Bayesian Analysis of the Effects of Colorado's Salary Transparency Law on Hiring

Will Johnson (hmd9tv) and Kaia Lindberg (pkx2ec)
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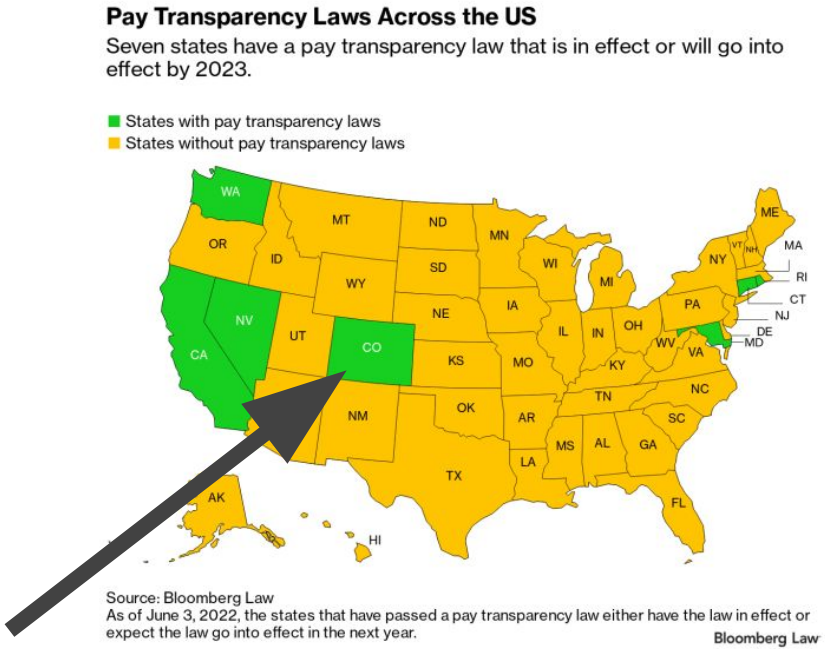
Salary Transparency Laws

Several states have begun requiring employers to disclose salary information as part of efforts to reduce the gender and race wage gap

Colorado is at the cutting edge of these states, requiring all job postings to include salary ranges as of January 2021



Key Question:

What is the impact of salary transparency on hiring trends in Colorado?

Data

BLS's Job Openings and Labor Turnover Survey

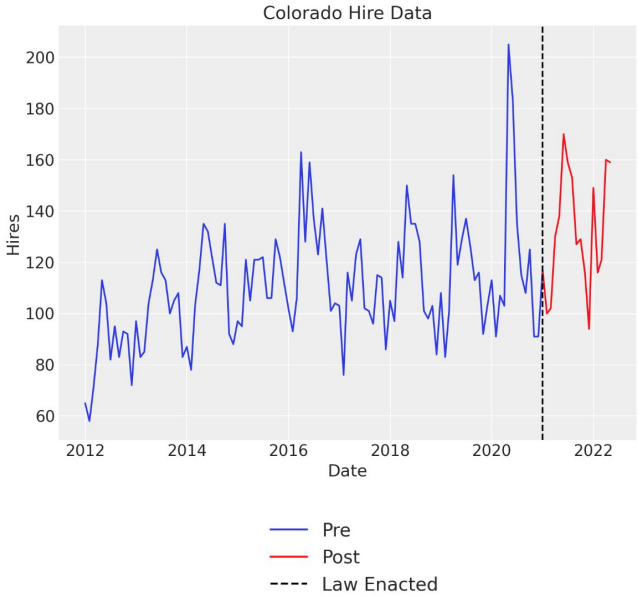
Hire data from January 2012 through May 2022

Data preparation to normalize data and convert datetime to numeric representation

Data for Colorado, but also obtained data from Washington as a control

Split data into pre and post CO law (January 2021)

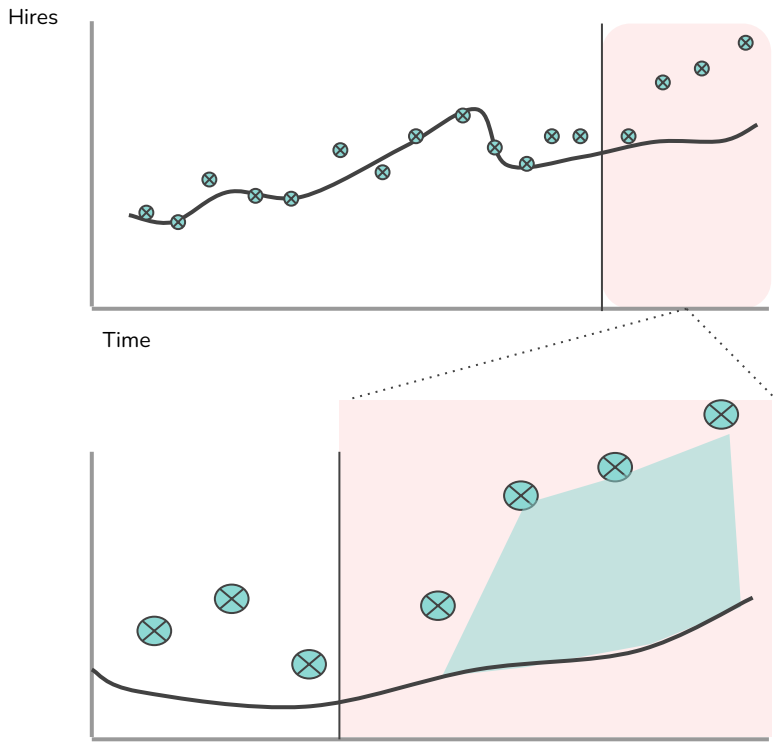
BLS
BUREAU OF LABOR STATISTICS
U.S. DEPARTMENT OF LABOR



Methodology

Time Series Counterfactual

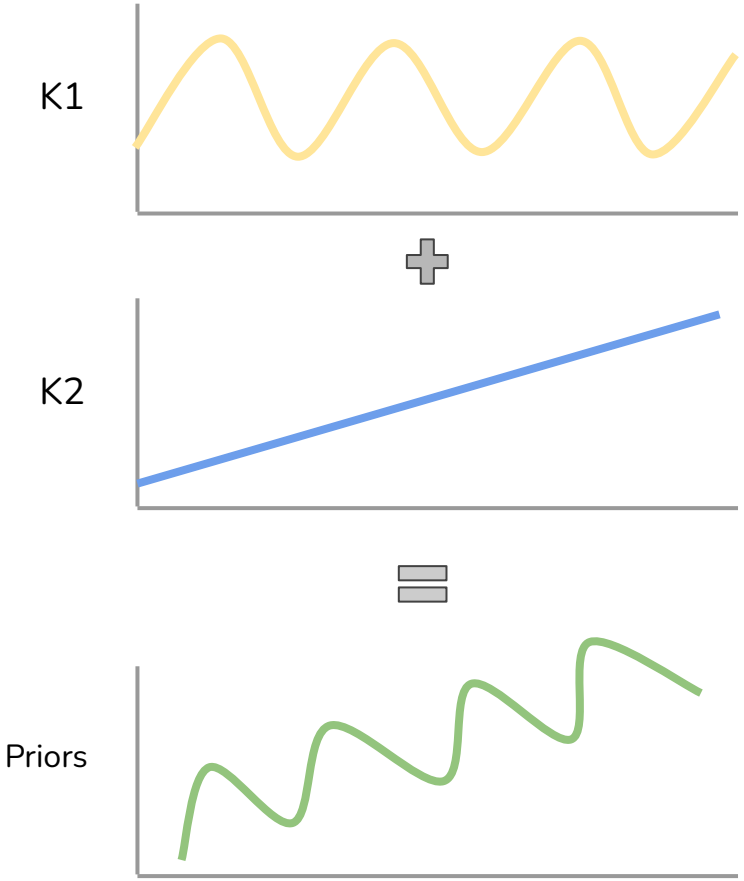
- We don’t know what would have happened
- Use a time series predictive model to estimate what might have happened
- Measure the difference between our prediction and reality



Methodology

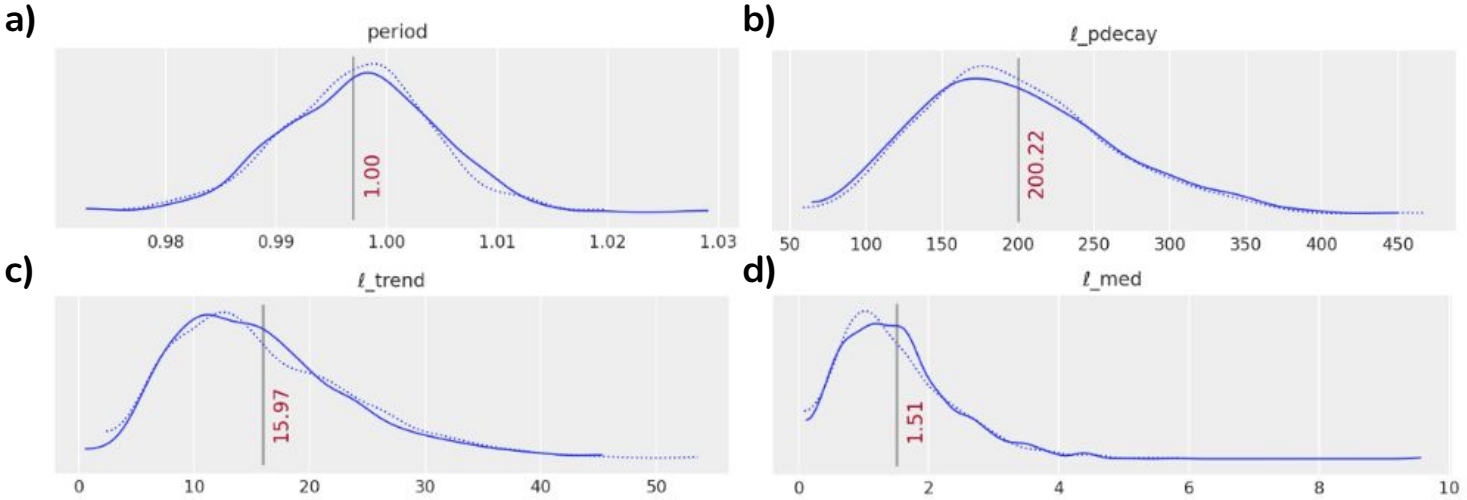
Gaussian Processes

- Aims to predict a function $f(x)$ rather than parameters
- GP: Adding Kernel functions as priors with industry knowledge
- Training Data limits our possible outputs and and we pick the function with hughes P(f(x) | x, D)
- Posteriors are for parameters for our kernel functions



*Just a selection of 4, see the appendix for all parameters

Results - Posterior Distributions*

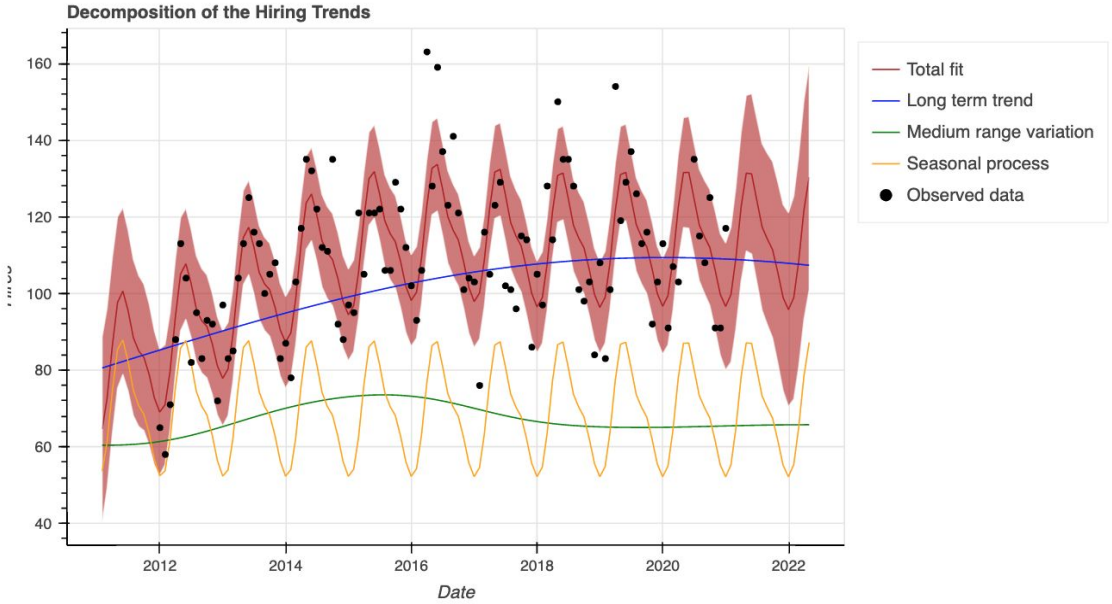


a) **Period:** time period for seasonality component: 1 year → annual hiring cycle
b) **Period decay:** posterior mean ~200 years → don't expect cyclicality of hiring to decay anytime soon
c) **Long term trend:** length scale between 10 and 30 years → longer term trends (e.g. business cycle, longer term macroeconomic trends)
d) **Medium trend:** length scale between .5 and 3 → short to medium term fluctuations (e.g. recession, recovery, pandemic related changes)

Results - Decomposition of Trends

Model allows us to account for and explain different components of hiring trends, including long term trends, seasonality, and medium term variation

Fits observed data fairly well prior to CO's salary transparency law

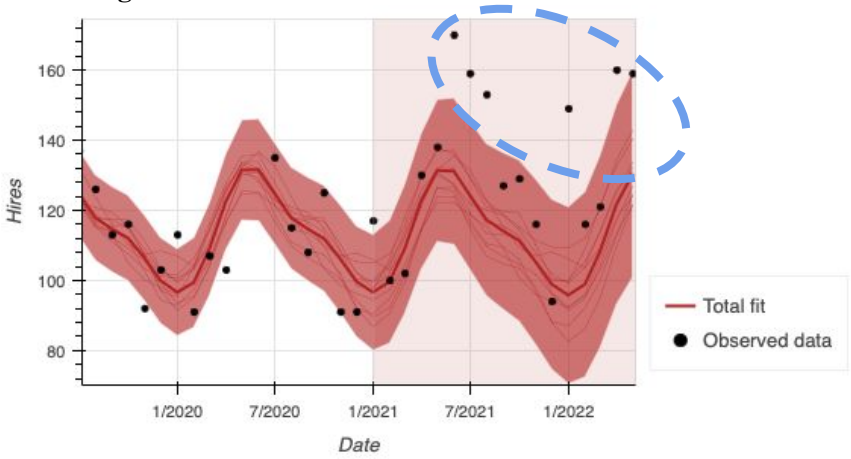


Results

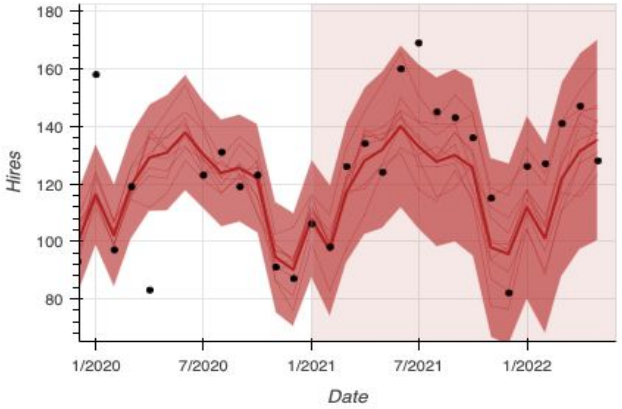
Hirings Increased after law

- Our model estimated a modest increase consistent with trend
- The actual data points were higher
- CO RMSE: 12k pre, 25k post
- Washington State's model also increased, but not as much.
    - WA RMSE: 12k pre, 16k post

Figure 5: Colorado Post-Law



WA



Conclusion and Next Steps

Evidence not strong enough to confirm growth

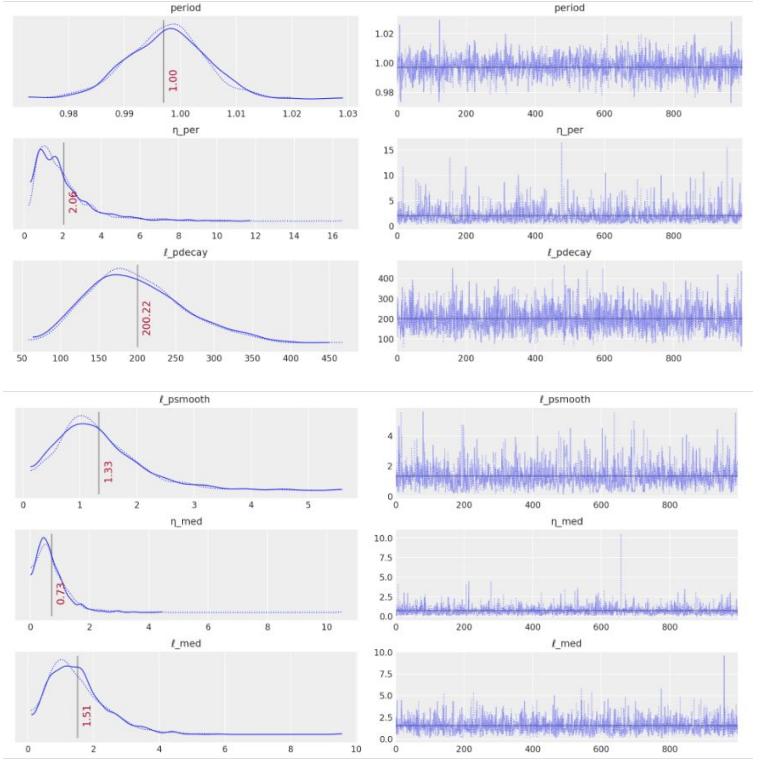
- Observed Increases could be due to unknown confounders
- But there is some evidence that hires grew.

Next Steps

- Look at the effect once Washington’s law goes into effect
- Partner with job market sites to run controlled experiments

End

Appendix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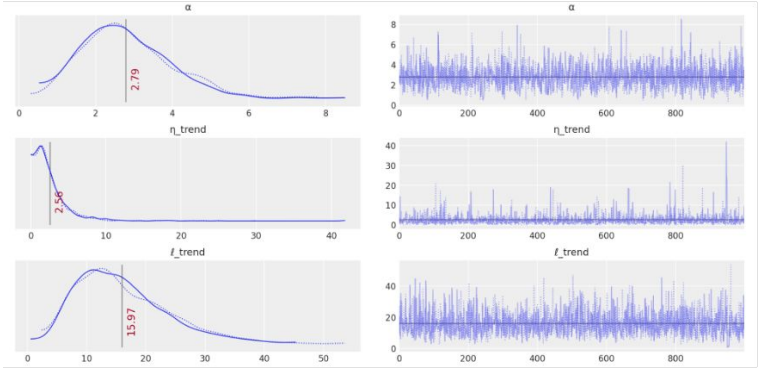
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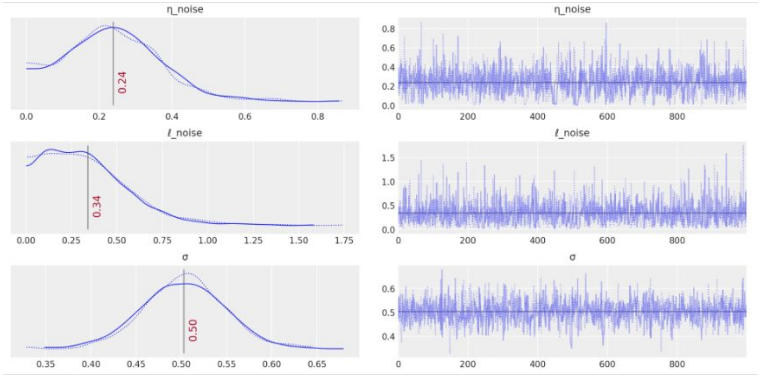
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σ

References

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[6] https://docs.pymc.io/en/v3/pymc-examples/examples/gaussian_processes/GP-MaunaLoa.html