How Can Dynamic Pricing Models be Successfully Implemented into Digital Marketplaces to Benefit SMEs in Kazakhstan?

RESEARCH PRESENTATION

Safiyakhon Zulfikarova
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This study aims to develop a
dynamic pricing model fitted for
Kazakhstani market and SMEs with
a macroeconomic focus.

Safiyakhon Zulfikarova @ STEMulate
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Dynamic Pricing Model

Demand · Inflation · WPI · CPI

Introduction to Dynamic Pricing

- The rise of digital marketplaces has created new challenges in price-setting for SMEs in Kazakhstan.
- Dynamic pricing offers a flexible approach to adjust prices based on market conditions and economic climate.
- This strategy is crucial for SMEs in emerging markets where economic instability impacts pricing.
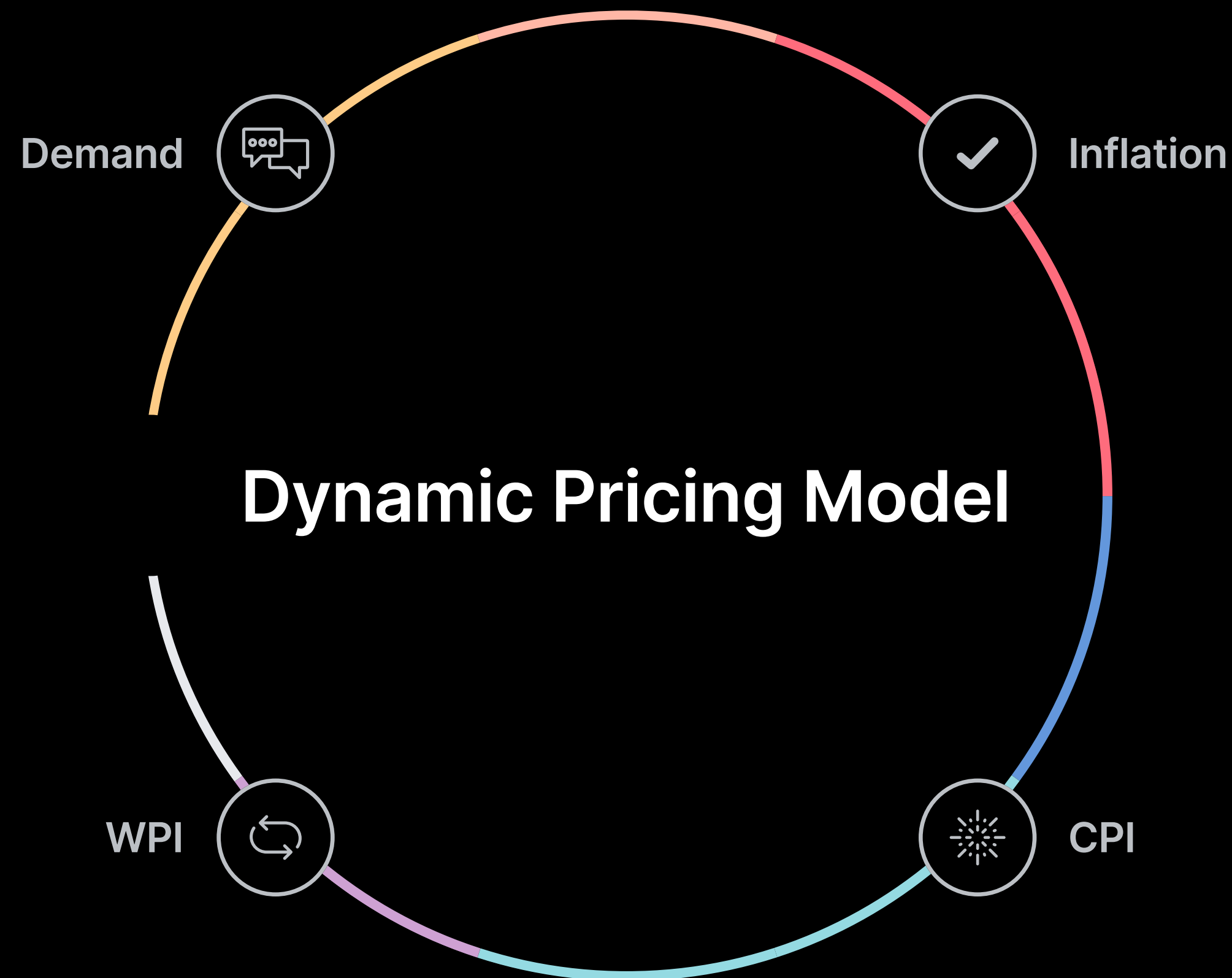
The Problem
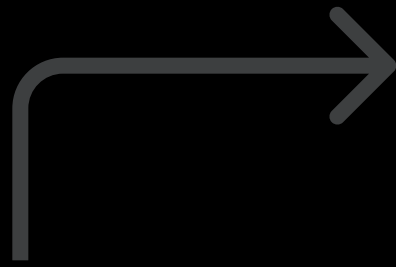
1

Economic Instability

Kazakhstani SMEs face difficulties in adapting to digital commerce due to economic volatility

2

No Tailoring

Current pricing models are not optimized for the unique economic factors in Kazakhstan
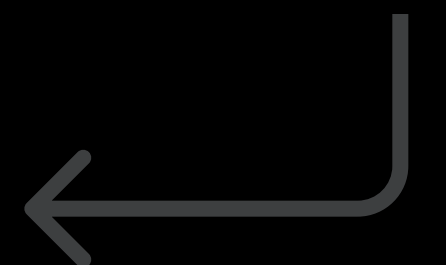
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Lack of Optimisation

SMEs have limited ability to digitalise and optimise their pricing strategies

4

Solution

There is a need for a dynamic pricing model that integrates macroeconomic indicators specific to Kazakhstan.

Literature Review

Regional Context

Many studies highlight the productiveness and relevance of dynamic pricing models, especially in E-commerce. The articles explain the importance of the models in maximising profit and aiding SMEs.

Research indicates the importance of customer demand, cultural norms and, for emerging markets specifically, economic indicators on the pricing decisions.

In Kazakhstan, the biggest factors affecting SME success were found to be export and import rates, government support and inflation.

There was a gap in literature on the implementation and development of dynamic pricing models for E-commerce tailored for Kazakhstani economy.

Methodology

ARIMA Model ●

The study employed the ARIMA model to forecast economic data. The model was chosen for its flexibility and computational simplicity, since it is well tailored for non-stationary economic data.

Data ●

Historical data from Kazakhstan's National Bureau of Statistics and National Bank was analysed. The datasets included CPI, WPI, exchange rates and predicted inflation rates. The pre-forecasted data was used to ensure the ARIMA forecasts' reliability.

Pricing Model ●

The pricing model was developed based on the overall trends from forecasted and historical data, accounting for flexibility in certain variables. The model was later tested on the macroeconomic data to review its robustness.

The Dynamic Pricing Model

The model integrates inflation and exchange rates which both majorly affect SMEs' pricing. Furthermore, it allows for extra flexibility when it comes to demand and WPI, since both are to be unstable due to swift nature of digital marketplaces and varying exchange rates. It is designed to fit the fluctuating and growing economic environment of Kazakhstan.

The data analysis results along with pre-made forecasts indicated that there were be both short and long-term increase in prices and stable increasing rates of inflation. The WPI values were predicted to experience fluctuating and exchange rate forecasts showcased a stable yet step rise in the next three years.

CPI value in percentage to previous month v Year

WPI value in percentage v Year

KZT-USD and KZT-CNY

THE MODEL

$$P_t = P_{t-1} \times (1 + \alpha_t \times Infl_t) :$$
$$\times (1 + \beta \times \frac{ER_t - ER_{t-1}}{ER_{t-1}})$$
$$\times (1 + \gamma \times \frac{D_t - D_{t-1}}{D_{t-1}})$$

Where α_t is $\alpha_1 \times (1 + \delta \times \frac{WPI_t - WPI_{t-1}}{WPI_{t-1}})$
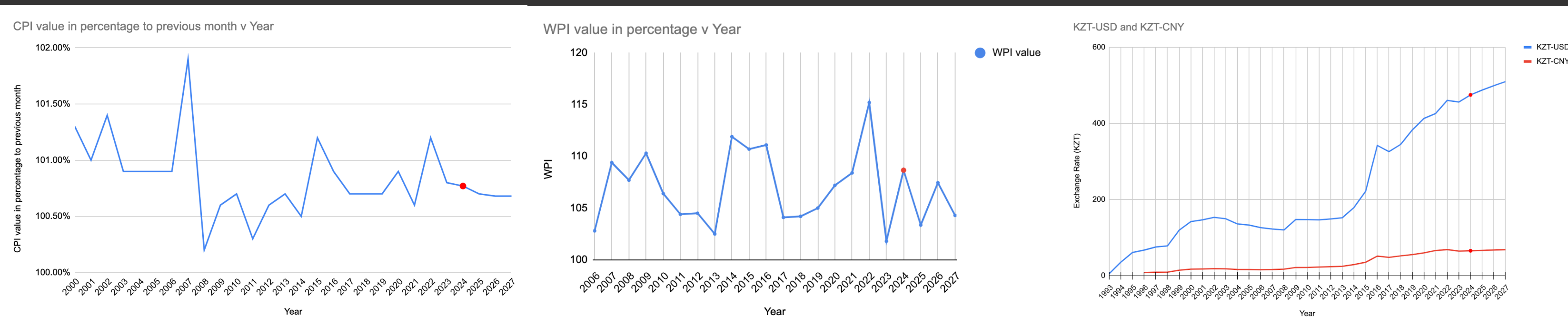
$P_t = P_{t-1} \times (1 + \alpha_t \times Infl_t) \times (1 + \beta \times \frac{ER_t - ER_{t-1}}{ER_{t-1}}) \times (1 + \gamma \times \frac{D_t - D_{t-1}}{D_{t-1}})$

Where P_t is the price of the product at a time t, P_{t-1} is the price of the product at the previous time step, $Infl_t$ is the inflation rate at a time t, β is sensitivity to exchange rate, ER_t is the exchange rate at a time t, γ is sensitivity to demand, D_t is demand for the product at a time t and

α_t is $\alpha_1 \times (1 + \delta \times \frac{WPI_t - WPI_{t-1}}{WPI_{t-1}})$

Where α_1 is base sensitivity to inflation, δ is the scaling factor and WPI_t is Wholesale Price Index is at the time t.

Limitations

In the 2 months of working towards this project, there were many obstacles. Unfortunately, due to lack of availability of data, the model was not tested on the grounds of consumer behaviour. Another problem included lack of historical pricing data which stopped the model from being tested by MAE and RMSE metrics.

01 Lack of consumer behaviour data

02 Lack of historical pricing data

03 Overall under-researched area

TBD

In the future, however, the project could be expanded by gathering first hand data from SMEs operating on digital marketplaces in Kazakhstan. The model itself could be tested or refined. Other forecasting models such as machine learning could be used in data analysis.

04 Gathering more data

05 Testing and refining the model

06 Using other data analysis software

Conclusion

Dynamic pricing offers a viable solution for SMEs and digital marketplaces in Kazakhstan to navigate economic challenges.

The developed model can help SMEs enhance their pricing strategies with limited resources.

In the future, the model can be refined and further developed and expanded for larger context.

Thank you!

Safiyakhon Zulfikarova
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