Forecasting short term trucking rates

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Motivation / Background

Transportation

- **$1.5 trillion** spent in 2015 on logistics and transportation
- **8%** of US GDP
- Up to **50%** of total logistics costs are transportation cost
- Emphasize on lean production and inventory minimization

Trucking

- Lifeblood of the US economy
- Earned **$726.4 billion** revenue in 2015
- Represents **81.5%** of US freight transportation revenue

Forecasting

- Transportation budget planning
- Economics order quantity
- Inventory replenishment
- Facility location

Key Question / Hypothesis

The objective of this project is to develop a forecasting model that predicts both contract and spot rates for dry van on individual lanes for the next seven days on a rolling-window basis.

Relevant Literature

> Approximated rate functions

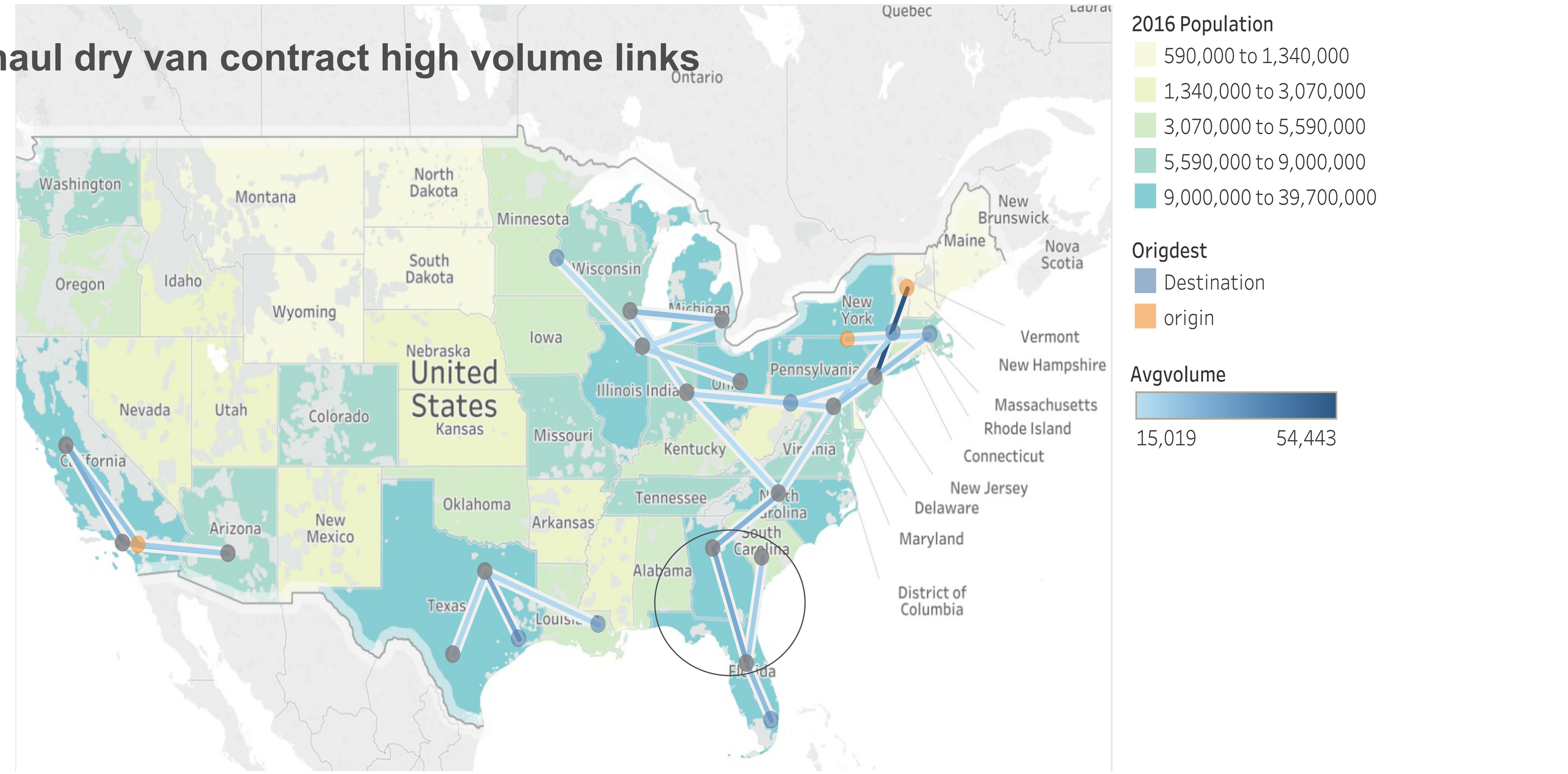
– Freight rate defined as a function of distance and weight. By using such function, a simple market rate for a lane can be calculated for a given origin and destination (Swenseth and Godfrey, 1996)

> Actual rate forecasting

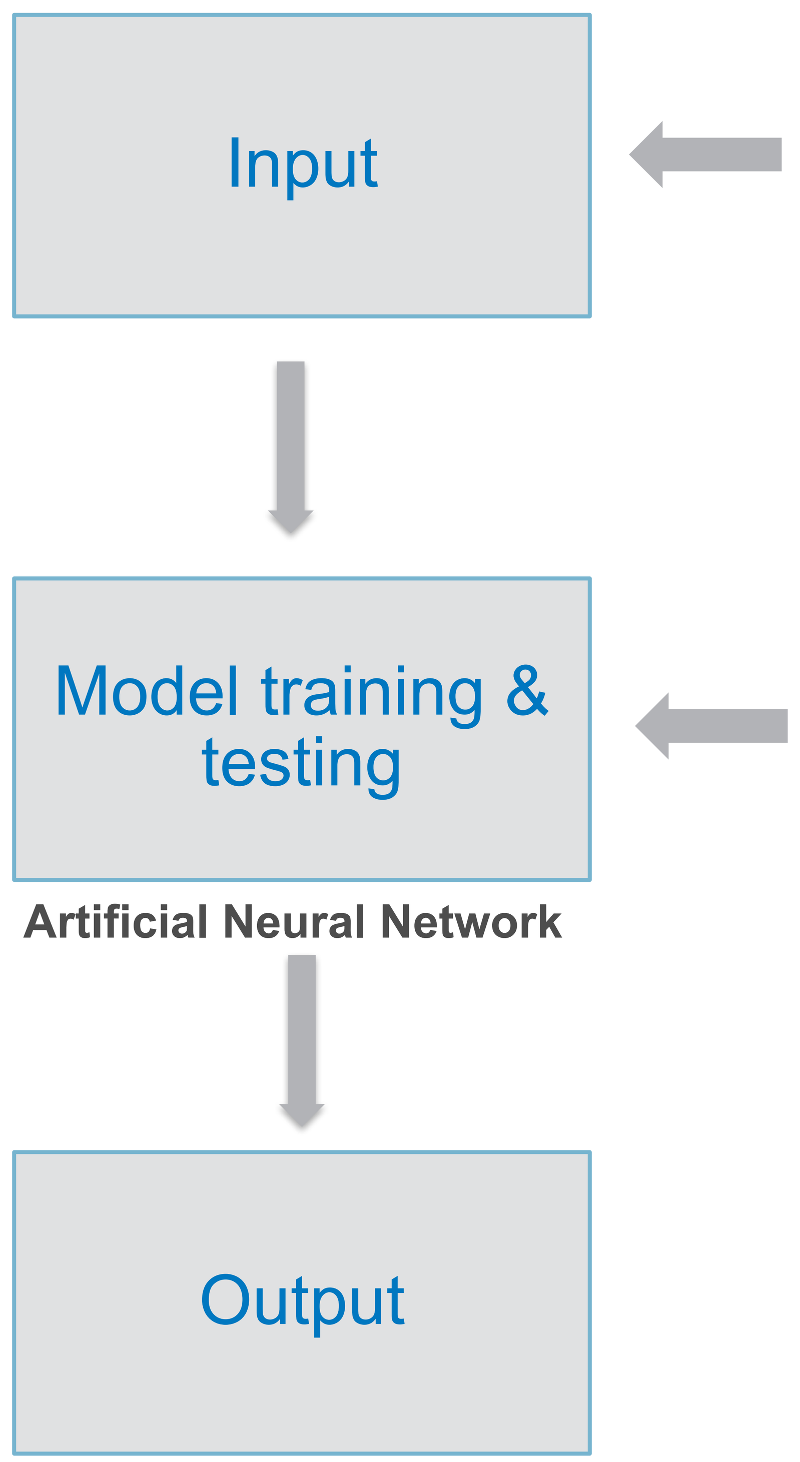
– Budak et al. (2017) compared artificial neural network (ANN) and quantile regression methods in predicting TL spot market price.

– Özkaya et al. (2010) used multiple regressions to model the US Less-than-Truckload (LTL) market rate. Considered both tangible and intangible market (not captured in the dataset) factors.

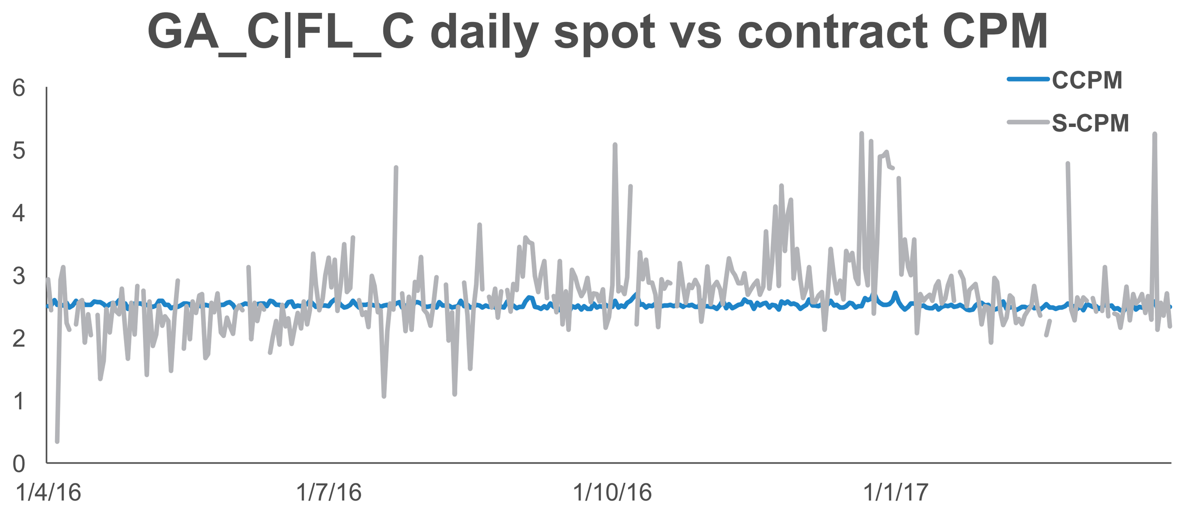
Long haul dry van contract high volume links

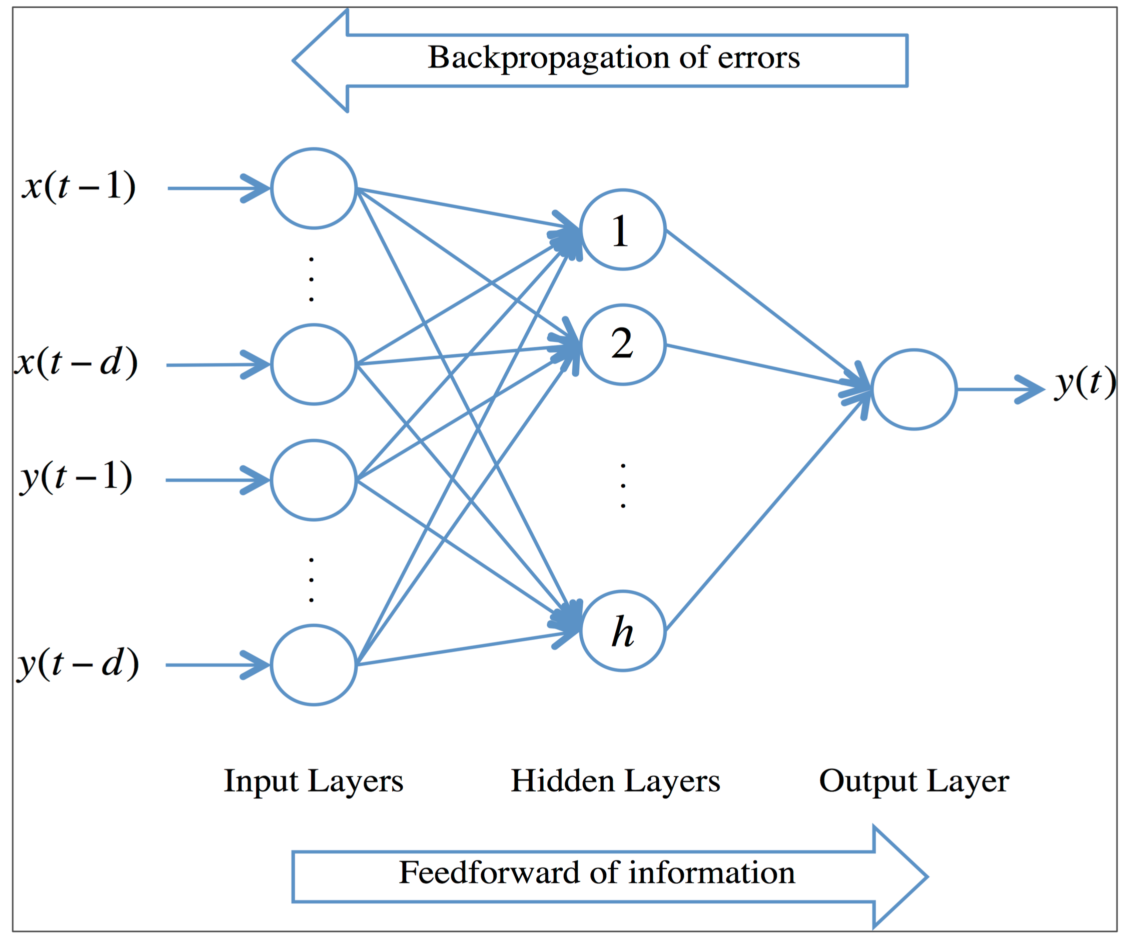


Methodology



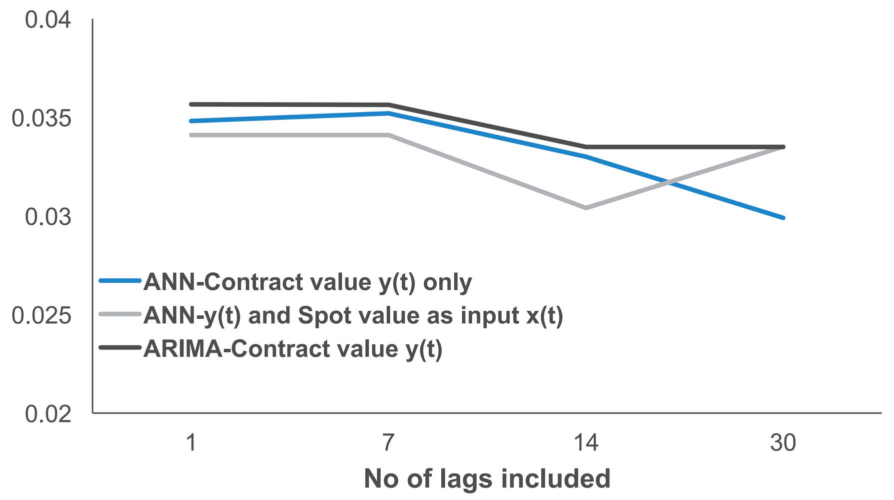
GA_C|FL_C daily spot vs contract CPM



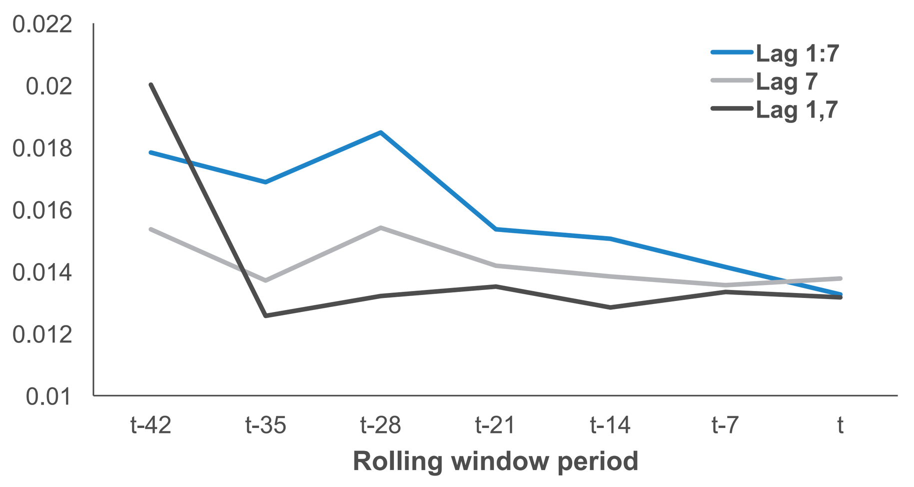


Initial Results

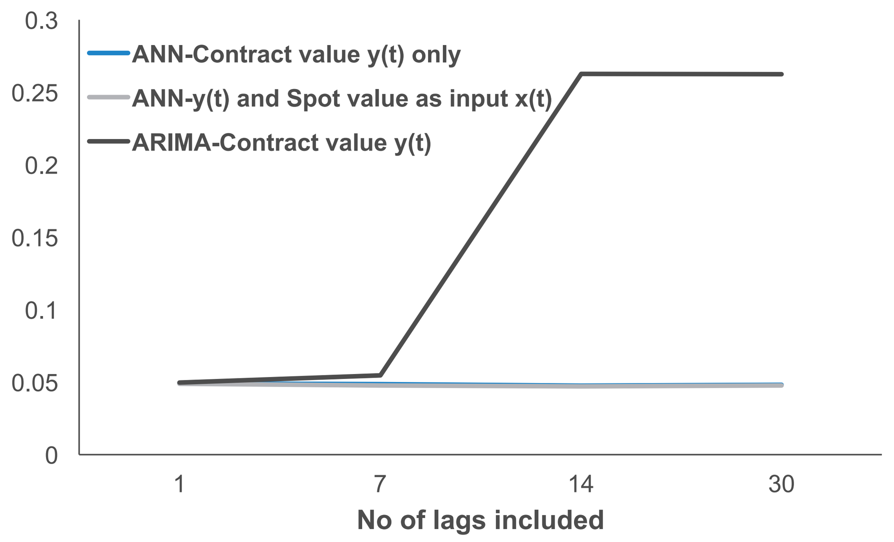
RMSE for in-sample data



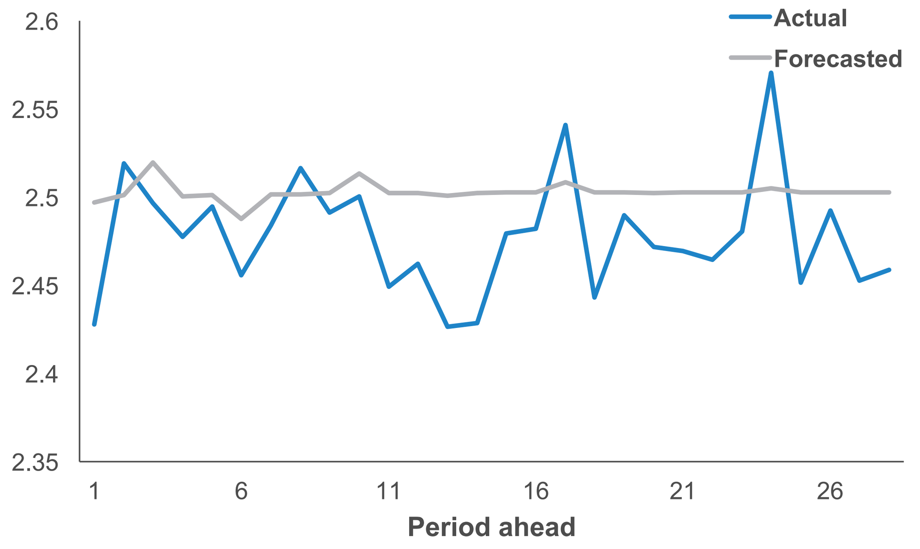
MAPE over time
(weekly update four weeks forecast)



RMSE for out-of-sample test



Actual vs forecasted rate



Expected Contribution

> Improve short-term forecasting accuracy of TL rate;

> Identify the spot and contract rate relationship and how past values of spot can be used to predict contract rate;

> Identify effects of market variables, such as weather condition on TL rate;

> Aid decision-making processes for truck carriers with respect to determining future cash flows.

> provides useful guidance for third-party providers and shippers regarding potential price fluctuations and resulting risks.

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