

# Revenue optimization

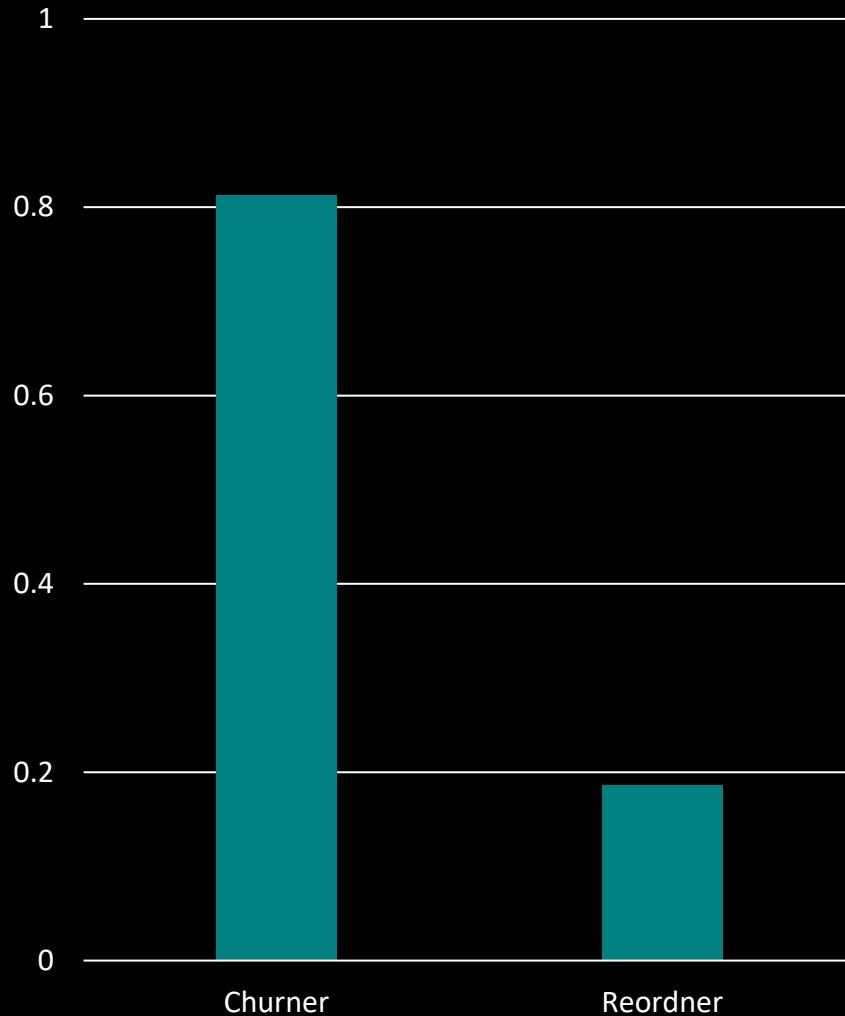
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FINAL PRESENTATION

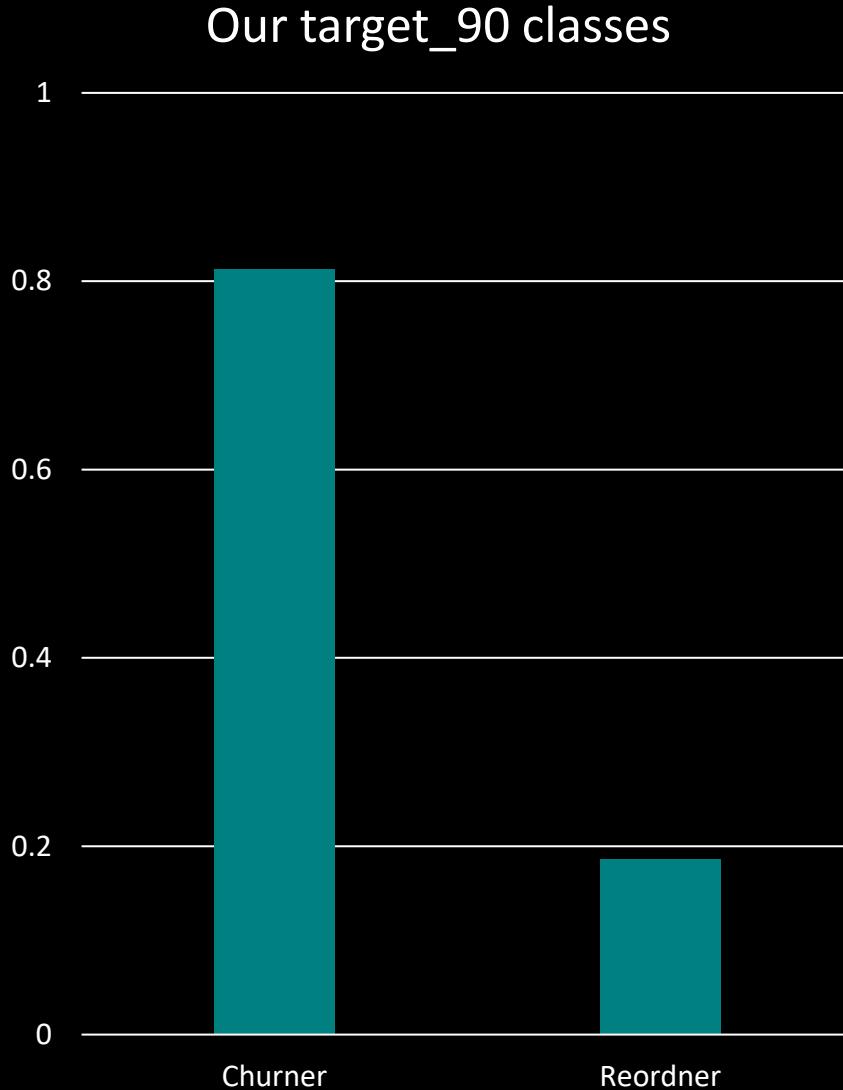
DS405 MACHINE LEARNING APPLICATIONS IN BUSINESS AND ECONOMICS

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Our target\_90 classes



First, we need to understand our customers



Our initial situation is a decision problem with asymmetric costs based on a binary outcome

Sending vouchers out to everyone

Not send vouchers out at all

Either we spend too much money or lose potential customers

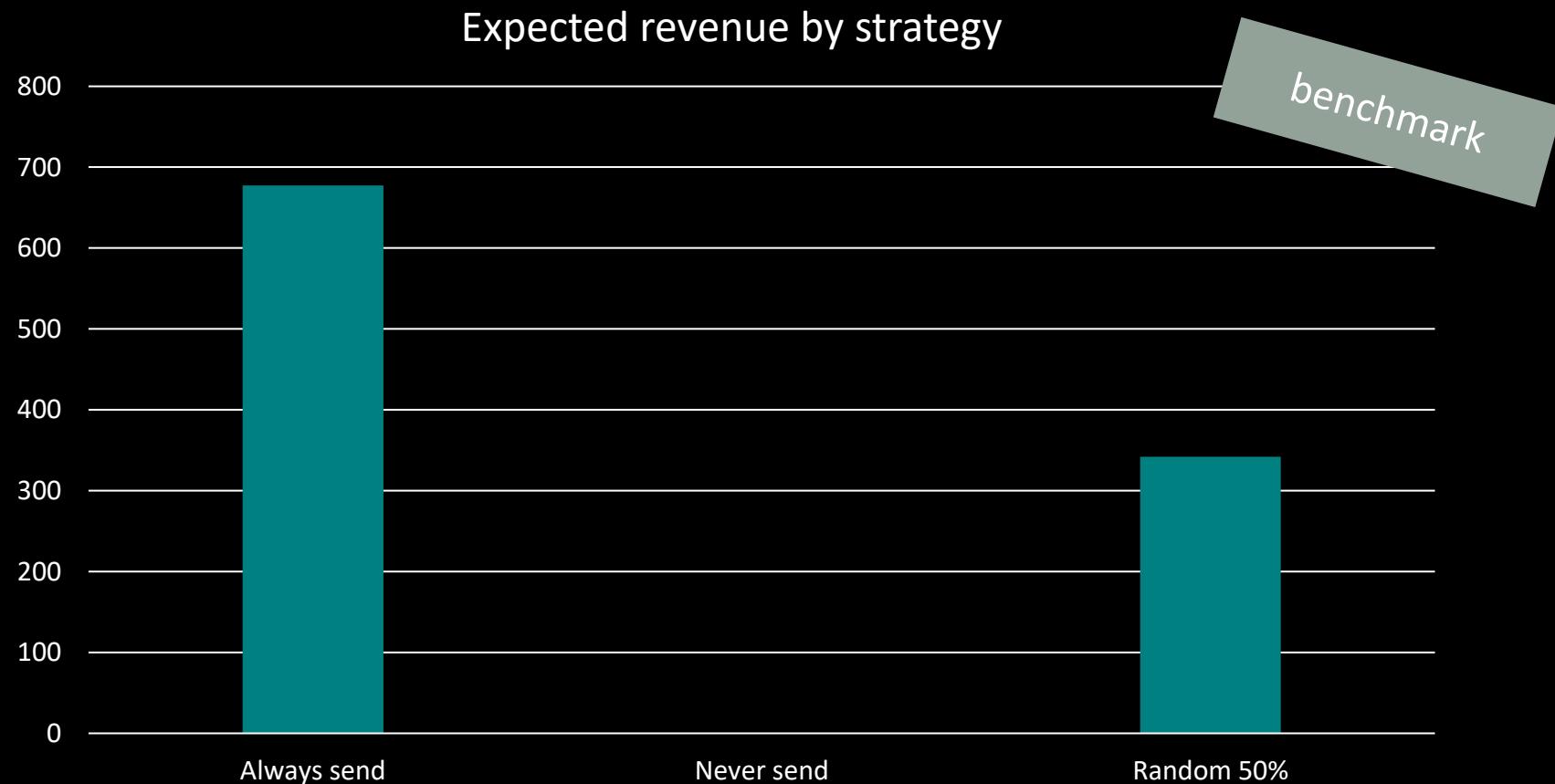
# How do we decide who gets a voucher?

Decision	True outcome	Revenue
Send voucher	No reorder	+ 1.25 €
	Reorder	- 5 €
No voucher	Any	0 €



Voucher decisions are made using predicted reorder probabilities and their expected revenue impact

# Naive voucher strategies destroy value



# Gradient Boosting is the best-performing model

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1

We tuned the model's hyperparameters to maximize revenue

**Hyperparameters:**

- subsample: 0.6,
- n\_estimators: 600,
- min\_samples\_split: 5
- min\_samples\_leaf: 1
- max\_features: None
- max\_depth: 4
- learning\_rate: 0.01

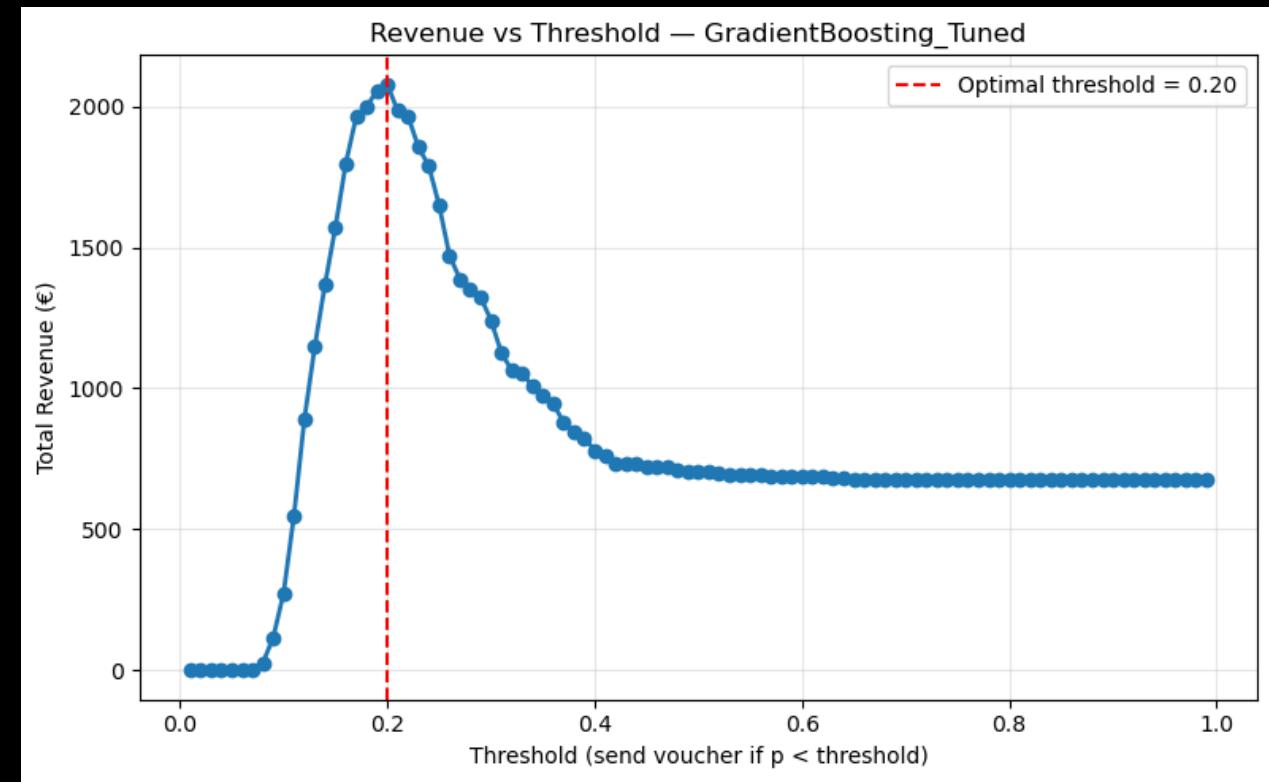
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We boosted expected revenue to 2077.50 €

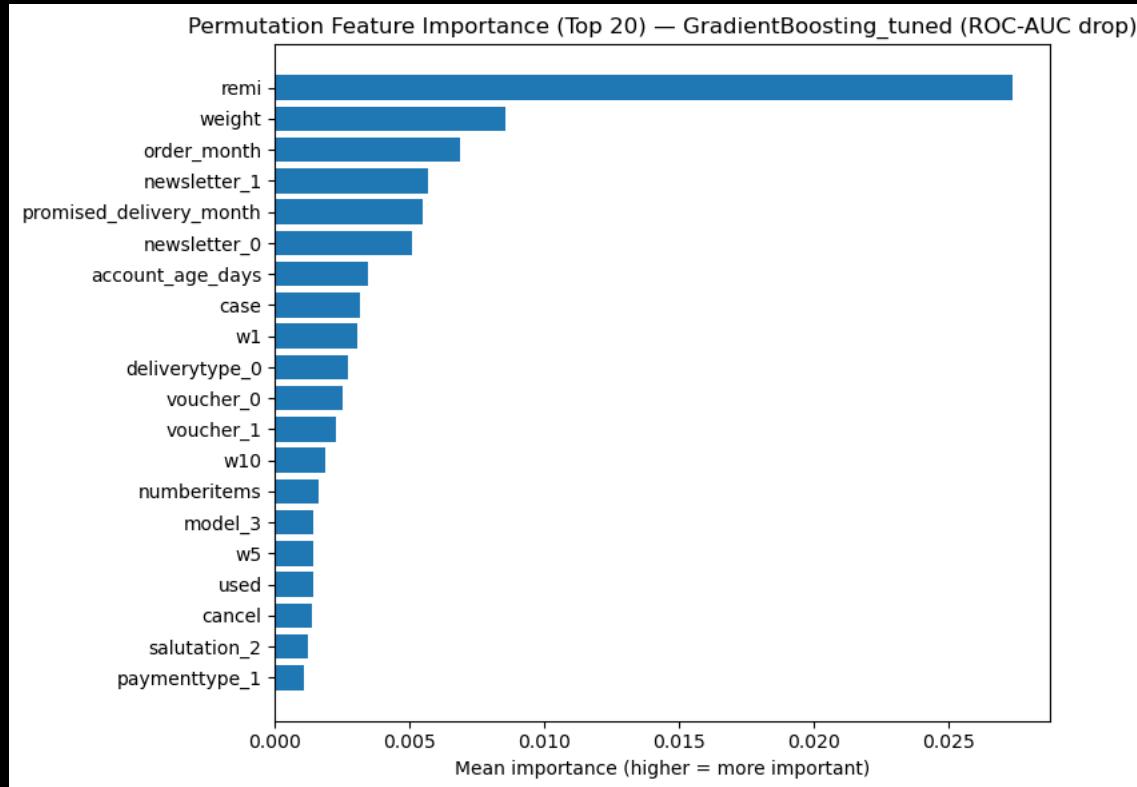
# A revenue-optimal threshold determines who receives a voucher

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True Label	Action	
	Don't send	Send
No Reorder	2016	4578
Reorder	784	729



# Customer behavior and Operational factors drive reorder predictions



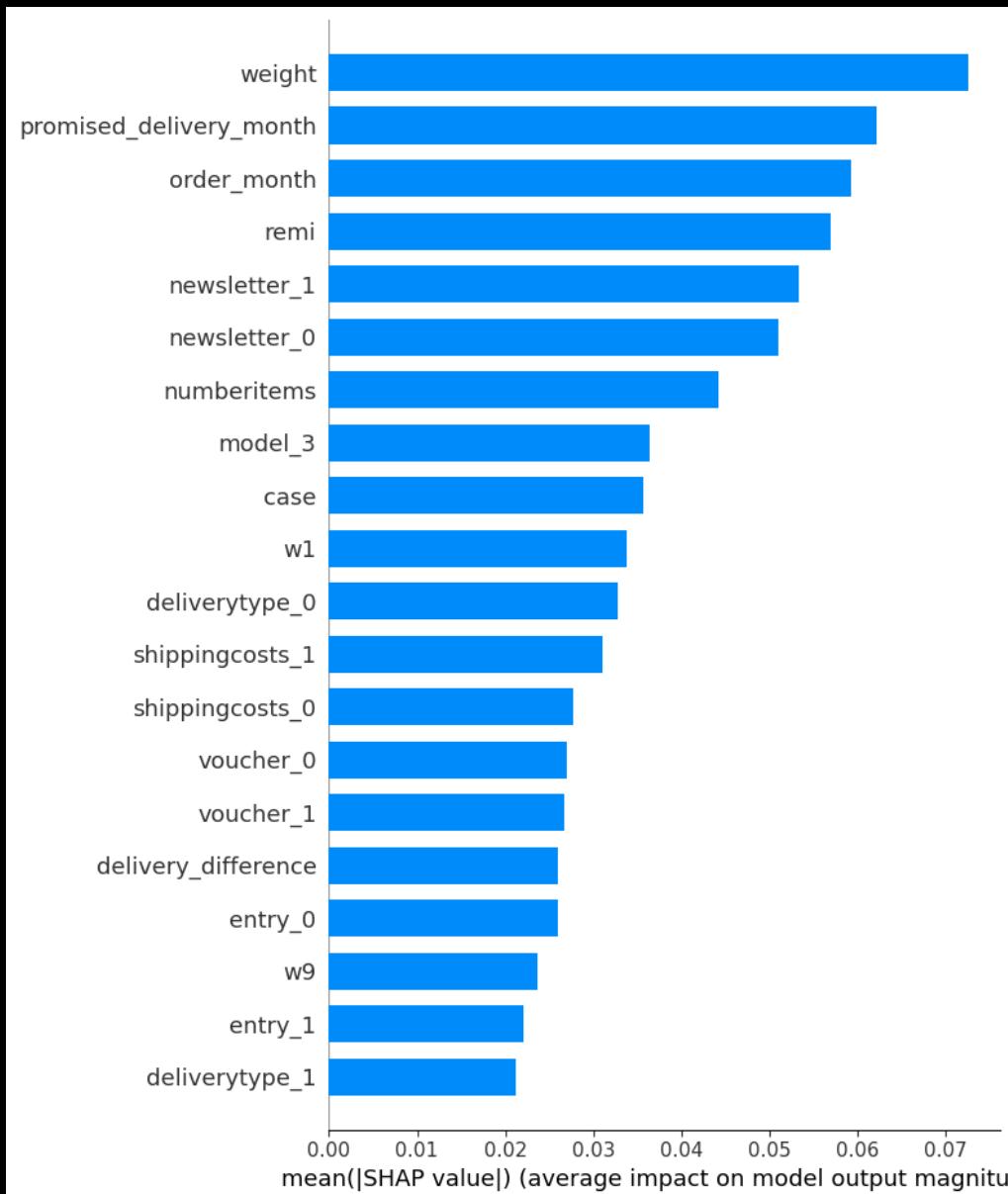
## Key insights

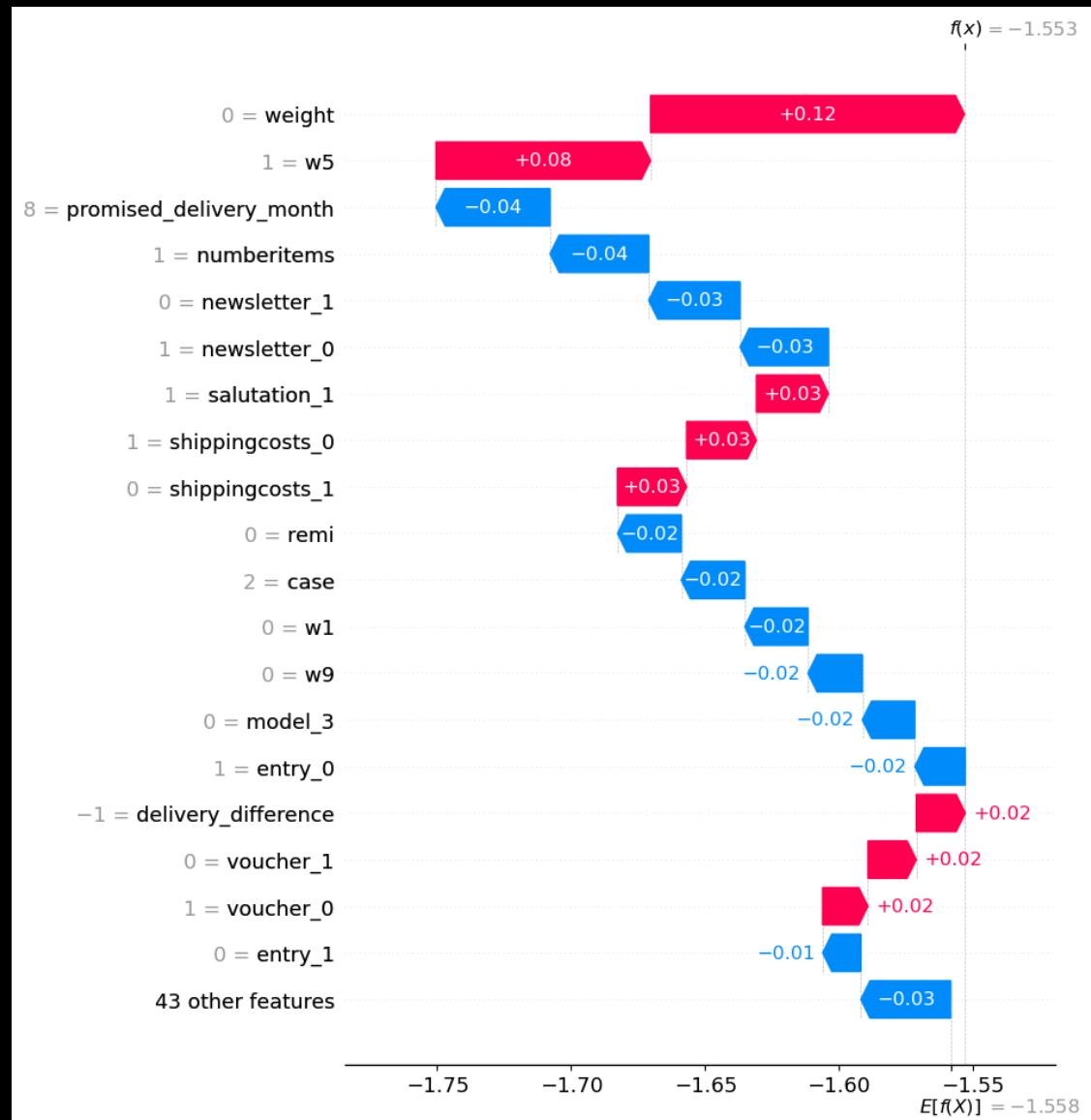
- Return behavior (remi) is the strongest signal
- Operational factors (e.g. weight, delivery) also influence reorders
- Seasonal effects (order month) matter

# SHAP feature importance

## Key insights

- Bars show average impact of each feature on predicted reorder probability
- Both customer behavior and order characteristics matter
- No single feature dominates





# Explaining an individual voucher decision

## Key insights

- Several features reduce the predicted probability of reordering
- Weight and w5 contribute positively to the predicted reorder probability
- The final predicted probability falls below the revenue-optimal threshold
- A voucher is therefore sent to this customer