>.*

Task A

Preliminaries

First, we load the MASS package and check what variables there are in the Boston dataset.

```
# Header -----  
  
rm(list = ls())  
gc()  
  
pacman::p_load(MASS)  
  
# Check Column Names -----  
  
colnames(Boston)
```

Creating the Function

Next, we create the desired function.

```
# Create the function -----  
  
boston_quick_ols <- function(dependent, ...) {  
  
  # Create a formula string from the inputs  
  independents <- paste(c(...), collapse = " + ")  
  formula_string <- paste(dependent, "~", independents)  
  
  # Fit the model  
  fitted_model <- lm(as.formula(formula_string), data = Boston)  
  
  # Get the summary  
  fitted_model_summary <- summary(fitted_model)  
  
  # Get point estimates and confidence intervals  
  list_coef <- fitted_model_summary$coefficients  
  list_conf <- confint(fitted_model, level = 0.95)  
  list_ervr <- fitted_model_summary$sigma^2  
  
  # Output a list  
  return(list(coefficients = list_coef[, 1], error_variance = list_ervr, test_statistic_t  
    = list_coef[,  
      3], test_statistic_p = list_coef[, 4], confidence_intervals = list_conf))  
  
}
```

A Simple Linear Model

Next, we apply the function, using a collection of four independent variables.

```
boston_quick_ols("medv", "rm", "age", "dis", "nox")  
  
## $coefficients  
## (Intercept)          rm          age          dis          nox  
## -6.61135440   8.00051949 -0.06932587 -1.08526888 -22.10858455  
##  
## $error_variance  
## [1] 37.35166  
##  
## $test_statistic_t
```

```
## (Intercept)          rm          age          dis          nox
##   -1.590287    19.654992   -4.422259   -4.850184   -5.486524
##
## $test_statistic_p
## (Intercept)          rm          age          dis          nox
## 1.124008e-01 3.520952e-64 1.198751e-05 1.649044e-06 6.516890e-08
##
## $confidence_intervals
##           2.5 %           97.5 %
## (Intercept) -14.7793094    1.55660058
## rm           7.2007886     8.80025034
## age          -0.1001258    -0.03852595
## dis          -1.5248891    -0.64564866
## nox          -30.0256124   -14.19155674
```