Anticipating Philippine Trade Flows: Data-Driven Forecasting for Timely Policy Action

using local and global forecasting models

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THE PROBLEM

PH imports and exports (values in Billion USD) are key drivers of Gross Domestic Product (GDP) However, because of **limited trade data, supply chain network effects, and a two-month lag in official statistics**, accurate and timely forecasting has been a. great challenge for policymakers.

OBJECTIVE

In this study, we aim to develop various forecasting models of Philippine Import and Export activity to examine whether global forecasting models, with cross-learning, can provide better forecast performance compared to local/single tasks models

MODEL DEVELOPMENT STRATEGY

1

NB1 : Exploring the Time Series

- Train/test Split [2024-01 to 2025-03]
- Data: Import and Export
- Exogenous Factor: Foreign Exchange

2

NB2 : Single Task Learning

STL
Models: ETS (additive and multiplicative), Naive, RWD, ARIMA, Random Forest, Gradient Boosting, and Long-Short-Term Memory Neural Network.

3

NB3 : Multi Task Learning

MTL
- Tried different sets of countries for Cross-learning
- Models: DeepAR, TFT, PatchTST
- Feature Engineering: Fourier Terms

Main Evaluation Metrics MAE, Prediction Intervals

T. Kristinsson (2021)
Networks of order in East Asia: Beyond hegemonic theories of the Liberal International Order

2017 Trade Network

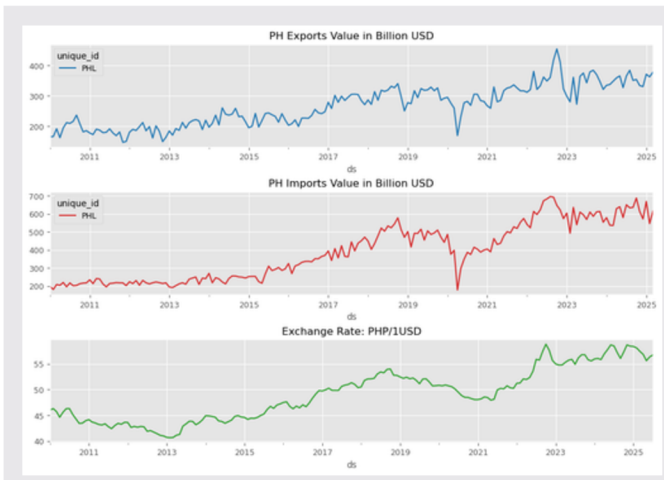
The graph shows linkages of Philippine trade partners suggesting that import/export activity of the Philippine may also be affected by the activity of our trade partners.

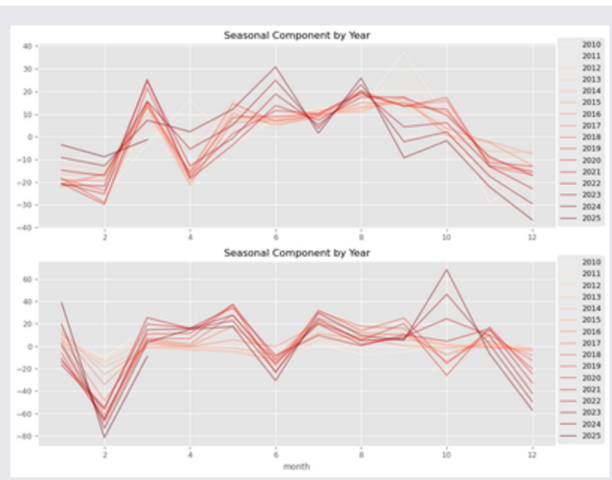
Recent PSA reports show the share to the value of imported and exported goods across different trading partners.

TOP TRADE PARTNERS

p - preliminary
Note: Details may not add up to total when computed manually due to rounding.
Source: Philippine Statistics Authority

NB1: EXPLORING THE TIME SERIES





Data was sourced from S&P Global (Value of Import and Exports in Billion USD) and BSP (FX rates) across several countries.

Monthly PH import, export, and FX series covers period January 2010 to March 2025 (N_obs = 168 months).

Key observations

- Trend. PH series are strongly dominated by an upward trend (strength of trend close to 1.0).
- Residuals. Trough and peaks in PH import and export coincided with economic events, e.g., Global economic slowdown due to COVI-19 pandemic (in 2020) and resurgence of demand (in late 2022).
- Seasonality. Some seasonality in export activity correlates to harvest season of some exported crops (in the first quarter).
- Value of exported goods are driven by semiconductors and manufactured products which show a slowdown of production during holiday season (in November and December)

NB2: SINGLE TASK LEARNING

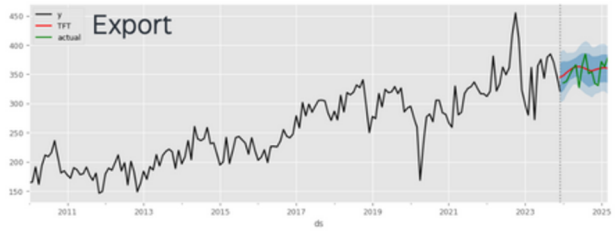
	Best model	MAE	MAPE	MASE	RMSE	RMSSE
PH_export	ETS_multiplicative	20.34	5.83	0.70	25.03	0.64
PH_import	ETS_additive	38.87	6.12	0.63	50.0	0.60

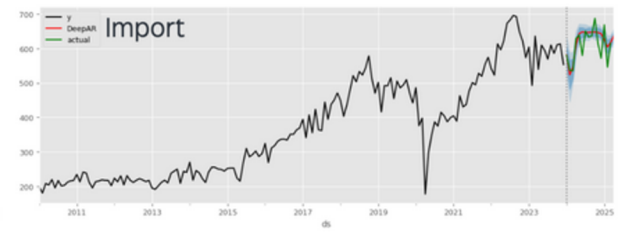
For PH export, Exponential Trend Smoothing (ETS_multiplicative) was the best among statistical and ML models for the single-task learning.

For PH imports, ETS_additive also showed the minimal forecast error.

We can also observe that both models exhibit high forecast uncertainty (wider prediction interval).

NB3: MULTI TASK LEARNING





	Best model	MAE	MAPE	MASE	RMSE	RMSSE
Top 4 Exports Only with Forex	TFT	13.03	3.76	0.45	16.87	0.43
Top 4 Imports Only with Fourier Terms	DeepAR	26.11	4.37	0.43	35.29	0.42

For PH export, Time Fusion Transformers (TFT) performed the best with inputs/tasks of predicting the export activity of top export partners (Hongkong, Japan, China, Singapore).

FoFor PH imports, DeepAR was the best model with inputs/tasks combined with trade partners.

LIMITATIONS

1. Additional information on Import/ Export from other countries may be unavailable. Further, this analysis cannot openly be done as the data required is subscription-based
2. There could be omitted variables in the model as suggested by the bias in the forecast residuals.
3. Models may benefit hyperparameter tuning but requires higher computational cost

NEXT STEPS

1. Examine further the features and include informative indicators such as uncertainty indices to improve prediction intervals.
2. Include interpretability and feature importance

CONCLUSION

MTL shows superior performance for forecasting Philippines exports and imports activity with up to 36% improvement in MAE against STL models.

Data from other countries help regularize the model by supplementing it with more information enabling a production of a single global model for trade for dfferent countries

Central Banks and statistical agencies may consider Multi-task/Global forecasting models as part of their forecasting tool to derive