Experimental Parameters

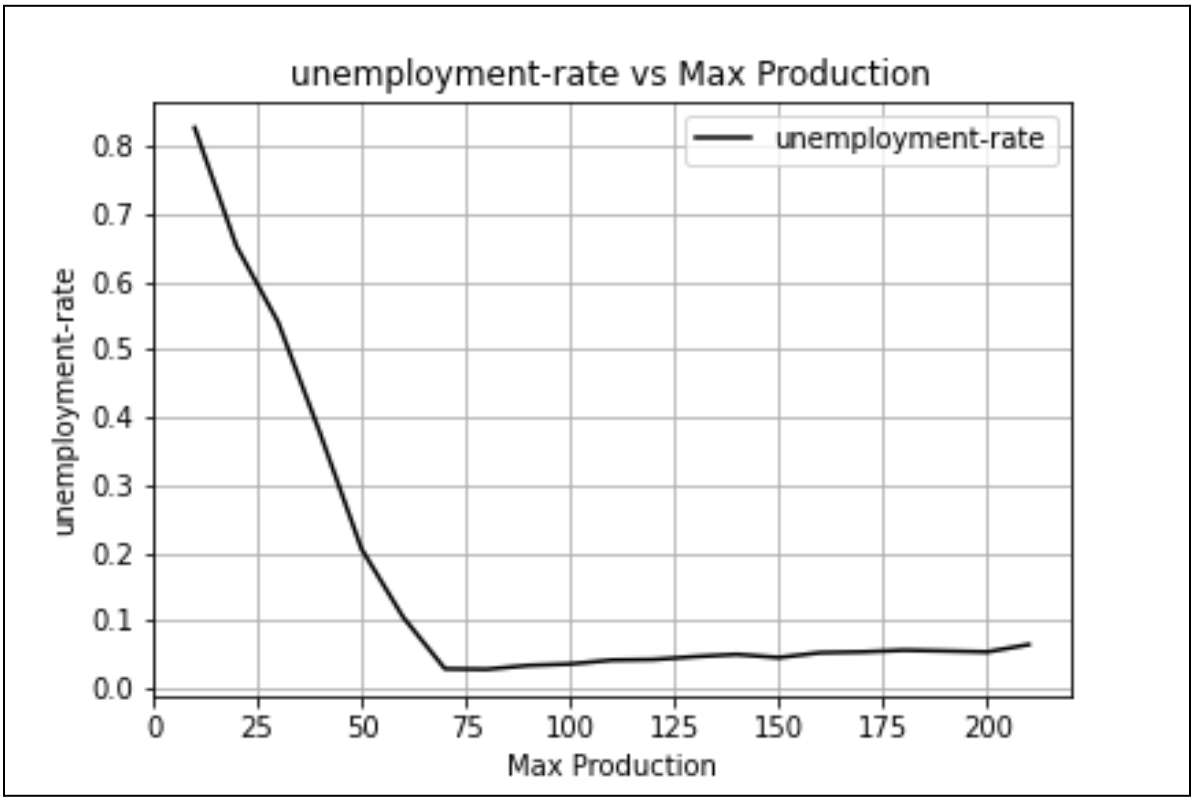
- Layoff-probability: 0.5
- N-firms: 30
- Firm-competency: 0
- Transactions-per-month: 1
- N-households: 500
- Setup-structure: two-layer
- Mean-new-agreements-per-month: 2
- Fix-n-framework-agreements?: FALSE
- Firm-memory-constant: 0.8
- Framework-duration: 24

Commit Hash:

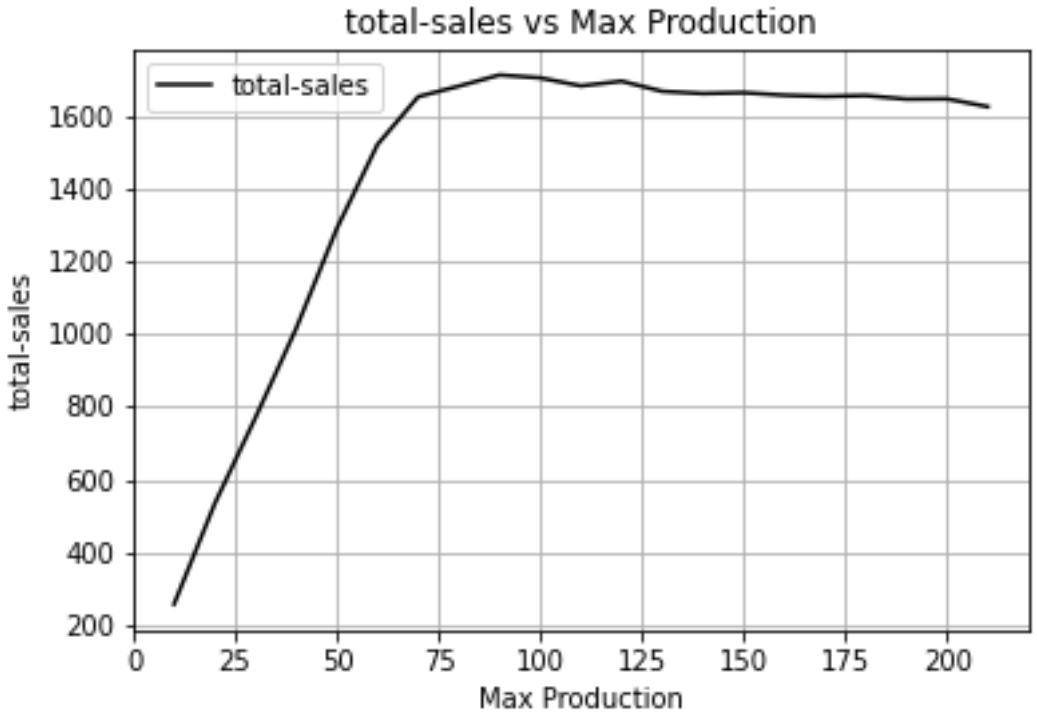
800f0855d9ea9ccb521c5902b5ca79b122e2be69

Results and Analysis

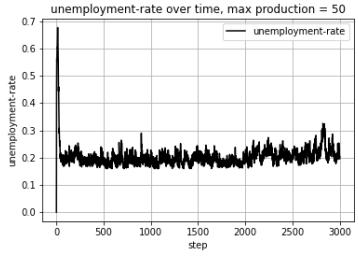
We chose to focus our analysis mainly on unemployment and total-sales. Below is a graph of the mean unemployment rate over the last 1500 steps for model runs with different maximum-productive-capacities:

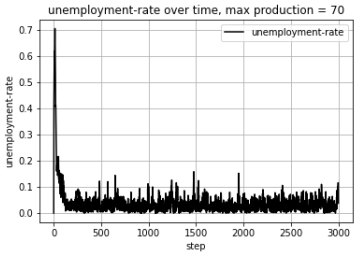


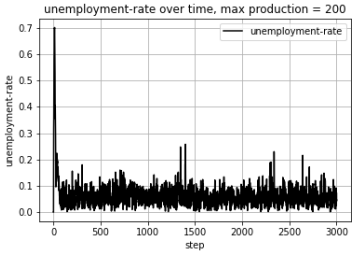
Note how as maximum-productive-capacity increases from around 10 to 70, unemployment decreases, ultimately hitting a floor at around 70. However, there is a slight upward trend in unemployment from 70 onwards. We ran the experiment twice to verify that this trend was not accidental, and sure enough, it appeared in both runs. We see a similar, albeit inverse, trend in total sales:

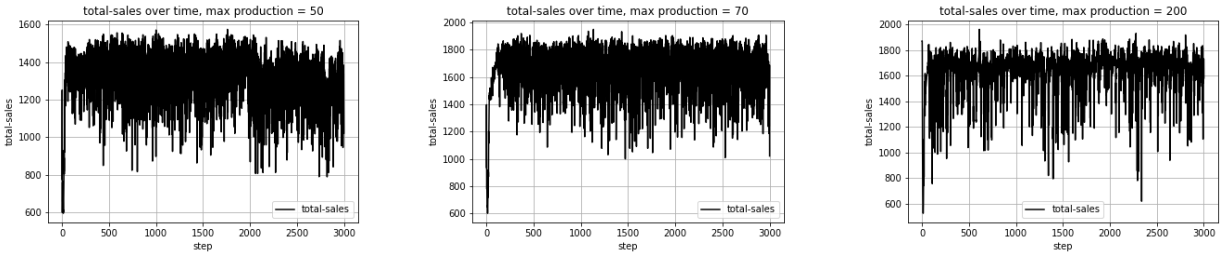


Total sales increases from maximum-productive-capacity values of 0 to 85, but then slowly decrease thereafter. To understand why this might be happening, we looked at time-series graphs for both unemployment and total-sales for maximum-productive-capacity values of 50, 70 and 200:

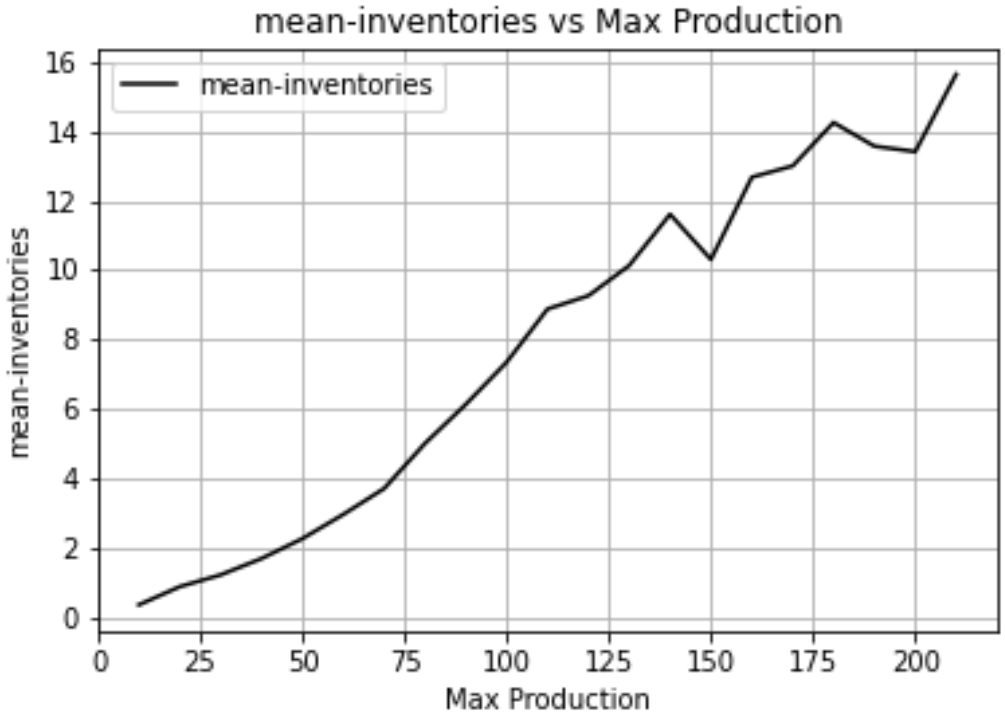








We see that unemployment stays fairly constant around a higher value for a maximum-productive-capacity of 50 than for 70 or 200. The difference between 70 and 200 appears to be that for a maximum-productive-capacity of 200, unemployment varies more than for 70, seemingly pulling the average up. For total sales, at a maximum-productive-capacity of 200, the sales distribution seems to be more concentrated than at 70, but with larger dips down and fewer spikes, seemingly draggin the average down. A plausible explanation for this may be the average inventory levels of firms:



Average inventories increase with maximum-productive capacity, which makes sense (if firms are able to produce more, they will likely have more in stock). We hypothesize that as firms acquire more inventory, they layoff workers in subsequent ticks because they do not need to produce as much. Consider the following hypothetical: say a firm predicts it will sell 100 units of a good in a given period of time, and it wants 40 extra units just in case, for a total of 140. Let's

say the maximum-productive-capacity of the firm's land is 200. In this scenario, the firm produces 140 units in the first time period and sells 100, leaving 40 leftover. The next time period, the firm also predicts 100 units of sales and would like 40 extra, but now it only needs to produce 100 units because it has 40 leftover, so it lays off some unnecessary workers to minimize costs. Had maximum-productive-capacity been 100, the firm would have only been able to produce 100 units in the first period, leaving none leftover for the next period. Therefore, the firm would have been less likely to layoff any workers. This phenomenon may explain why unemployment varies more under higher maximum-productive capacities. The higher average unemployment explains the lower total sales - more unemployment means fewer households with disposable income and hence lower overall demand. One thing that is not entirely clear is why sales start to decrease after unemployment starts to increase. It could be that sales is more of a lagging effect than unemployment, but further testing is required to explain why this occurs.