# Problem Set #6

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## 1   Introduction

The purpose of this study is to shed light on the factors that may increase the attractiveness of European foreign direct investment (FDI) in the United States from 2003-2014. This analysis will utilize investment data from fDi Markets, a database maintained by the Financial Times, which collects cross border greenfield investment information. Utilizing a Poisson and Negative binomial specification, I investigate the factors that may increase the number of investments in a certain state.

The locational determinants that I will examine in this study are state labor force, infrastructure, and region characteristics. In terms of labor force characteristics, I will examine the impact of union participation, the size of the labor force, average hourly salary, poverty rates, and educational attainment in reference to no degree. The infrastructure characteristics are meant to examine the connectivity and access to local markets of a given location. These measures include the land area in square miles, the number of airports, and the number of rural and urban lane miles. In some specifications of the model, I will control for region fixed effects. I define region as defined by the BEA and my base comparison group will be the Mideast as this region saw the largest number of investments from 2003-2014. European countries are identified as countries that were EU member nations in the beginning of 2003 in order to keep a consistent track of European investors over the time period investigated.

I expect union participation rates, unemployment rate, average hourly salary, and poverty rates to decrease the number of investmetns in a given state and year. I expect the size of the labor force, the infrastructure characterisitcs as well as educational attainment to positively impact the number of investments. In the next page, I present preliminary results for my model.

## 2 Results

| | Poisson | Possion FE | NegativeBinomial |
|---|---|---|---|
| Intercept | 6.39437*** | 3.47437*** | 4.01908*** |
| | (0.31409) | (0.41028) | (1.21739) |
| Union | −0.08879*** | −0.10145*** | −0.04249* |
| | (0.00371) | (0.00619) | (0.01755) |
| LaborForce | 0.00000*** | 0.00000*** | 0.00000 |
| | (0.00000) | (0.00000) | (0.00000) |
| UnemploymentRate | 0.07883*** | 0.04119*** | 0.05342 |
| | (0.00810) | (0.00854) | (0.03180) |
| AvgHourlySalary | 0.01345* | 0.06085*** | −0.03124 |
| | (0.00587) | (0.00777) | (0.02593) |
| Poverty | −0.01856** | 0.01433 | 0.00622 |
| | (0.00565) | (0.00735) | (0.02431) |
| Airport | 0.00268*** | 0.00212*** | 0.00789*** |
| | (0.00045) | (0.00057) | (0.00209) |
| RuralLanes | 0.00001*** | 0.00001*** | −0.00000 |
| | (0.00000) | (0.00000) | (0.00000) |
| UrbanLanes | −0.00003*** | −0.00002*** | 0.00002 |
| | (0.00000) | (0.00000) | (0.00001) |
| LandArea | −0.00000*** | −0.00001*** | −0.00001*** |
| | (0.00000) | (0.00000) | (0.00000) |
| HighSchool | −10.38844*** | −8.70674*** | −6.85585*** |
| | (0.60976) | (0.71856) | (2.05966) |
| Associates | −9.98371*** | −3.68584* | −13.67907* |
| | (1.54368) | (1.69221) | (5.65985) |
| Bachelors | 0.02867 | −6.65175*** | −6.25807 |
| | (1.04929) | (1.34197) | (4.04673) |
| Graduate | −2.18161* | 1.64167 | 10.61406** |
| | (0.87040) | (1.06710) | (3.68617) |
| Southeast | | 1.76561*** | 1.70304*** |
| | | (0.14409) | (0.34387) |
| NewEngland | | 1.76851*** | 1.62295*** |
| | | (0.12780) | (0.25767) |
| GreatLakes | | 2.15298*** | 1.68956*** |
| | | (0.13465) | (0.30277) |
| Plains | | 1.93428*** | 2.78598*** |
| | | (0.15424) | (0.38247) |
| Southwest | | 2.46443*** | 2.72296*** |
| | | (0.16150) | (0.40970) |
| RockyMtn | | 2.80454*** | 2.88298*** |
| | | (0.15565) | (0.35751) |
| FarWest | | 3.08675*** | 2.37234*** |
| | | (0.13533) | (0.28347) |
| AIC | 7697.88205 | 6885.15141 | 3085.01113 |
| BIC | 7757.16380 | 6974.07403 | 3178.16816 |
| Log Likelihood | −3834.94103 | −3421.57570 | −1520.50556 |
| Deviance | 6129.06317 | 5302.33253 | 555.93564 |
| Num. obs. | 510 | 510 | 510 |

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Table 1: Three Count Models

# 3   Discussion

The first column shows a Poisson model without region fixed effects. Almost all characterisitics are statistically significant at the 10% significance level or higher. In this specification we see that union participation, poverty rates, urban lane miles, and land area all decrease the number of investments in a certain state. When looking at the impact of various education levels we see that high school, associates, and graduate degrees, relative to no degree, all decrease the number of investments in a certain state while bachelor degrees have no effect on investments. The size of the labor force, the unemployment rate, the average hourly salary, the number of airports, and rural lane miles all increase the number of investments. The coefficient estimates on hourly wage and the education variables are surprising as one would expect firms to be drawn to states that have a more educated population as well as areas that have lower average hourly wages as these would translate to lower firm costs. However, these results indicate that firms look primarily for a large pool of available labor that is more productive and as such are willing to offer them a higher wage. While most of the infrastructre characteristics had the anticipated signs, I was expecting urban lane miles to increase the number of investments. These results seem to indicate that urban areas are expected to be well connected, however, if a firm is to choose a rural location, a better connected rural area would increase the number of investments a European firm would make.

When adding region fixed effects, all variables except for poverty rates and graduate professional degrees are significant. The signs on the main variables stay the same and the magnitudes of the coefficients do not change significantly.

The final specification uses a negative binomial approach rather than a poisson specification. This model would be more appropriate if the equidispersion principle does not hold. It is unlikely in this model that the number of investments are equally dispersed across states and time. In this model, labor force, unemployment rate, average hourly salary, poverty, and both lane mile variables are not statistically significant. The effect of bachelor degrees in comparison to no degree is also not statistically significant. From this model, it seems that the most important characteristics are union participation rates, the number of airports, and education with firms looking primarily for individuals with no degree or very highly skilled individuals with graduate degrees.

The bottom of the table also includes AIC, BIC, and Log Likelihood measures for each of the three models. Each of these measures point to the Negative Binomial model as the best choice for modeling the relationship between location charactristics and the number of FDI investments. Based on the results of this analysis we can conclude that union participation and land area decreases the number of investments in a state. These measures are as anticipated as traditionally firms steer clear of areas with higher union rates. A state with a larger land area also represents increased transportation costs to ship the product across the country and as such should decrease the number of investments. Finally, the educational attainment still shows a puzzling result as high school and associate degree attinement decrease the number of investments relative to no degree. However, in this specification, graduate degrees increase the number of investments relative to no degree which is as anticipated and indicates that European firms primarily look for more specialized labor.