June 6, 2024

Supply Chain Analytics

Global Dual Sourcing Strategy

Amber Trujilo
Bindu Priyanka Achalla
Keerthana Raviprasad
Sreyashi Bhattacharya
Yves Kalin

Today's Agenda

1. Introduction to the Problem
2. Sinlge Sourcing Strategy for Mexico & China
3. Dual Sourcing Strategy
4. Comparison of Strategies

Introduction

Objective: To maximize the ending bank account value by deciding on a global dual sourcing strategy.

Financial Data

Sales Price: $10/unit

Sourcing Costs:

- Mexico: $8/unit
- China: $7.25/unit

Financial Rates:

- Cash earns: 1% per period
- Debt costs: 1% per period

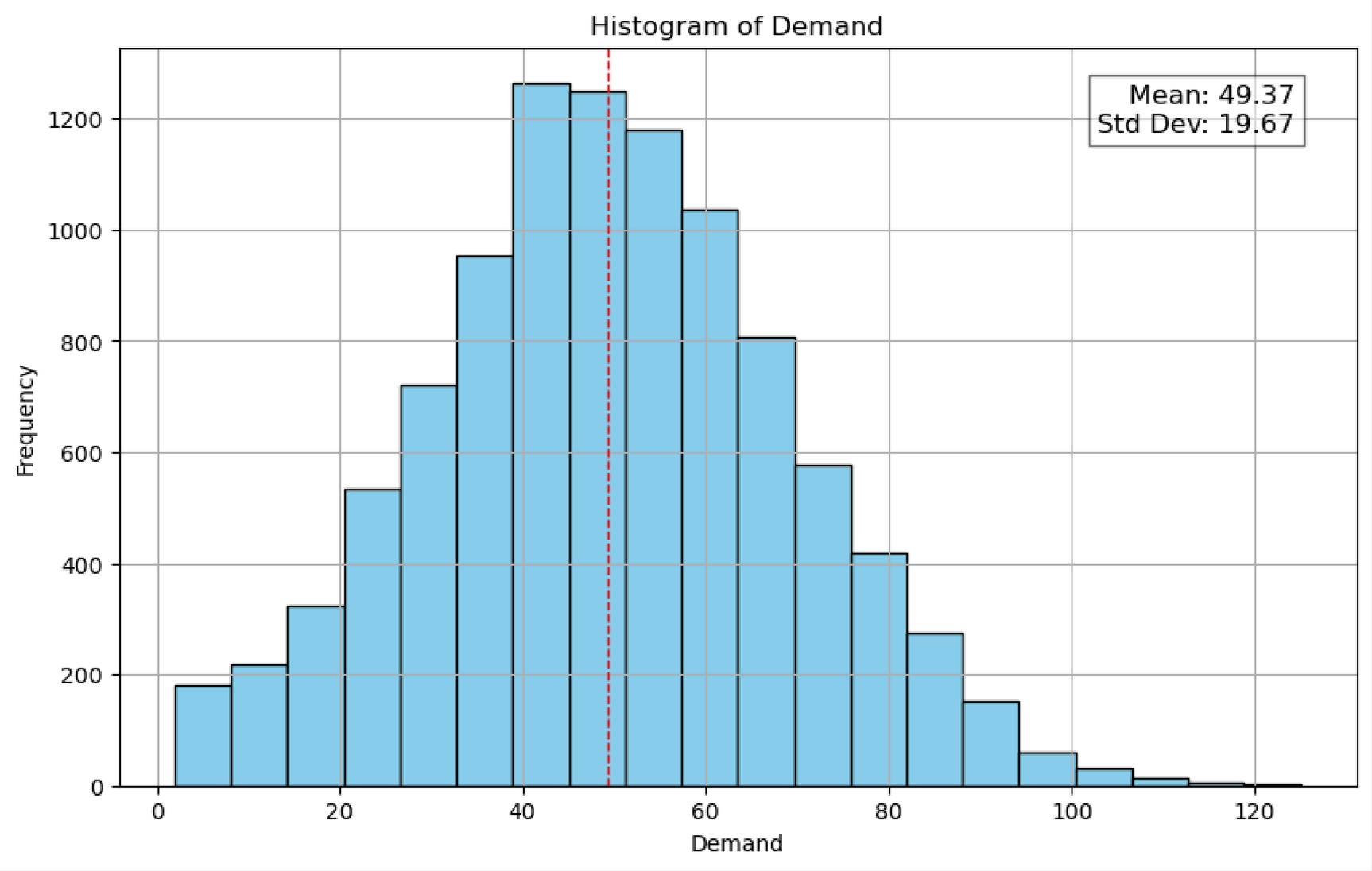
Order Lead Times

Mexico: Orders received and available *next* period

China: Orders received *after 4* periods

Initial Cash Balance: $0

Demand Distribution



Sourcing Strategy

Mexico

Assumptions:

1. No holding costs
2. No order costs
3. Continuous review

Lead Time: 1 days
Lead Time Demand: 1 x 49.372 ~ 49 units

Cu: $10 - $8
Co: $8

Service Level: 0.20

Safety Stock: 20 percentile daily day average ~ -16 units

ROP: LtD + SS ~ 33 units

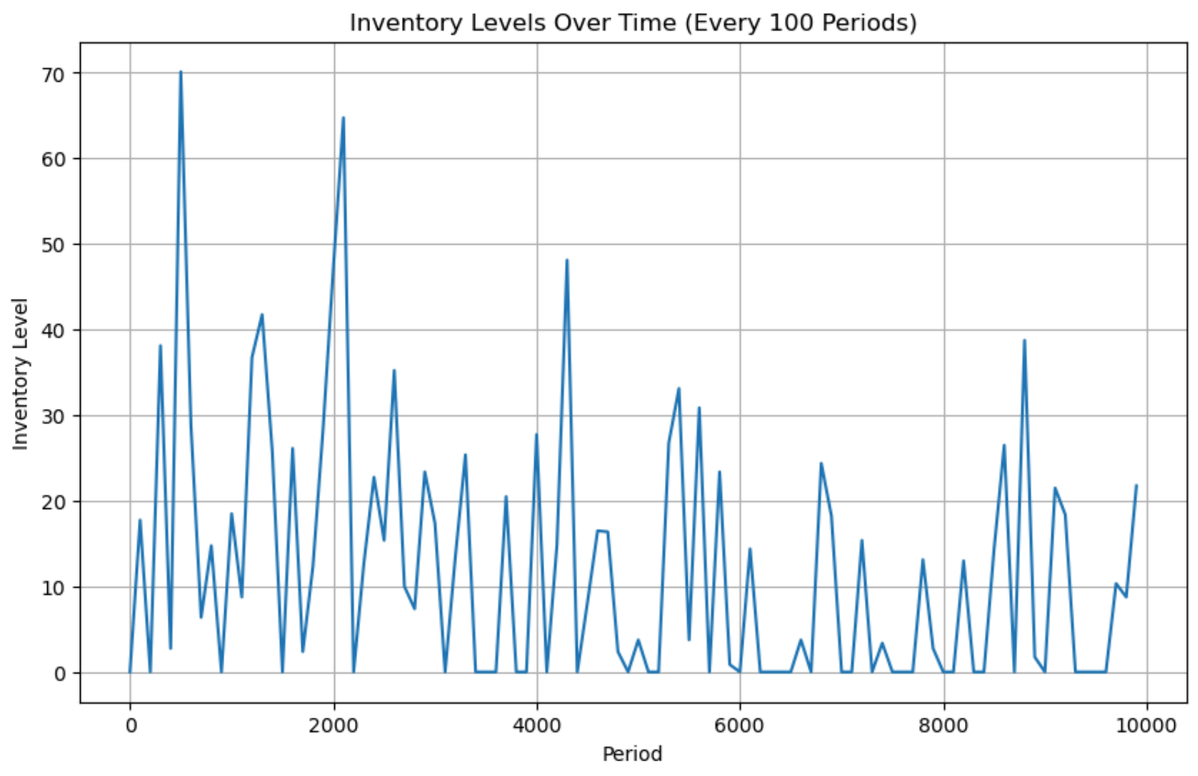
Service Level: 0.95

Safety Stock: 95 percentile of daily average ~ 32 units

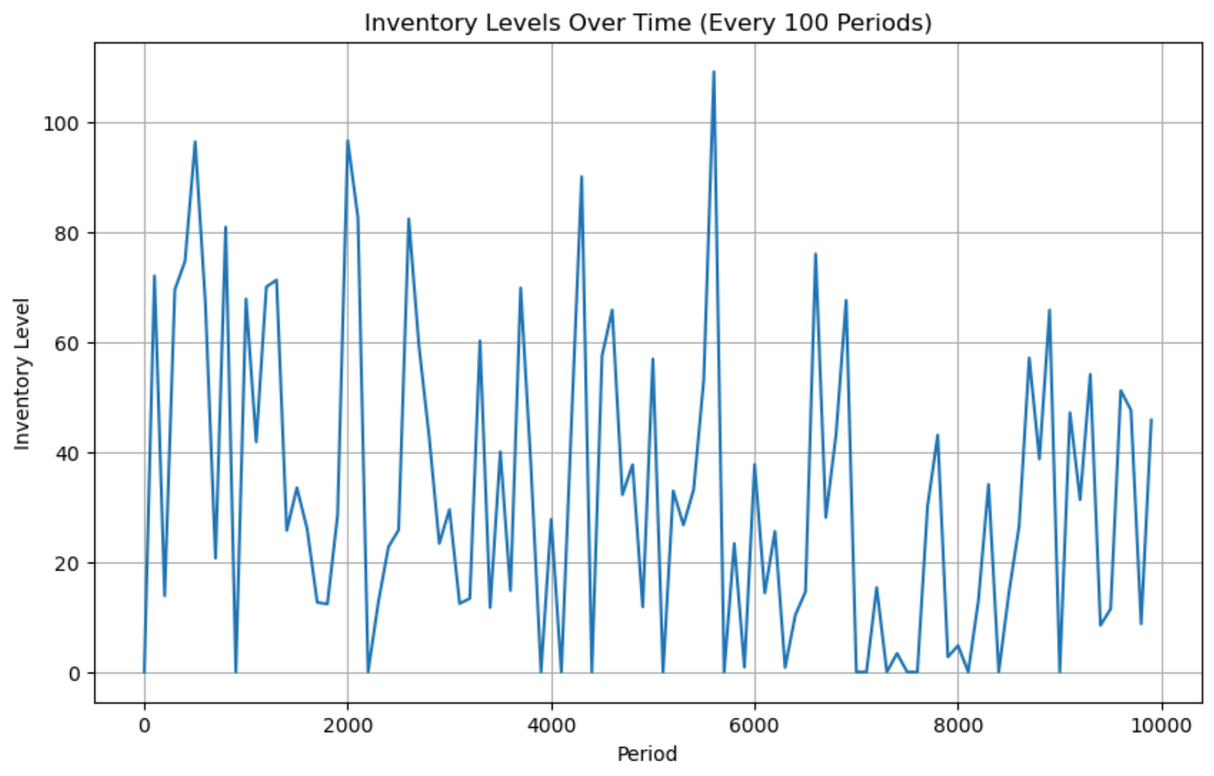
ROP: LtD + SS ~ 82 units

Inventory Plots - Mexico

Service Level: 0.2



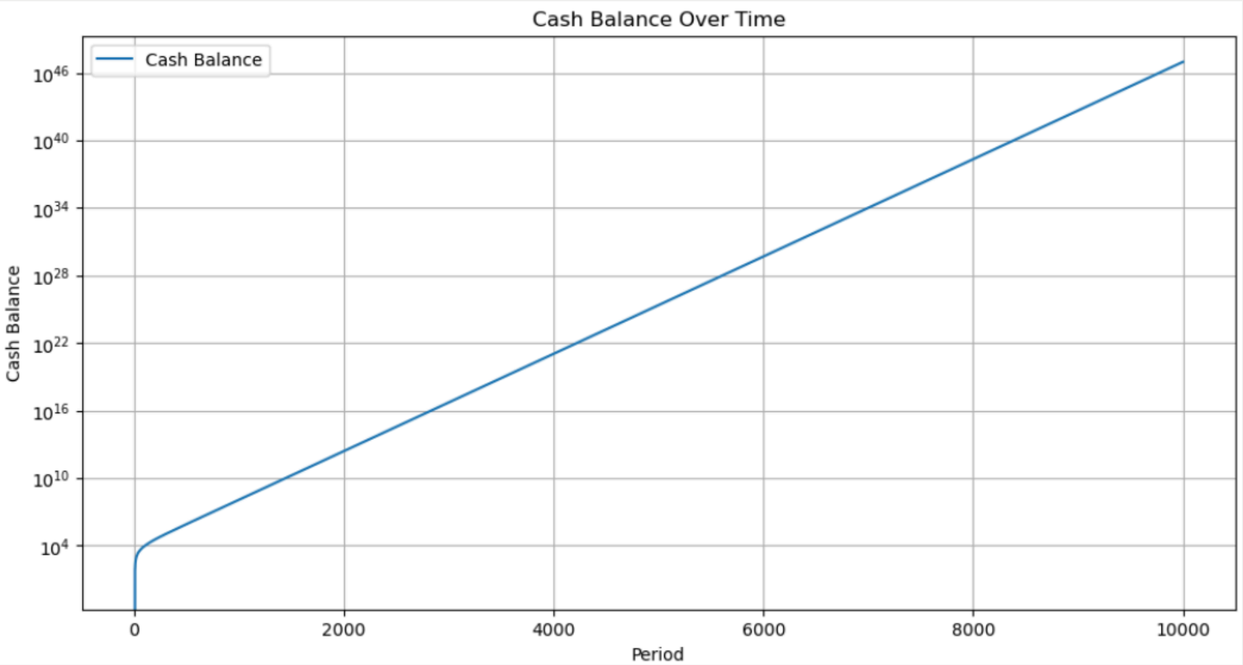
Service Level: 0.95

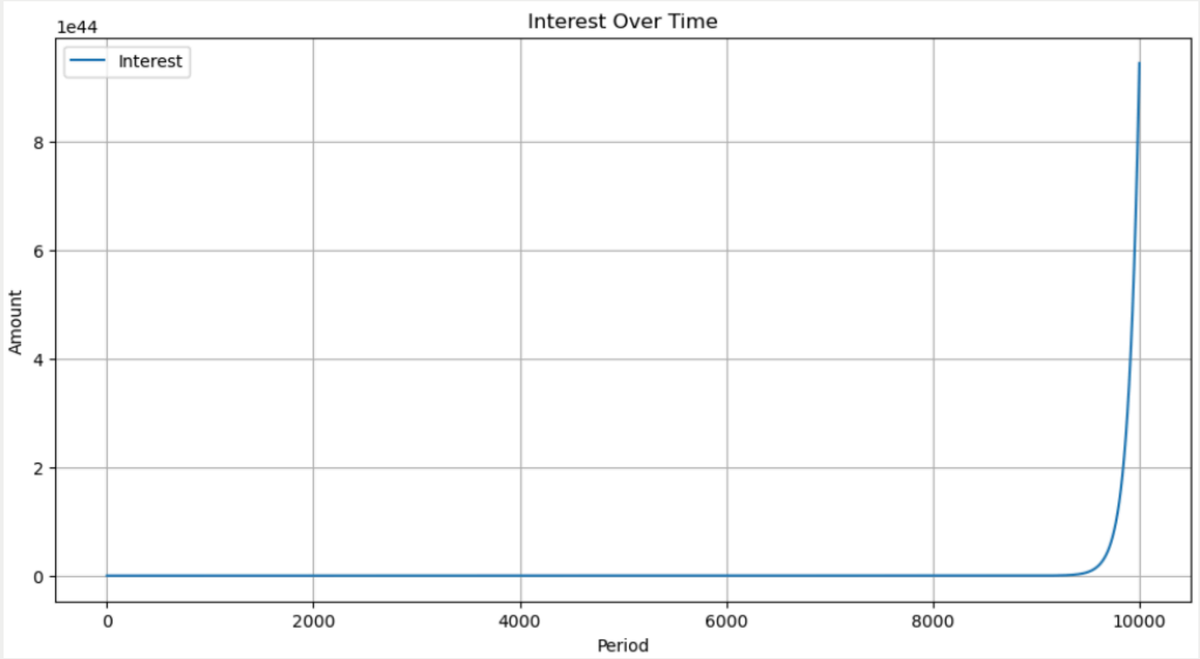


Cash Balance Plots - Mexico

Plotted cash balance using log scale

Service Level: 0.2





Sourcing Strategy

Lead Time: 4 days
Lead Time Demand: 4 x 49.372 ~ 197 units

Cu: $10 - $7.25
Co: $7.25

China

Assumptions:

1. No holding costs
2. No order costs
3. Continuous review

Service Level: 0.275

Safety Stock: 27.5 percentile of 4 day lead time average ~ -23 units

ROP: LtD + SS ~ 174 units

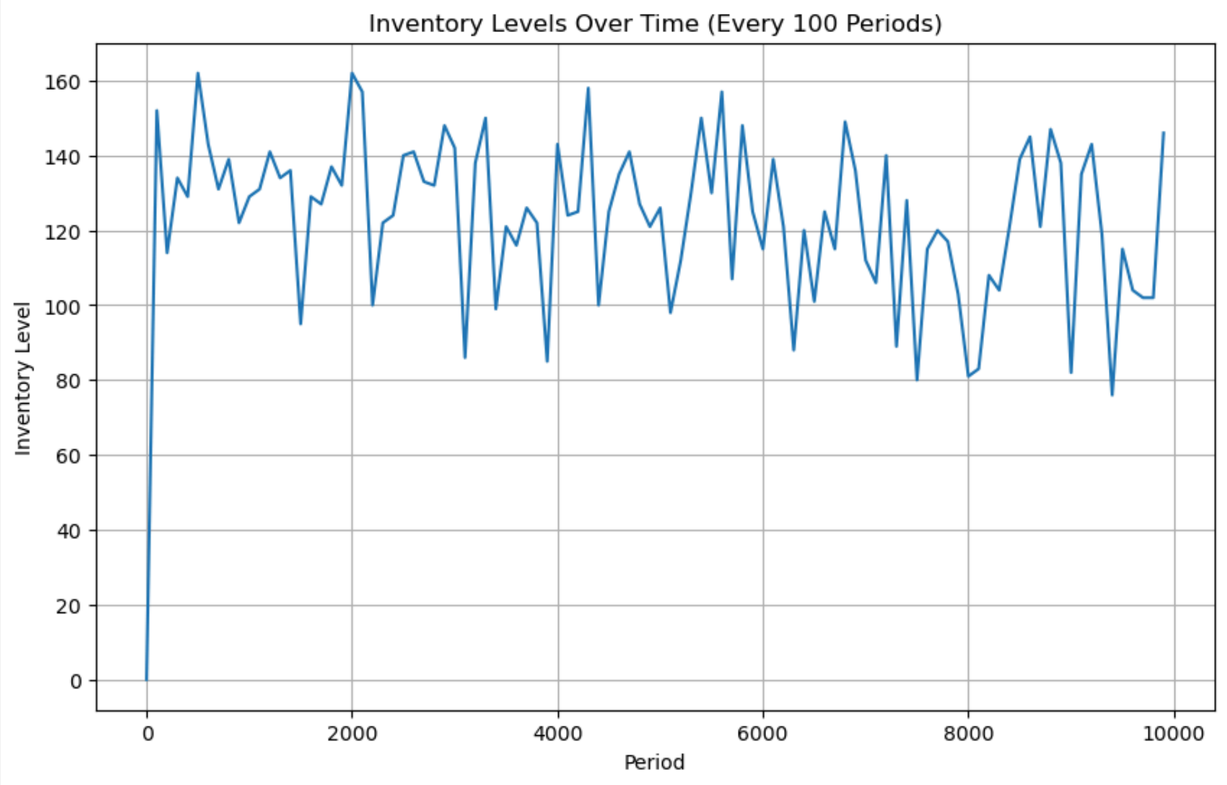
Service Level: 0.95

Safety Stock: 95 percentile of moving 4 day average ~ 65 units

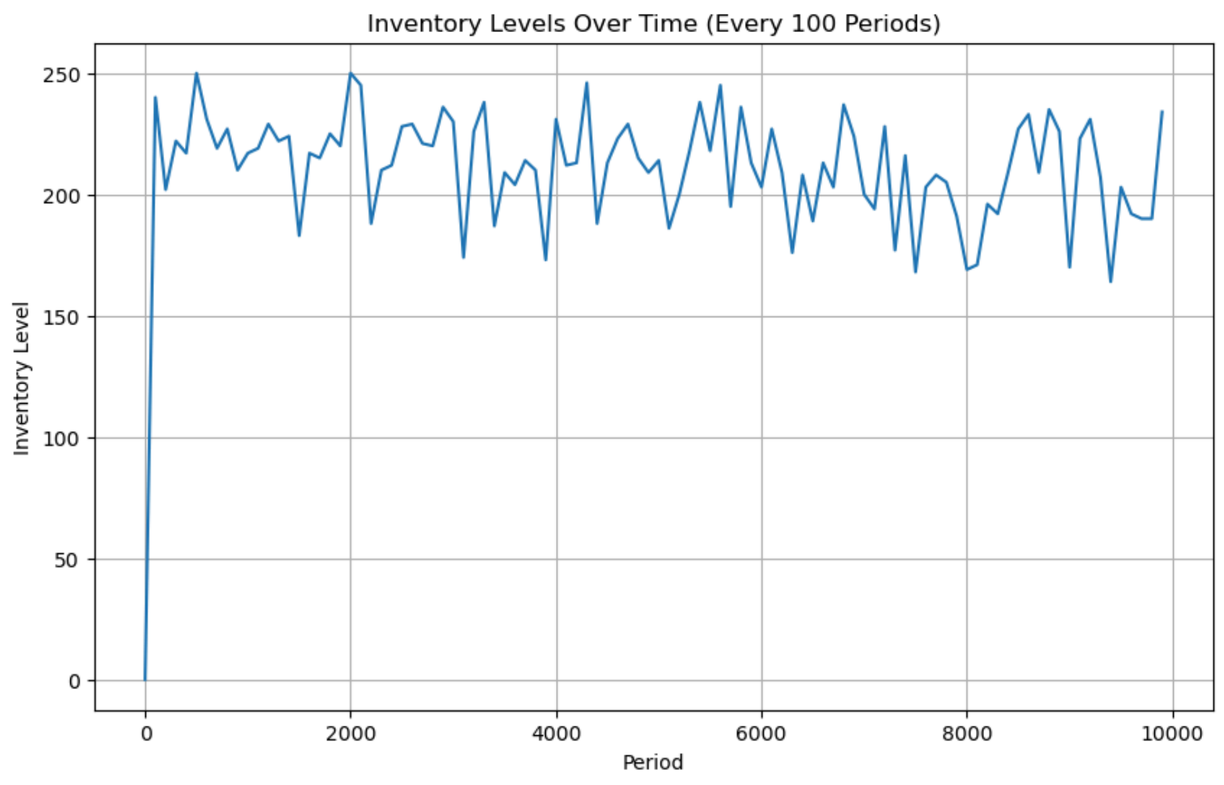
ROP: LtD + SS ~ 262 units

Inventory Plots - China

Service Level: 0.275



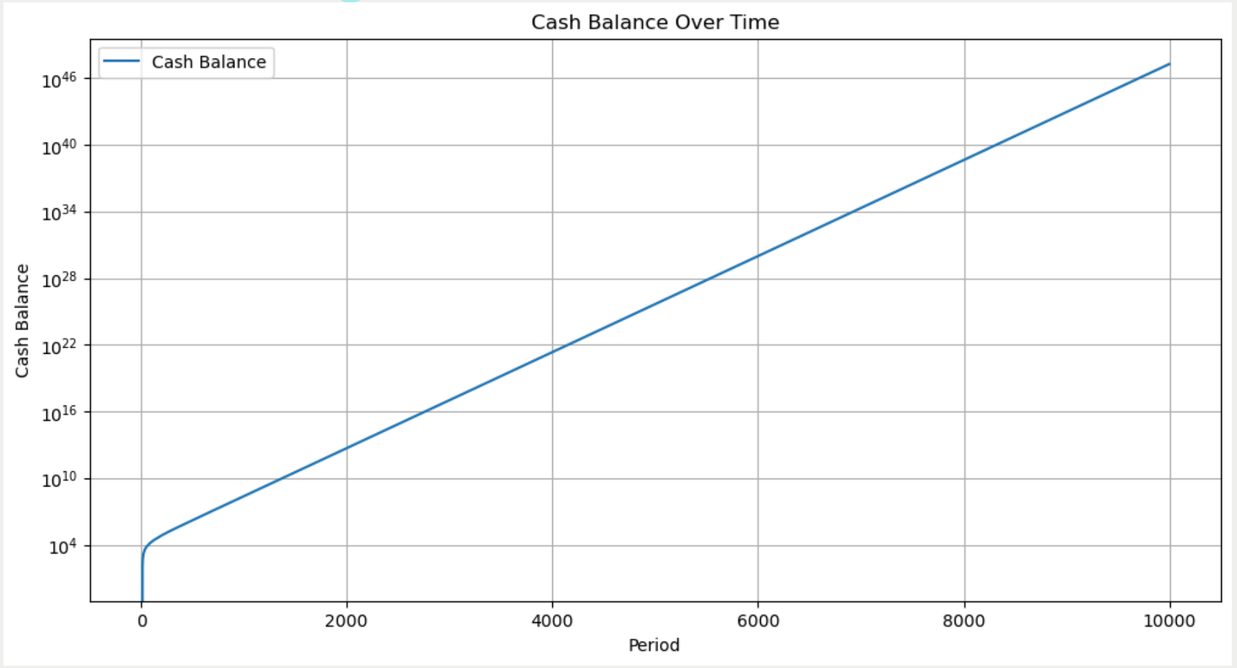
Service Level: 0.95



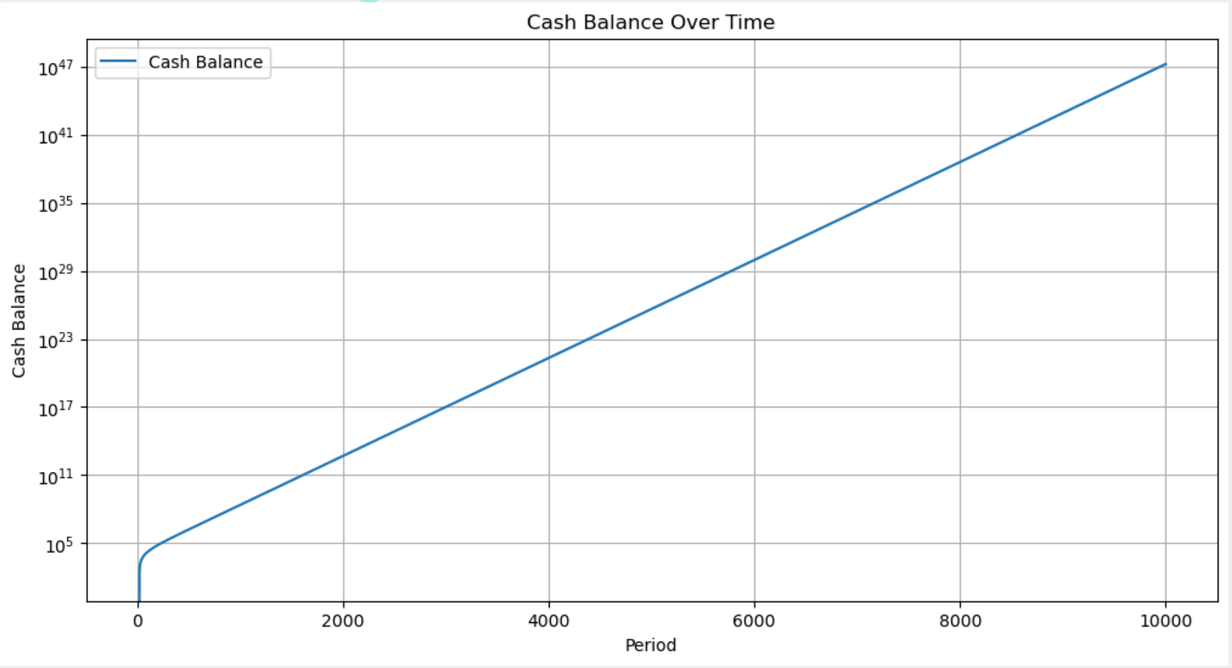
Cash Balance Plots - China

Plotted cash balance using log scale

Service Level: 0.275



Service Level: 0.95



Sourcing Simulation

1. When setting SL based on cost of under and over stocking:

   Mexico Ending Balance = **9.5361329367103 21e+46**

   China Ending Balance = **1.8714399397219125e+47**

2. When setting SL based on industry standard:

   Mexico Ending Balance = **1.449745686862104e+47**

   China Ending Balance = **1.794790276818095e+47**

Order Quantity

If current inventory + incoming orders < ROP, then make an order.

Order quantity is determined by forecasted LtD to prevent stock outs while waiting for next shipment.

Bank Balance

Bank Balance = (Previous balance + sales - order costs)*.01

Positive ending balance earns 1% interest, while negative ending balance earns 1% debt.

Inventory Levels

Beg Inv = current inventory - current demand + incoming orders
End Inv = Beg Inv - sales qty

The current demand is satisfied by what was in the inventory at the beginning of the day.

Profits

Revenue = min(demand, inventory) x $10
Costs = order qty x unit cost

Profits = revenue - costs per period

Dual Sourcing Strategy

Combining Quick Replenishment from Mexico and Cost-Effective Bulk Orders from China:

- Place timely orders with Mexico to quickly address immediate demand needs, ensuring the supply chain remains responsive to short-term fluctuations.

Reorder Point (ROP): 81.728 units
Safety Stock (SS): 32.356 units
Lead Time: 1 period

- Leverage longer lead times with China for cost-effective bulk orders planned in advance, optimizing costs by anticipating predictable demand patterns.

Reorder Point (ROP): 262.200 units
Safety Stock (SS): 64.712 units
Lead Time: 4 periods
Optimize costs by planning for predictable demand patterns with longer lead times.
Inventory Management:

- Inventory levels are continuously monitored.
- Orders are placed when inventory falls below ROP.
- Safety stock ensures buffer against demand variability and lead time.

Dual Sourcing Strategy

Cash Flow Management:

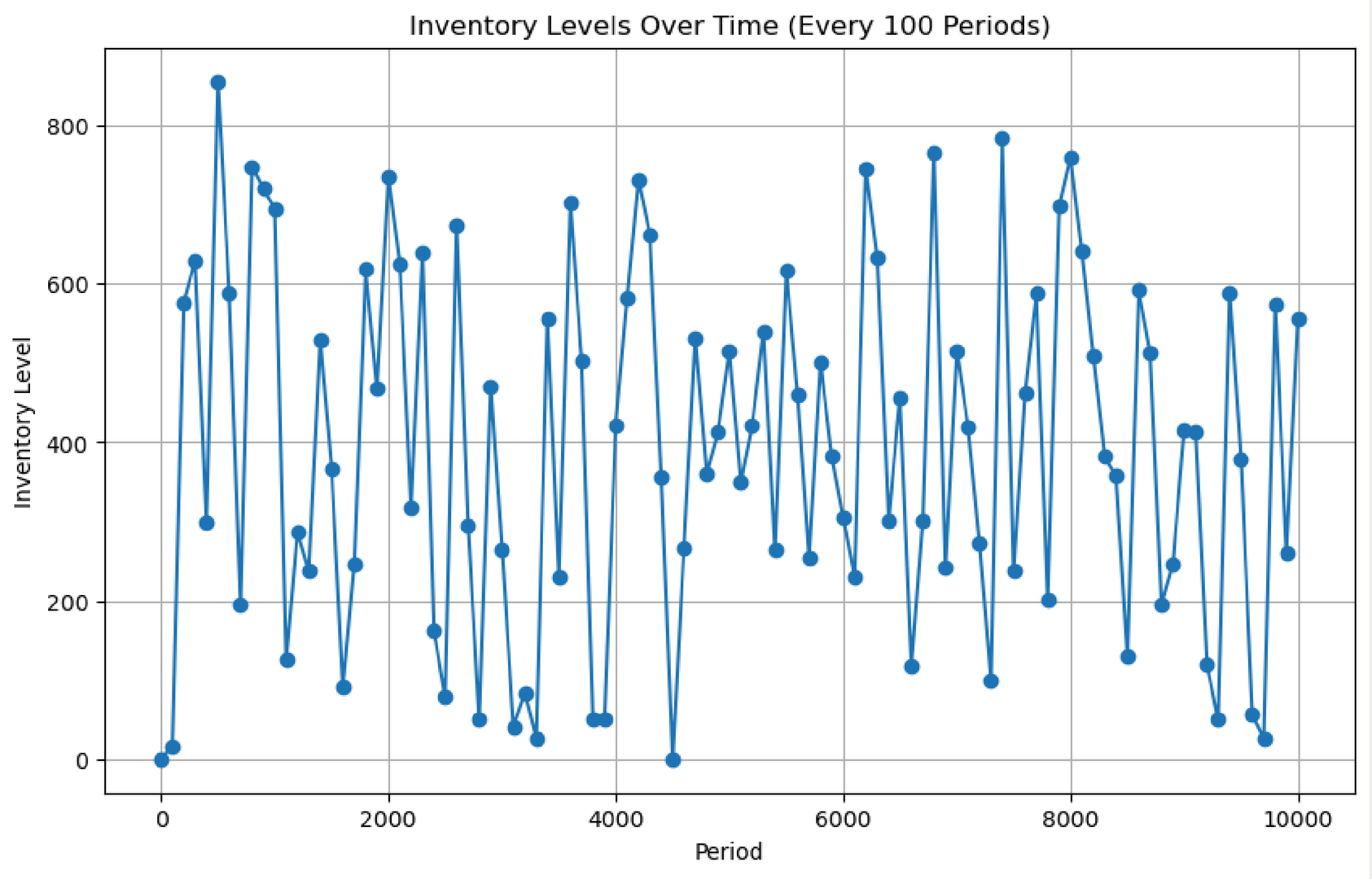
Cash balance is updated based on sales revenue and order costs.
Interest or debt costs are applied to maintain financial stability.

Table 1: Summary of Simulation Outcomes for Sourcing Strategies

Strategy	Final Cash Balance	End Inventory Level	Notes
Sourcing from Mexico	$\$9.54 \times 10^{46}$	Efficient levels	Minimal overstocks
Sourcing from China	$\$1.87 \times 10^{47}$	125 units	Scaling issues noted
Dual Sourcing	$\$6.96 \times 10^{47}$	Balanced levels	Enhanced cash flow stability

Dual Sourcing Inventory

Dual Sourcing Ending Balance = 6.96466471123976e+47



Conclusion

The Dual Sourcing Strategy generally provided better financial results and more robust inventory management compared to single sourcing strategy for reasons such as:

- Effective Inventory Management
- Responsive Supply Chain
- Cost Optimization
- Cash Flow Stability
- Operational Efficiency
- Scalability

Thank you!

Have
a good
weekend!