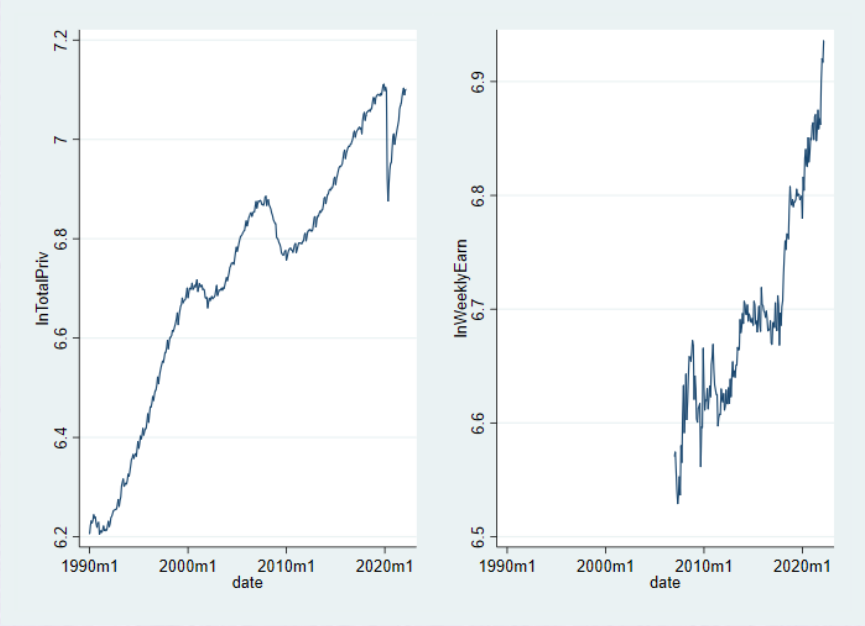
Time Series

Sydney Lieske

Introduction

- Orlando-Kissimmee-Sanford area (MSA)
- Total private employment
- Average weekly hours
- Average hourly earnings
- Average weekly earnings

TS line



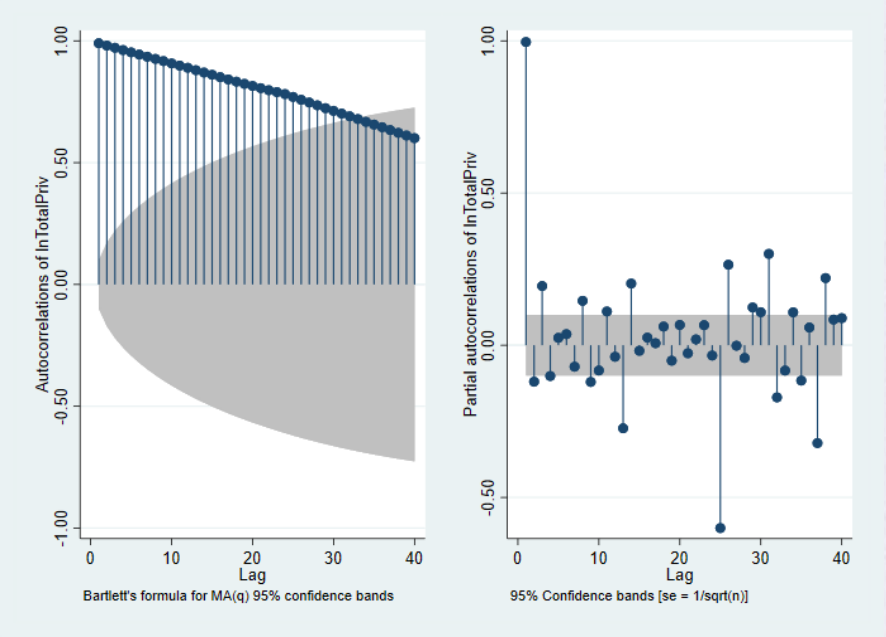
Log transform of total private employment **(left)**

- General upwards trend except in early 1990s, early mid 2000s, 2010~, and in 2020 where the data decreases

Log transform of average weekly earnings **(right)**

- Does not start until a bit before 2010.
- There is a decrease before 2010 before it increases and decreases again up until 2014~
- From there the data has an increase and stays somewhat balanced until 2020, where it has a major increase.

AC PAC of total private



The AC charts start high and decreases steadily. This suggests that in the data there is an autoregressive term. The PAC has quite an alternating pattern with positive and negative values that are not significant. It seems to have a pattern.

Vselect & RMSE

- Generated lags 1/12 for lnTotalPriv and lnWeeklyEarn
- The models with 2 – 6 predictors show similar performance
- Model 2 has the best AIC at -919.9073 while model 1 has the best BIC at -908.0097
- Model 6 has the best adjusted R-squared at .1155997
- Model 1 has the lowest RMSE at .01289857

Models	Preds	R2ADJ	C	AIC	AICC	BIC	RMSE
l(1,2)dlnTotalPriv	2	.0863858	-5.312001	-917.4171	-917.1747	**-908.0097**	**.01289857**
l(1,2,12)dlnTotalPriv	3	.1048409	-7.448541	**-919.9073**	**-919.5415**	-907.3641	.01385695
l(1,2,12)dlnTotalPriv l(12)dlnWeeklyEarn	4	.1078058	-6.888386	-919.4985	-918.9832	-903.8195	.0181307
l(1,2,12)dlnTotalPriv l(1,2)dlnWeeklyEarn	5	.1143199	-6.927468	-919.7777	-919.0864	-900.9629	.01821613
l(1,2,9,12)dlnTotalPriv l(1,2)dlnWeeklyEarn	6	**.1155997**	-6.065608	-919.0633	-918.1689	-897.1127	.01818075

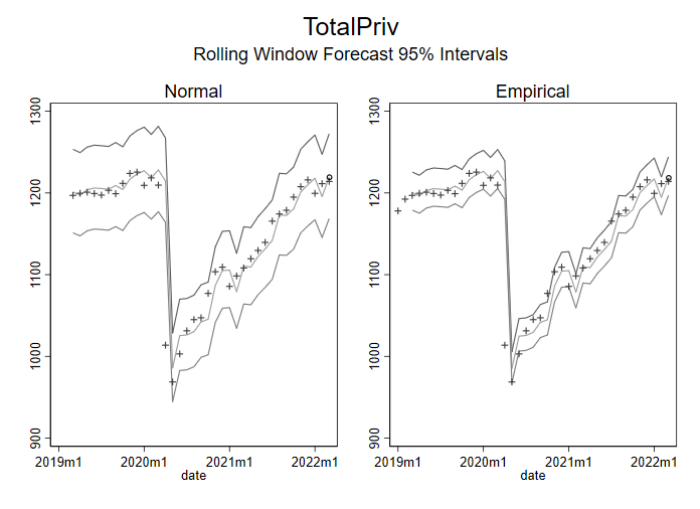
Rolling Windows

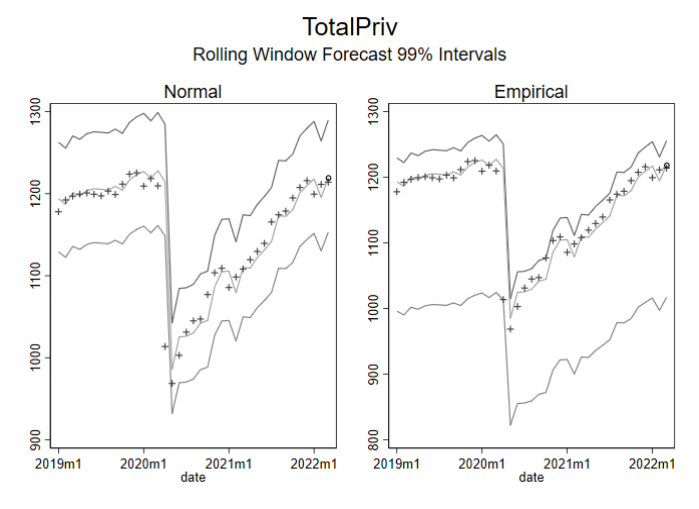
Now using rolling windows programs for each model, when looking at all models, model 1 has the best BIC and RMSE and less lags. In the table below is the respective model, window size, and RMSE for each. When run through with rolling windows, the optimal window size was 84 months (7 years) and it resulted in RMSE of 0.1755403.

Model	Window Size	RMSE
l(1,2)dlnTotalPriv	84	**.01755403**
l(1,2,12)dlnTotalPriv	84	. 02484131
l(1,2,12)dlnTotalPriv l(12)dlnWeeklyEarn	84	.02450599
l(1,2,12)dlnTotalPriv l(1,2)dlnWeeklyEarn	84	.02378657
l(1,2,9,12)dlnTotalPriv l(1,2)dlnWeeklyEarn	84	.02375954

Evaluation Charts

Actual (normal): 1219.515
Actual (empirical): 1218.71





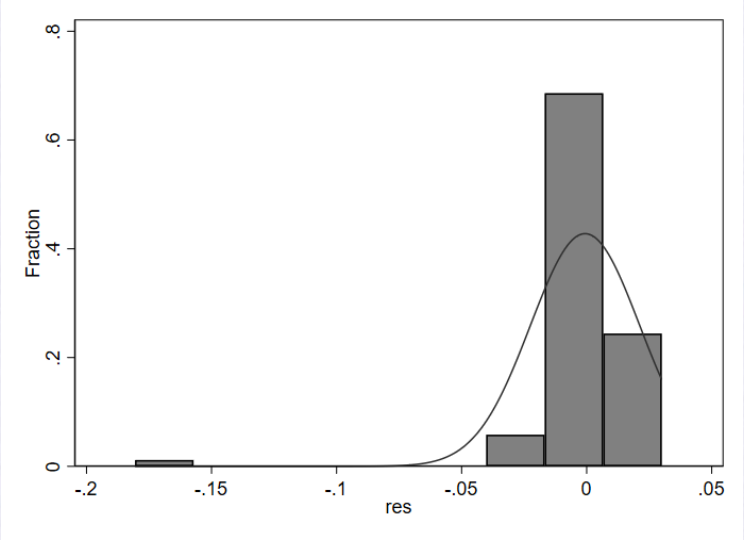
Upper bound (normal): 1272.511
Lower bound (normal): 1168.726

Upper bound (empirical): 1244.291
Lower bound (empirical): 1196.978

Upper bound (normal): 1289.75
Lower bound (normal): 1153.105

Upper bound (empirical): 1255.857
Lower bound (empirical): 1017.345

Histogram



Left skewed distribution with an outlier