Unemployment and Entrepreneurship in the US: An Analysis Using Vector Autoregression

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**Note: In this study, self-employment is a measure of entrepreneurship. Therefore, "Self-Employment" and "Entrepreneurship" are use interchangeably on this poster.*

"Entrepreneurship" is a complex and broad-reaching term, covering many different types of activity. Most papers measure entrepreneurship using some variant of the following: firm entry, firm churn, or self-employment. These measures capture different sub-sets of entrepreneurship, and the responses and effects of these variables differ significantly. I chose to use self-employment rate because of data availability and its history of use in the literature.

Results

The Effect of Unemployment on Entrepreneurship

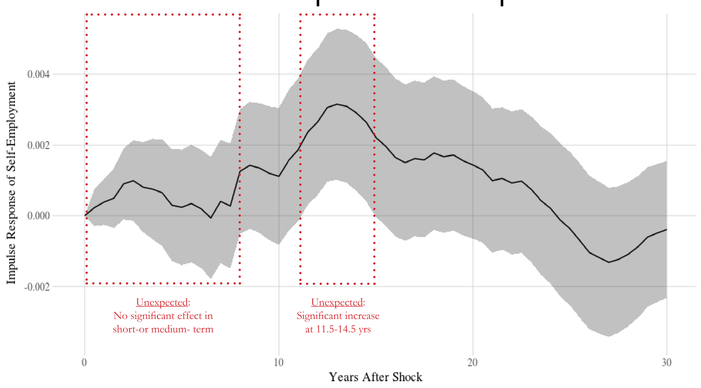

Fig. 1: Impulse response function showing the percent deviation in the unemployment rate in response to a 1% shock to the self-employment rate

The model did not find a significant short-term effect on self-employment in response to a shock to unemployment.

The literature suggests that there is a short- to medium- term positive effect. This is due to a push effect: Increased unemployment means, for those seeking jobs, that there is a reduced chance of finding regular employment. This increases the expected value of an entrepreneurship attempt relative to a job search.

The Effect of Entrepreneurship on Unemployment

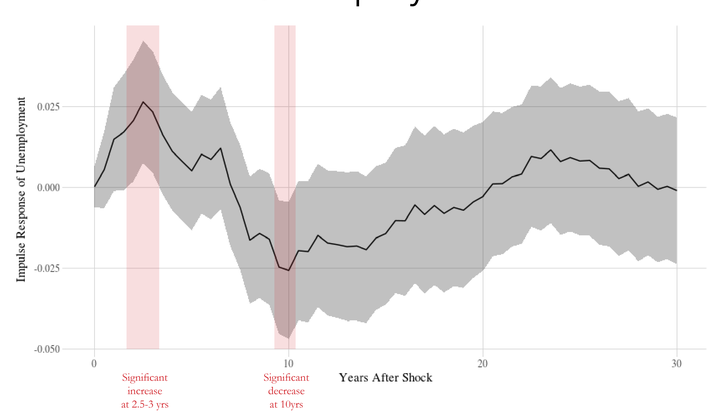

Fig. 2: Impulse response function showing the percent deviation in the self-employment rate in response to a 1% shock to the unemployment rate

The model found that, in response to a shock to self-employment, there is a significant short-term increase in unemployment and a significant medium- to long- term decrease.

This finding is consistent with the literature. The short-term increase is expected because creation of a new venture means that, ceteris paribus, there are more total jobs. The later decrease is due to two factors:

- Increased competition (which increases production in many markets), and
- Increased innovation, which may spur growth, thereby lowering unemployment towards structural levels.

Post hoc Analysis: Unemployment's Effects on Entrepreneurship

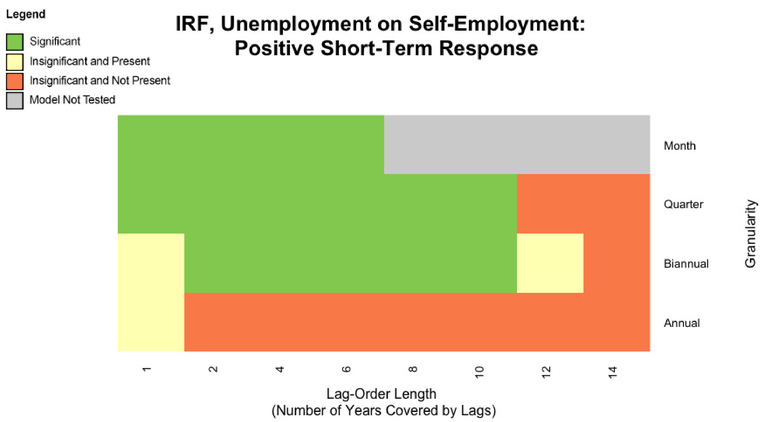

Fig. 3: Heatmap showing, for 28 different models, whether a significant short-term positive effect exists in an impulse response function shocking unemployment and observing self-employment. Each square represents the result for a single model.

While the final model did not capture a significant positive short-term effect on entrepreneurship when unemployment is shocked, post hoc analysis provides evidence for the existence of this effect. The heatmap in Fig. 3 shows one result from a series of models with different variations in granularity of the data and lag-order. I tested granularities of: monthly, quarterly, half-yearly, and annually. I organized lag-orders by the number of years they covered, regardless of how many actual lags were in the model; I tested lag-orders covering one year and every even number of years up to fourteen years. The majority of tested models predicted a significant positive short-term effect in an IRF that has the same parameters as Fig. 1. It appears that using a lag-order extending over more than ten years results in a model that is not sensitive to this effect. This is unsurprising, because increasing the number of variables in a model decreases its statistical sensitivity. Also unsurprisingly, models with annual data do not find evidence for this short-term and brief effect.

Abstract

I use a large dataset, VAR modeling techniques, and a detailed model selection procedure to investigate the relationship between unemployment and entrepreneurial activity in the US. I find that these variables are useful predictors of each other and that a shock to self-employment likely increases unemployment in the short-term and decreases it in the long-term. This has important implications for the use of entrepreneurial activity as a policy lever.

Vector Autoregression (VAR)

A vector autoregression is a two-equation model that can account for bidirectional causation in time-series data; VARs are also able to model simultaneous effects in one causal direction. One of the major challenges of investigating the relationship between entrepreneurial activity and unemployment is that there is bidirectional causation. Further, there is likely a simultaneous effect of entrepreneurship on unemployment. Because of these two factors, VARs are a useful model type for investigating this research question.

Data

The two variables used are unemployment rate and self-employment rate. Based on the results of the cointegration test described in Engle and Granger (1987), I treated the variables as cointegrated. Because they are cointegrated, they did not need to be stationarized. Both variables were logged for ease of interpretation.
The data used in this study is acquired from the Bureau of Labor Statistics and covers the U.S. from Jan. 1948 to Jun. 2016 (~68 years).

Final Model

The final model used half-yearly data, with 28 lags. Therefore, the lags cover fourteen years. It is likely that any within-period effect of unemployment on self-employment is negligible, so I have chosen to order self-employment before unemployment. In other words, the within-period effect of unemployment on self-employment is restricted to zero.

Contribution to Literature

There are several aspects of this paper that are unique and valuable: the dataset used spans an unusually long time range, the model type is especially suitable to this research question, and focusing on the US allows for policy recommendations tailored to the US economy. As far as I am aware, my data set is unique in its length and granularity, and has not been used in any major papers so far. The broad time range covered provides greater statistical sensitivity; it also means the results are more robust to the changing features of the US economy and therefore are more broadly generalizable across time.