

Assignment 1: Agent Based Origin-Destination Estimation (ABODE)

The Agent-based model for this assignment is ABODE. It can be accessed at <http://street.umn.edu/ABODE.html>. Scroll down for a description of the model.

The model is also described in more detail in Tilahun, N. and D. Levinson (2010) An Agent-Based Model of Worker and Job Matching (working paper), available at <http://nexus.umn.edu/Papers/AgentMatching.pdf>.

The main objectives of this assignment are to help students:

- understand how commute patterns change under simple changes in the location of jobs
- understand how specialization and wage variations can alter the commute outcomes
- understand how people's value of time impacts their commute

To ensure faster running times, leave the `agent-density` at 10%. You can also turn off the `show_h_w_links` switch. For the tasks in this lab, keep `empty-pos-annual-increase`, `annual-wage-increase`, and `unemp-asking_pay_cut` at zero to keep the model simple.

Task 1. Understand the model.

Run simulations by changing

- How jobs are distributed in the region by turning `distributed-employment` on or off.
- Change the specialization in the economy by changing `n-job-classes` under the default four job centers scenario.
- Alter whether `wage-dispersion` is present or absent at the same skill level under the default four job centers scenario.

Run each simulation at least 10 times. Make a note of the average home-to-work distance at the end of each run. Which variables affect the commute significantly in the model? How? What explains these differences?

Task 2. Understand how value of time alters the commute outcomes.

For this task leave the number of `n-job-classes` at 1, and set `wage-dispersion` to 1. Run simulations under `distribute_employment` and `vot_prop_of_wage` set to the values shown in the below table. Run each arrangement 5 times, record the mean commute for each run, and report the the mean of the average-commute for each run.

		vot_prop_of_wage		
		.1	.6	1
distributed employment	0			
	1			

Discuss the following points:

1. What happens as the value of time approaches the wage-rate?
2. If we assume that there is a variation in the VOT of the population such that it is equivalent to the wage rate for some people and lower than the wage rate for others, based on your findings above, which group would you expect to have the lower commute?
3. The utility function used in the model trades off travel-time with wages. What other factors are present in reality that could counter such an outcome?

Task 3: Submit a memo reporting your findings. The recommended outline is as follows:

1. Problem statement
2. Methodology: Describe the model and your approach to Tasks 1 and 2.
3. Analysis
 - Report the outcomes under the different settings you tested for task 1.
 - Report your findings under task 2.
4. Findings and Limitation

The report must be no more than 2500 words. You can use print-screen and paint if you wish to include figures from the simulation. Submit your homework electronically on PDF format.