Project VIX

Predicting market volatility

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1/25/19

Problem Statement - Can we predict market volatility?

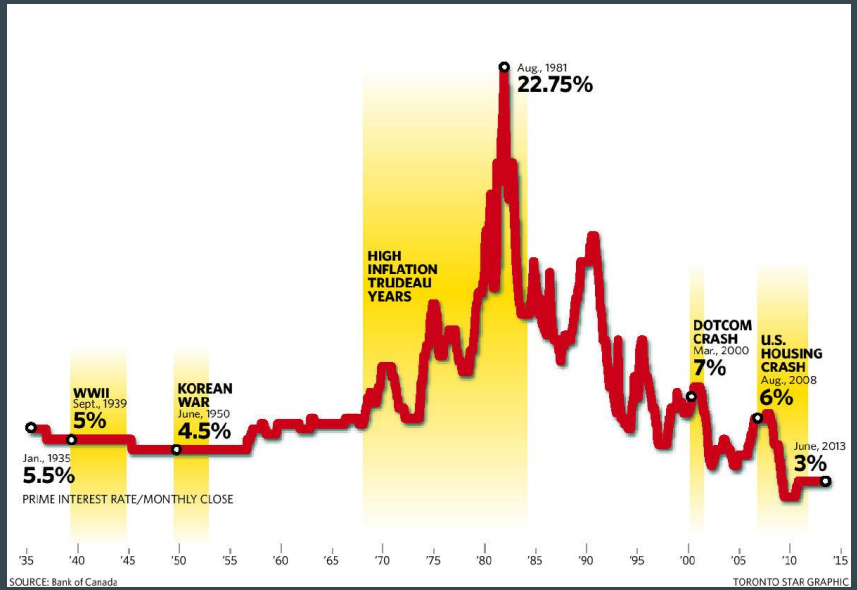
Part 1: Time series analysis

- Data isn't independent
- ARIMA & Facebook Prophet models

Part 2: Augment with exogenous data

- SARIMAX model
- Federal Prime Rate data

Prime Rate theorized to rise before market downturn



Data Sources

Data Available

- **Scraped** Federal Prime Rate history
- **Downloaded** Historical Vix data

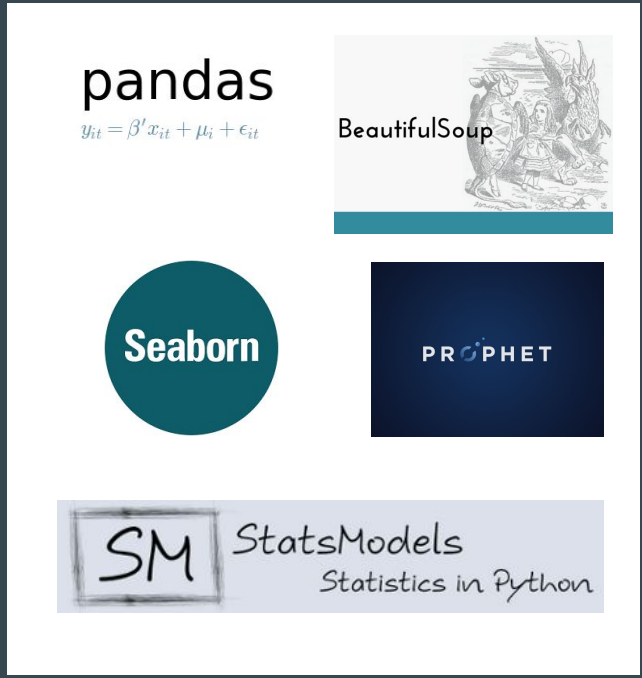
Time Frame

- **Federal Prime:** 1920s-Today
- **Vix:** 1990s-Today

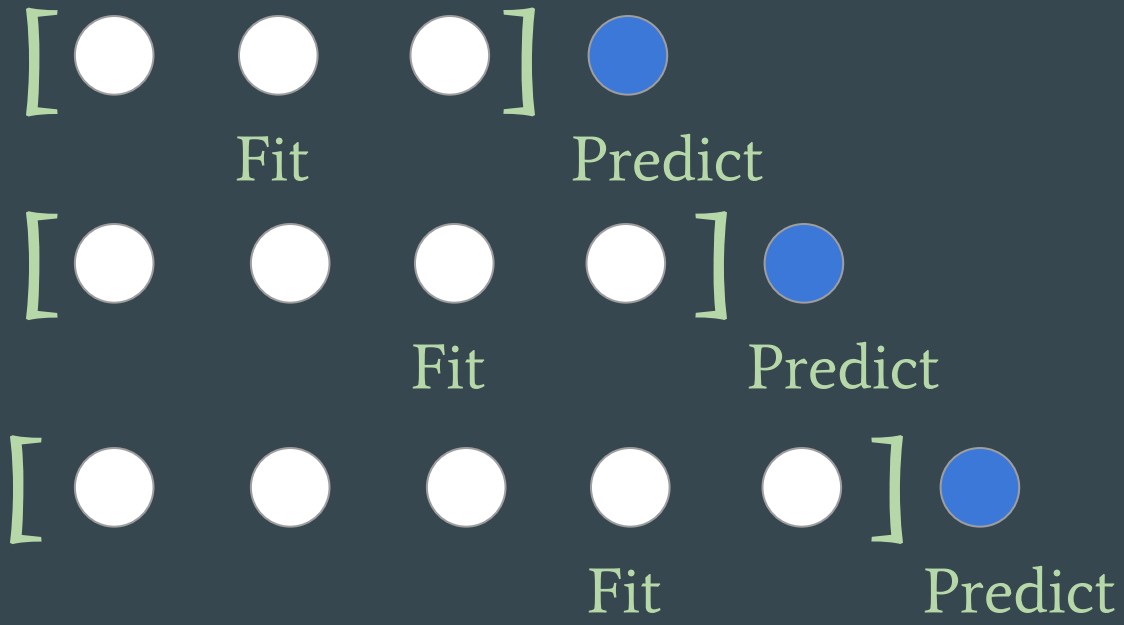
Process & Tools

1) Cleaned, normalized & split data
2) Optimized models in three ways:
- Partial & autocorrelation analysis
- Grid search algorithm for parameters
- Time window refitting

Tools Used



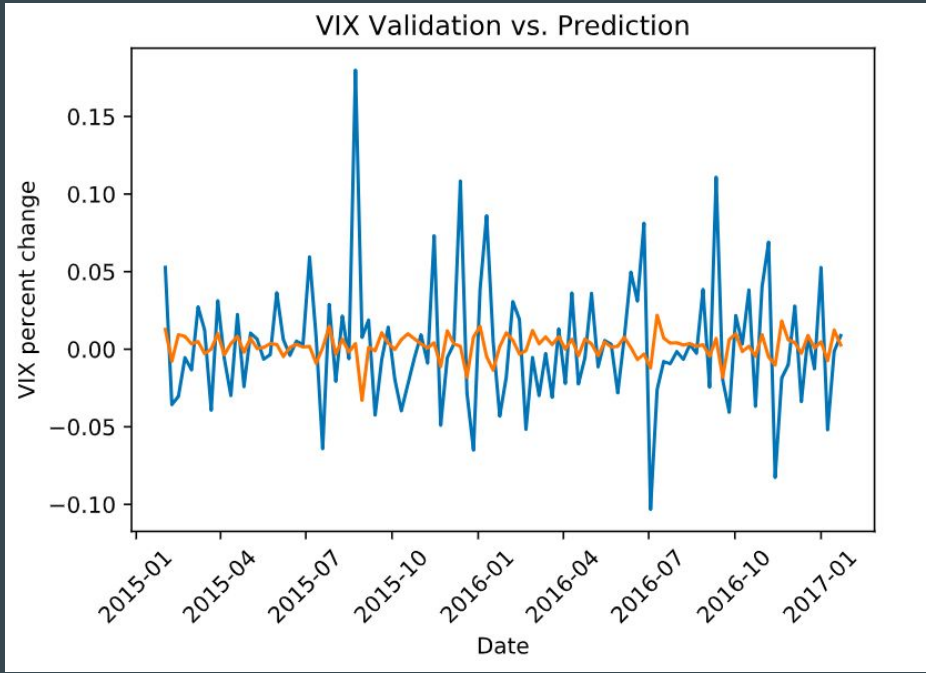
Time window refitting - Each dot is 1 data point



Model optimization only made minor difference

	RMSE	% Change
AR1	0.04217	-
ARMA(8,2)	0.04197	0.47
ARMA(8,2) Window	**0.04117**	**2.37**
SARIMAX	.04217	-0.05
Facebook Prophet	0.04257	-0.95

*Test data ARMA(8,2) RMSE is .03794



Analysis conclusions

- Time series analysis challenging on highly analyzed market indices
- Federal prime rates aren’t fast economic indicators

Future work: Try different exogenous data or other sources

- Use computers with larger processing power
- Include other economic data
- Try non-linear prediction models

Thanks!

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Appendix

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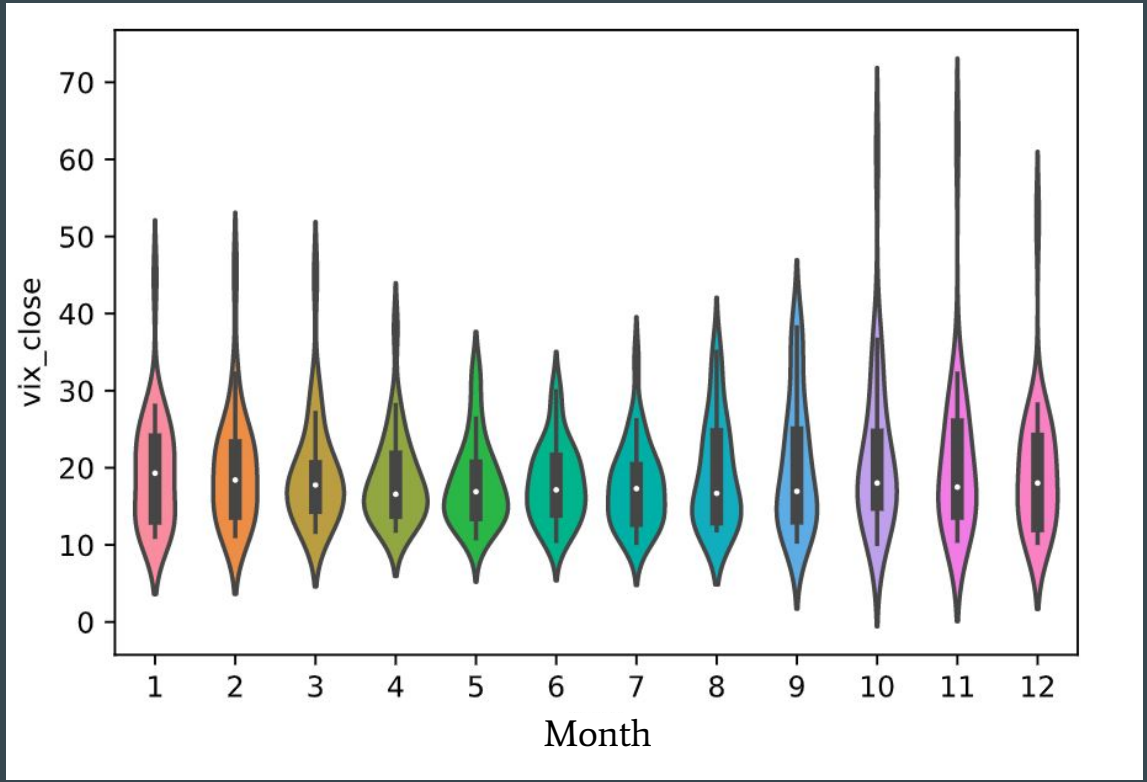
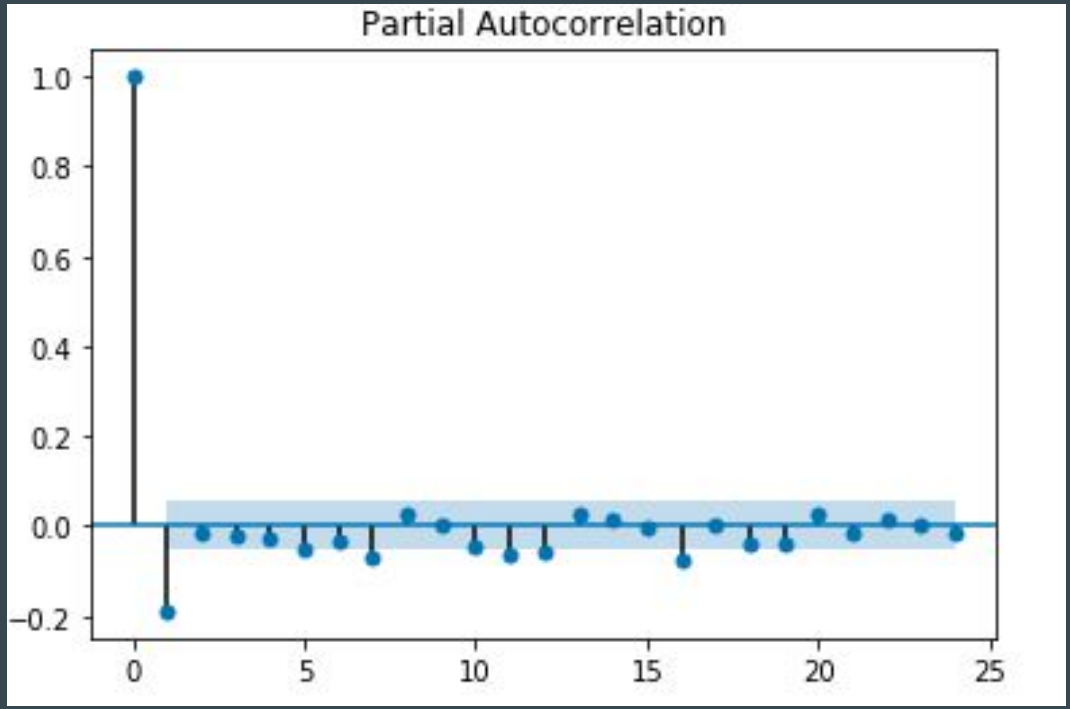
Data Seasonality



Weekly Vix Partial Autocorrelation



Weekly Vix Partial Autocorrelation