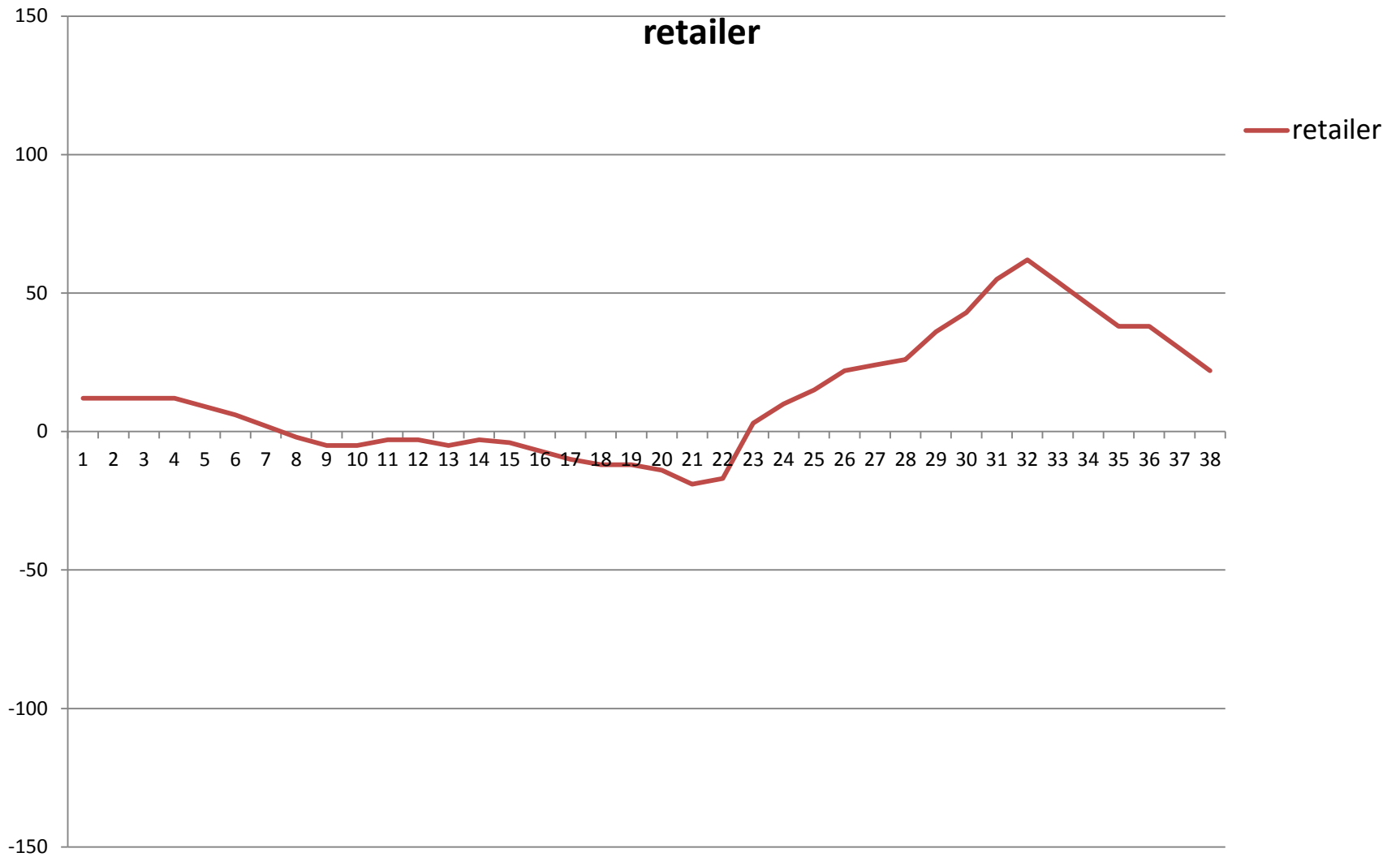
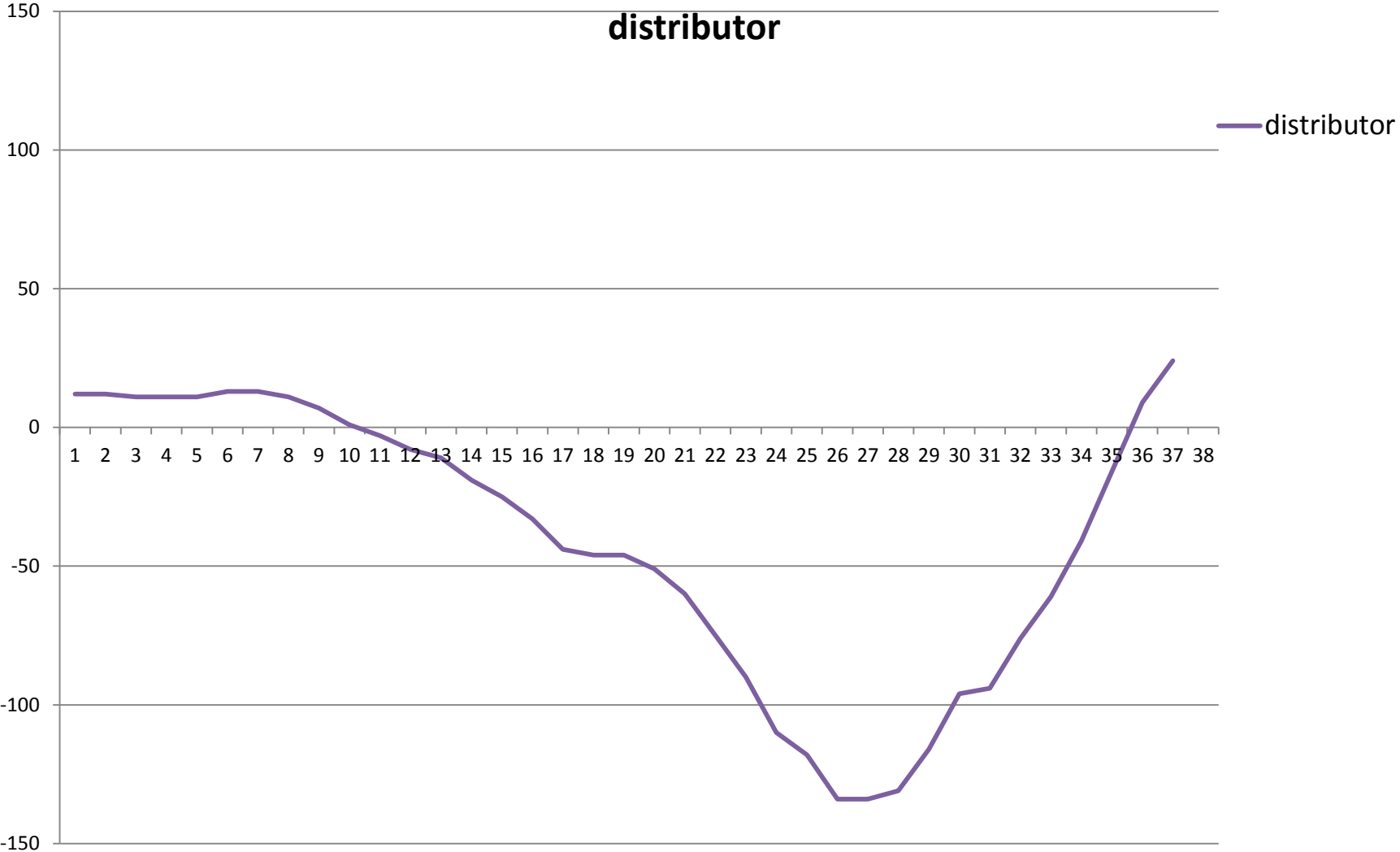


Beer Game Results

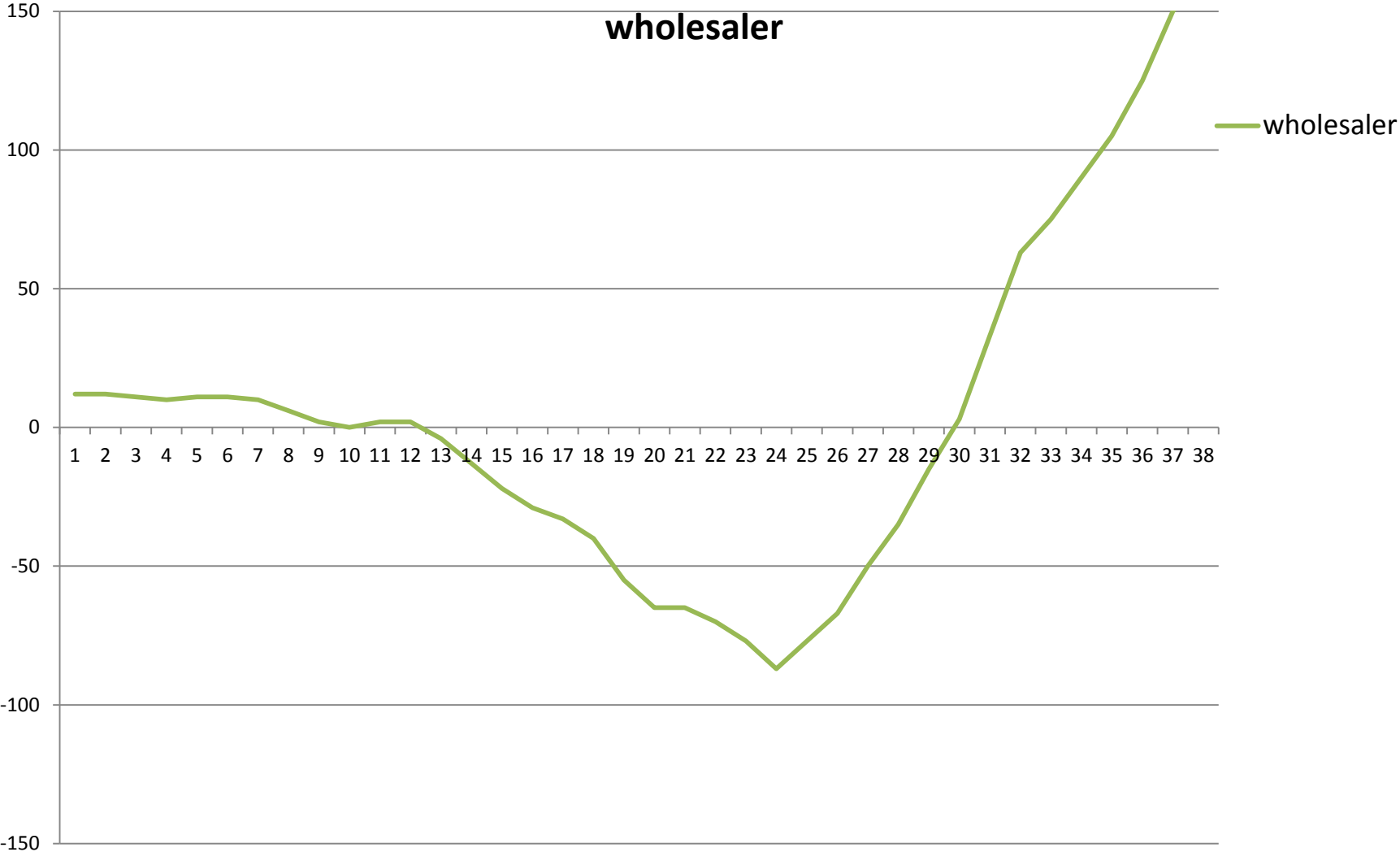
Muddy Charles Inventory



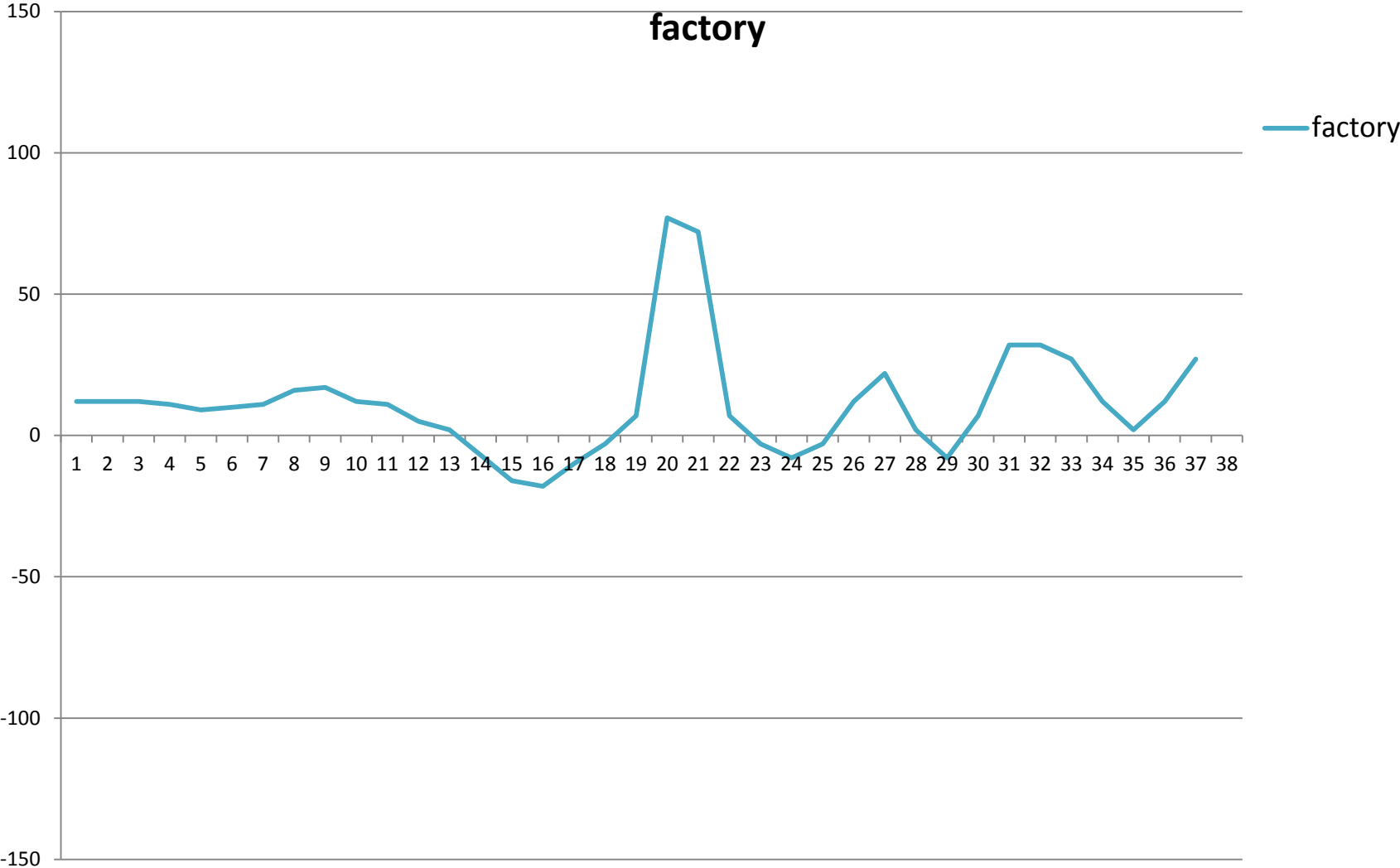
Muddy Charles Inventory



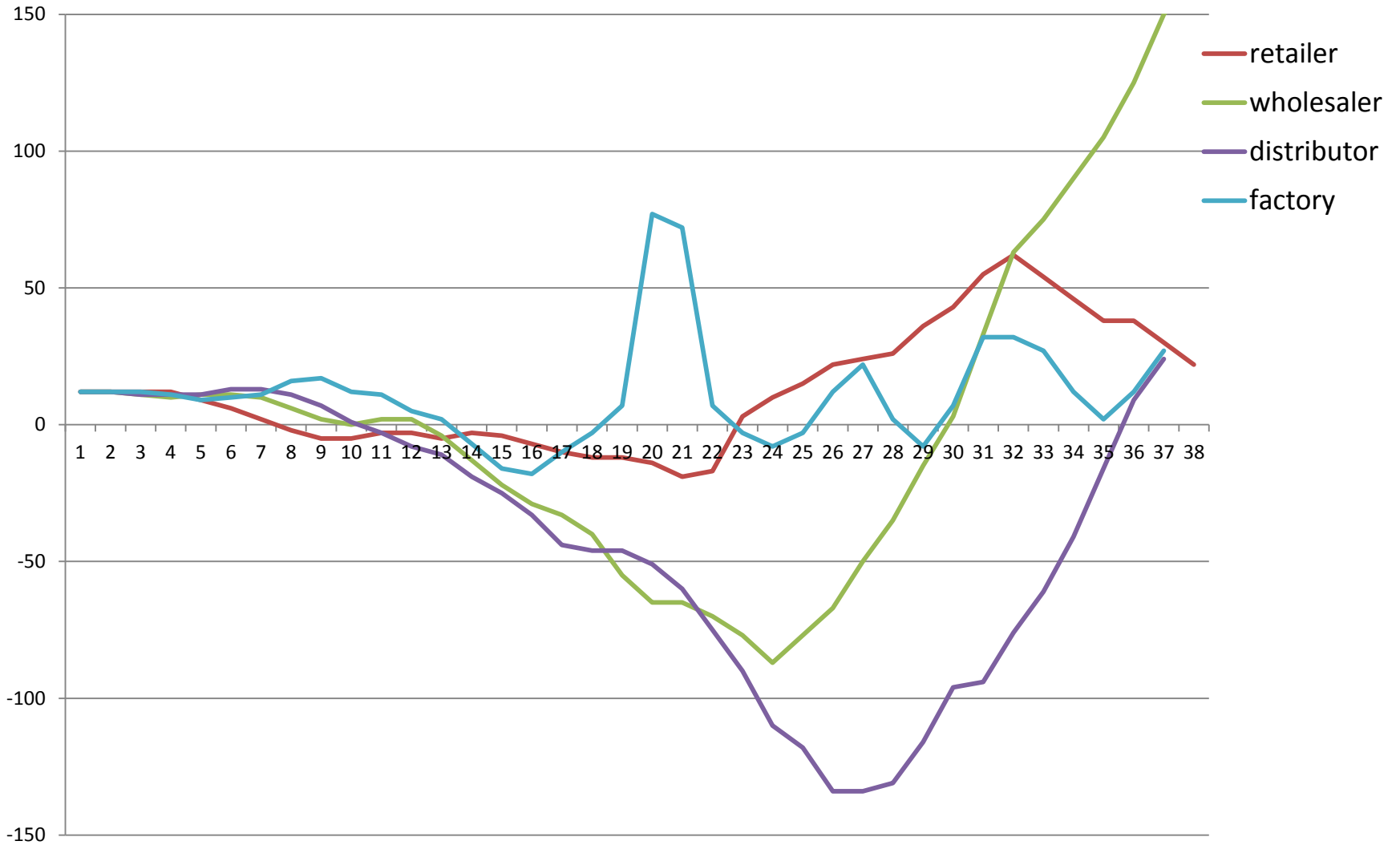
Muddy Charles Inventory



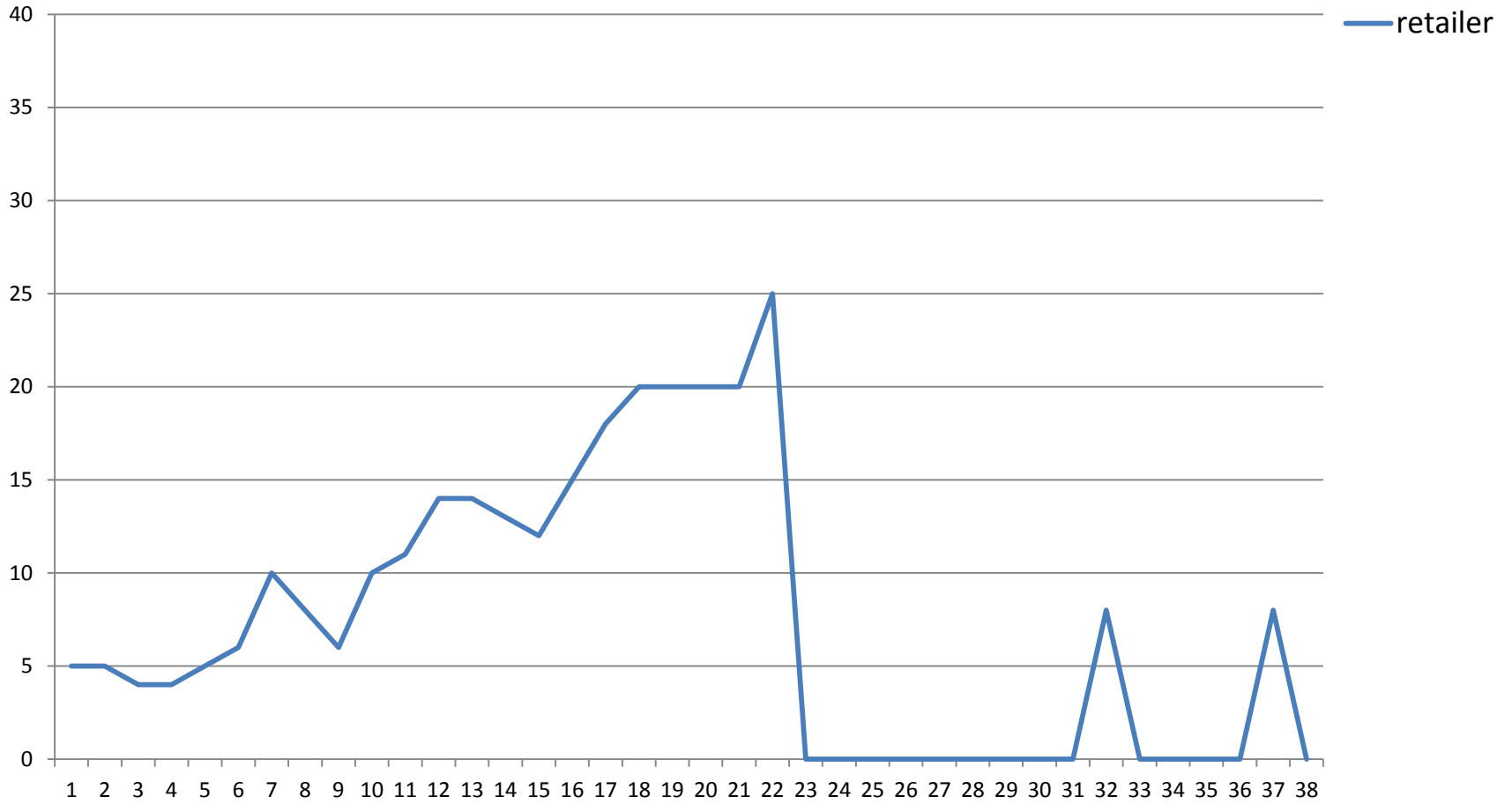
Muddy Charles Inventory



Muddy Charles Inventory --- total cost = \$3601

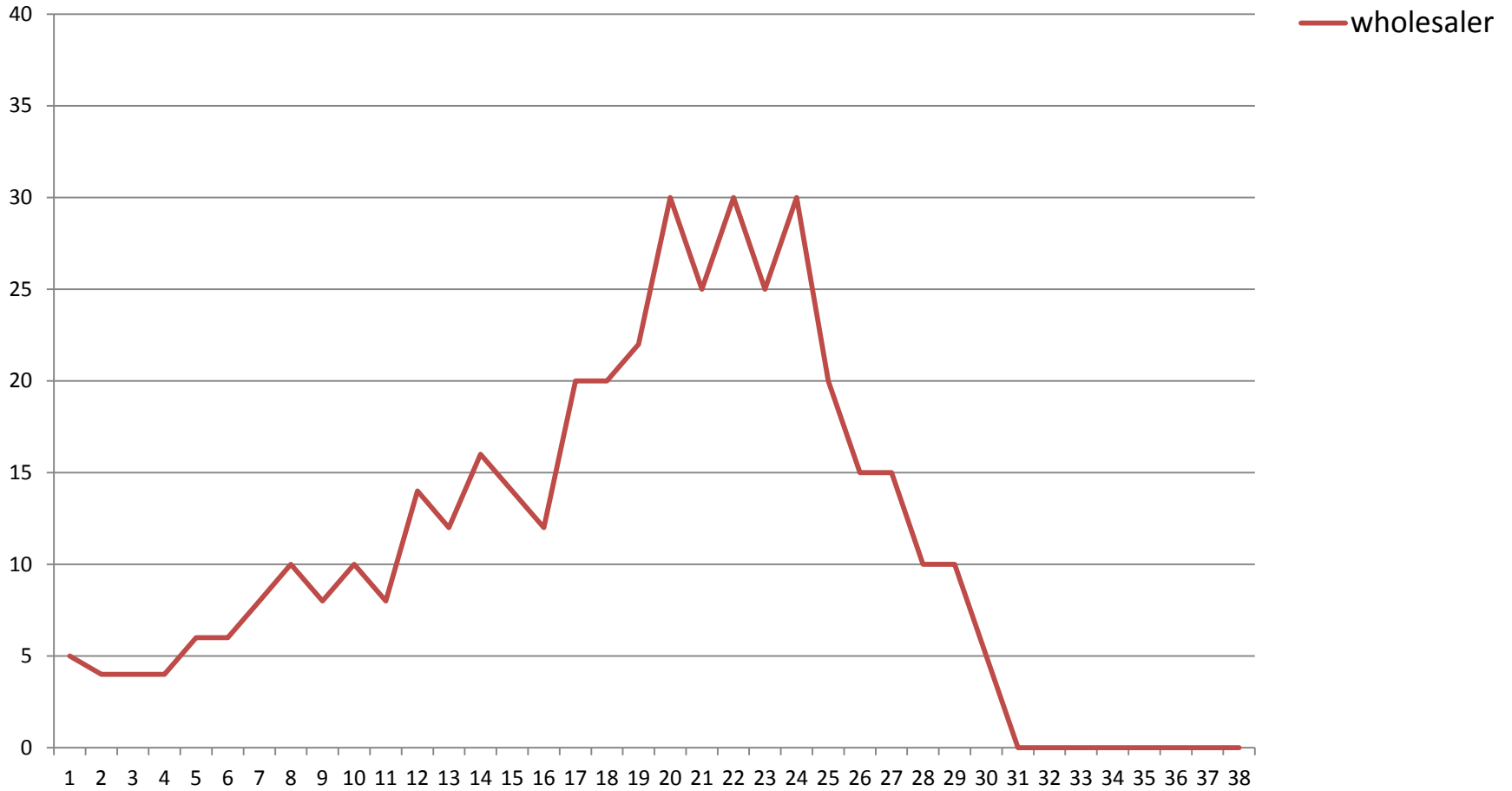


Muddy Charles retailer orders



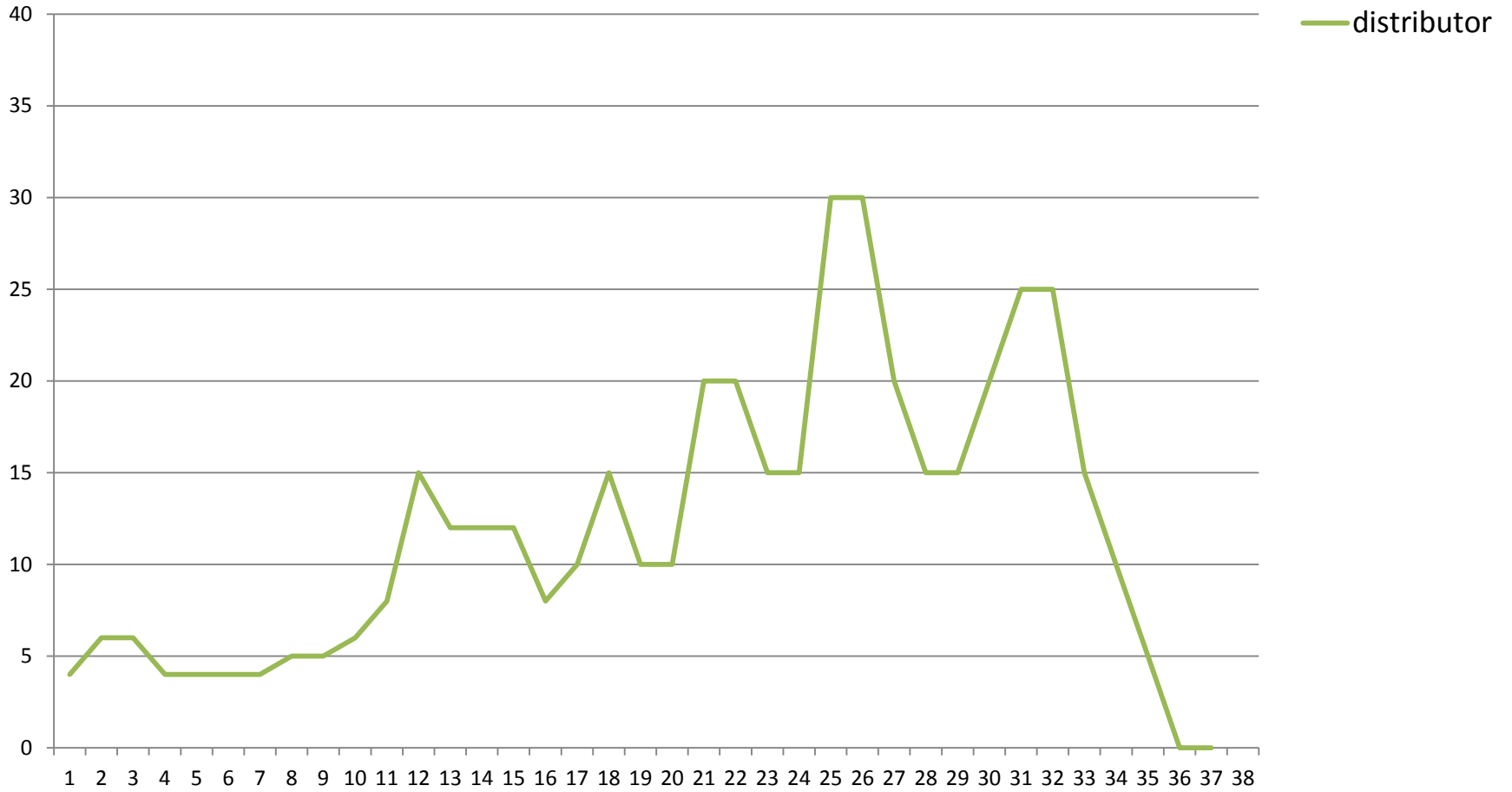
Muddy Charles wholesaler orders

wholesaler

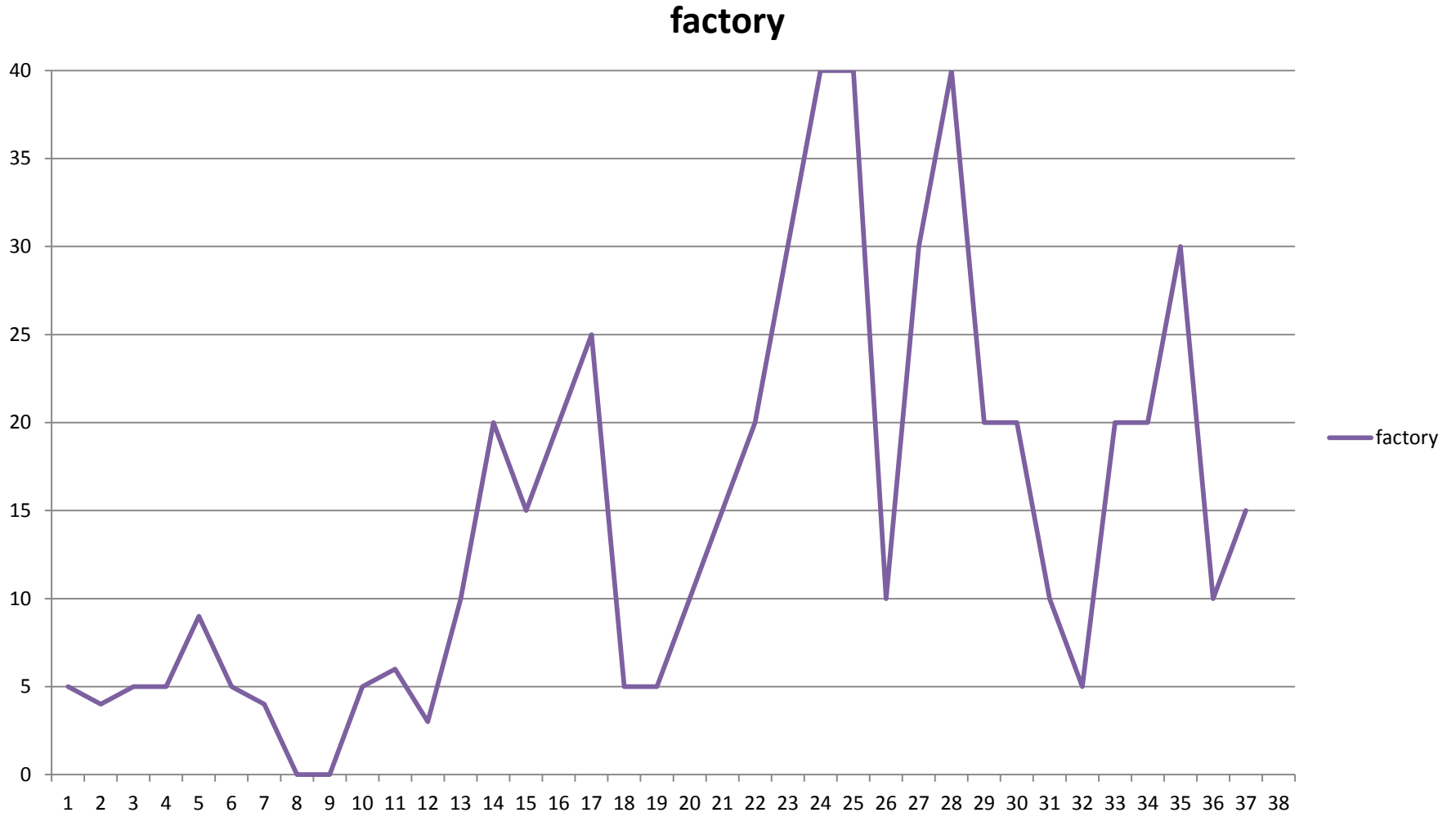


Muddy Charles distributor orders

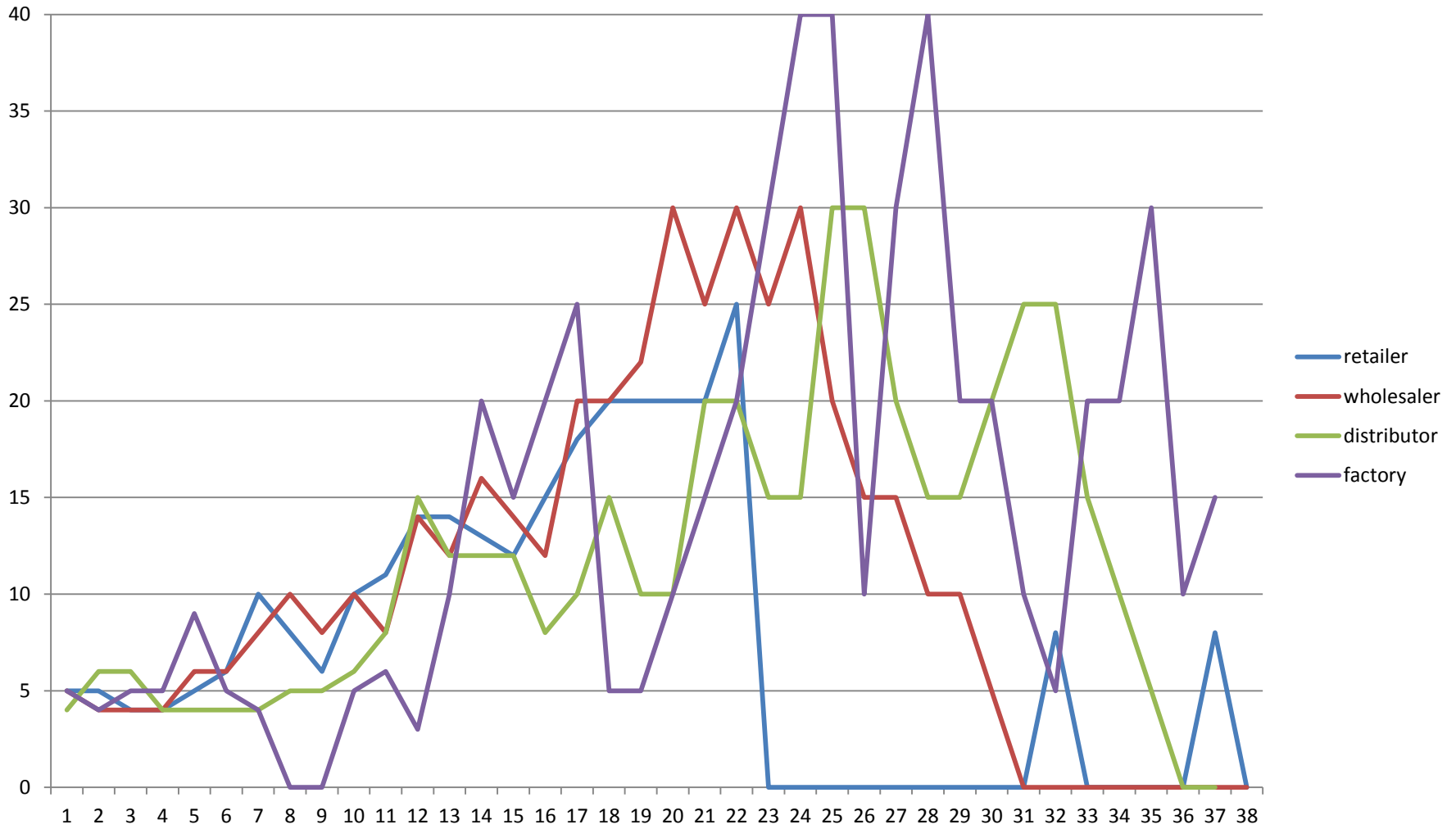
distributor



Muddy Charles factory orders



Muddy Charles orders



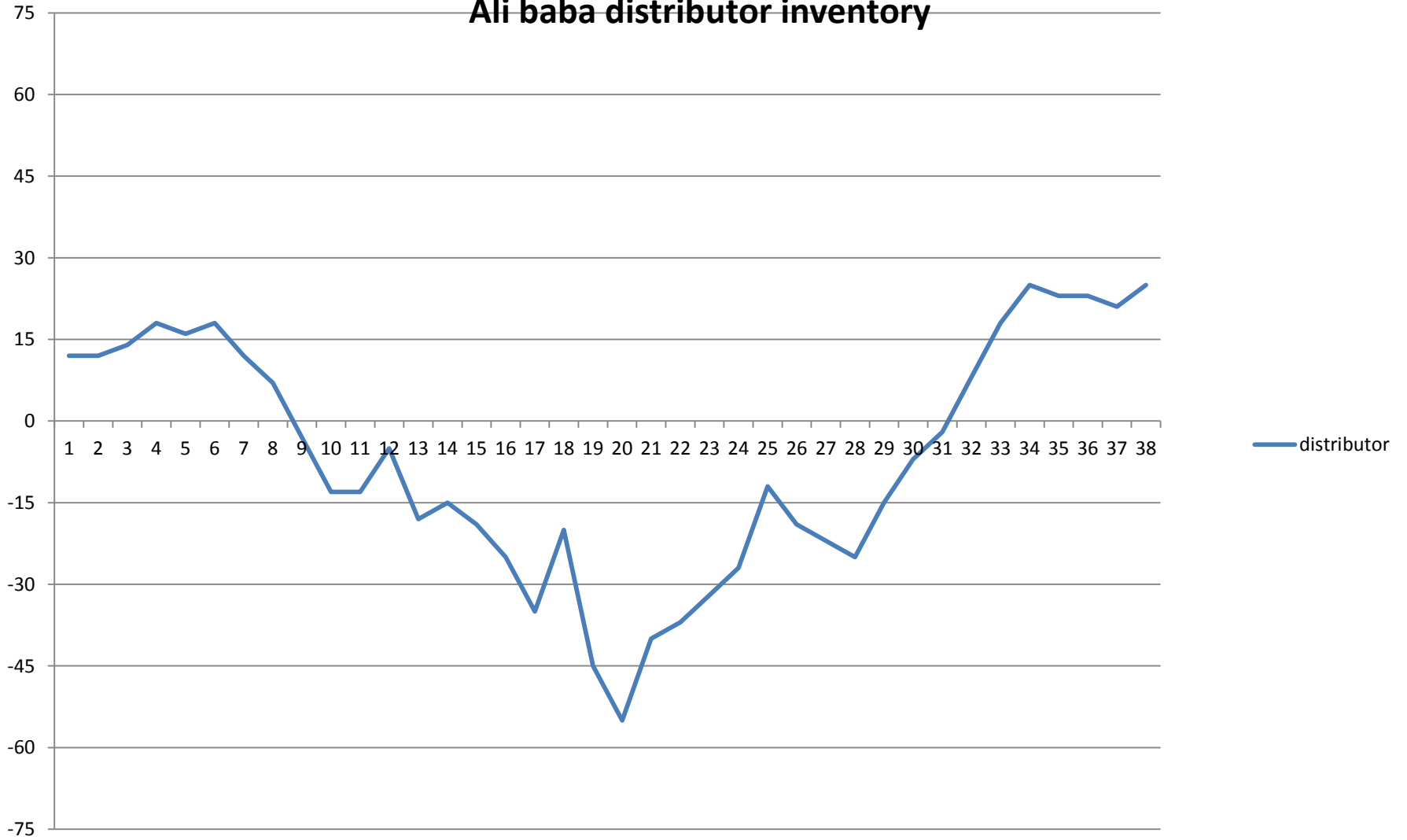
Ali baba retailer inventory



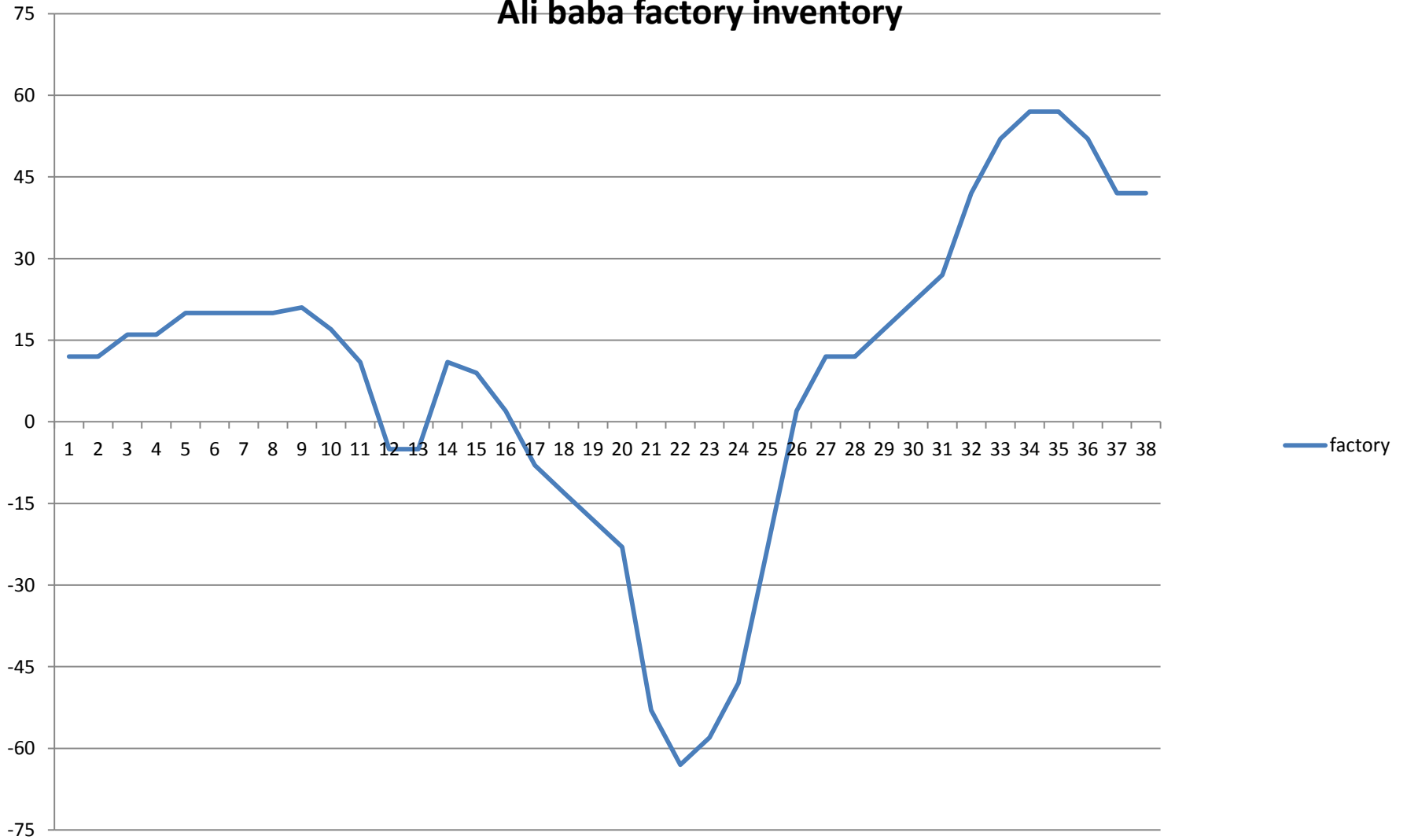
Ali baba wholesaler inventory



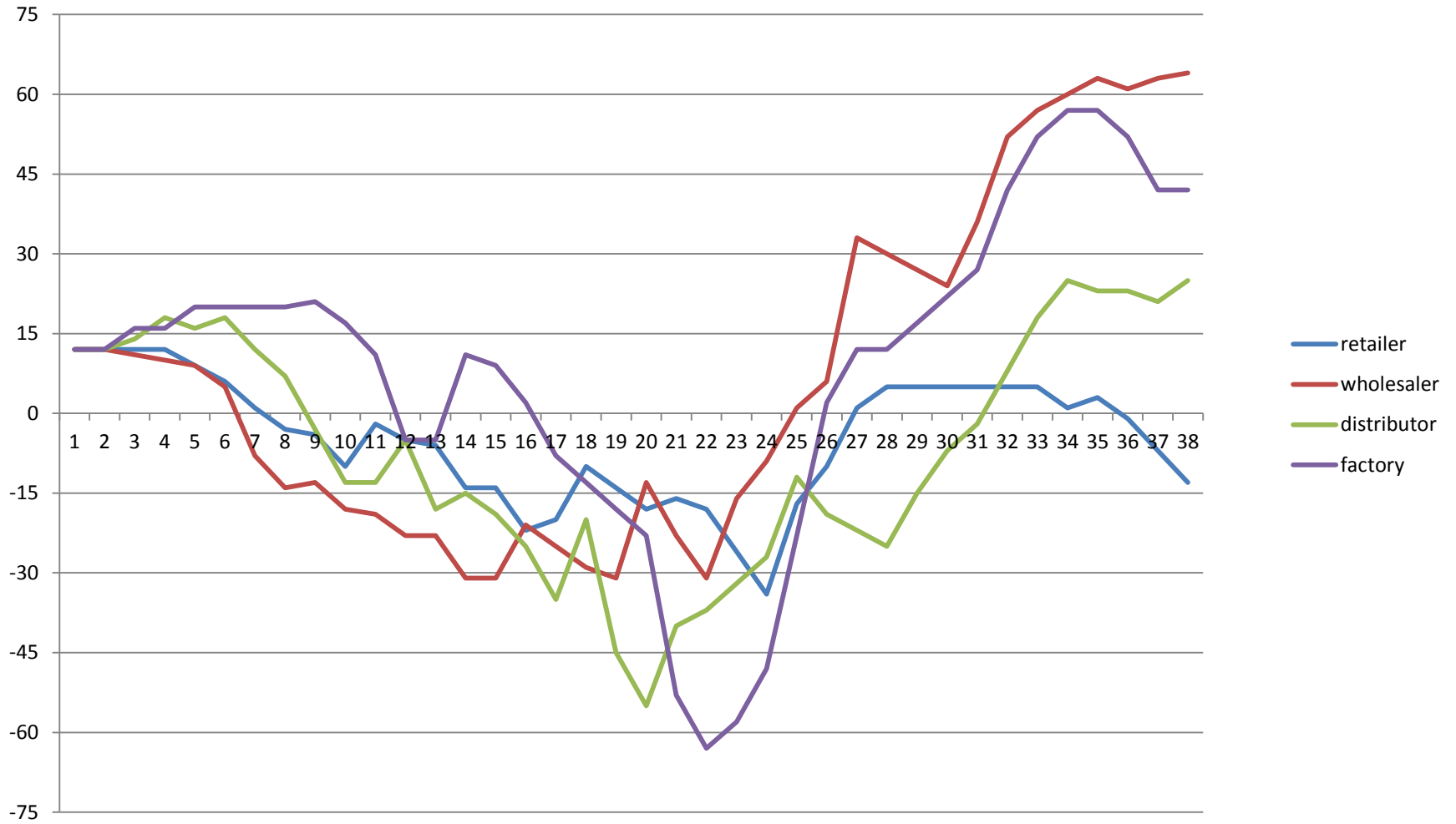
Ali baba distributor inventory



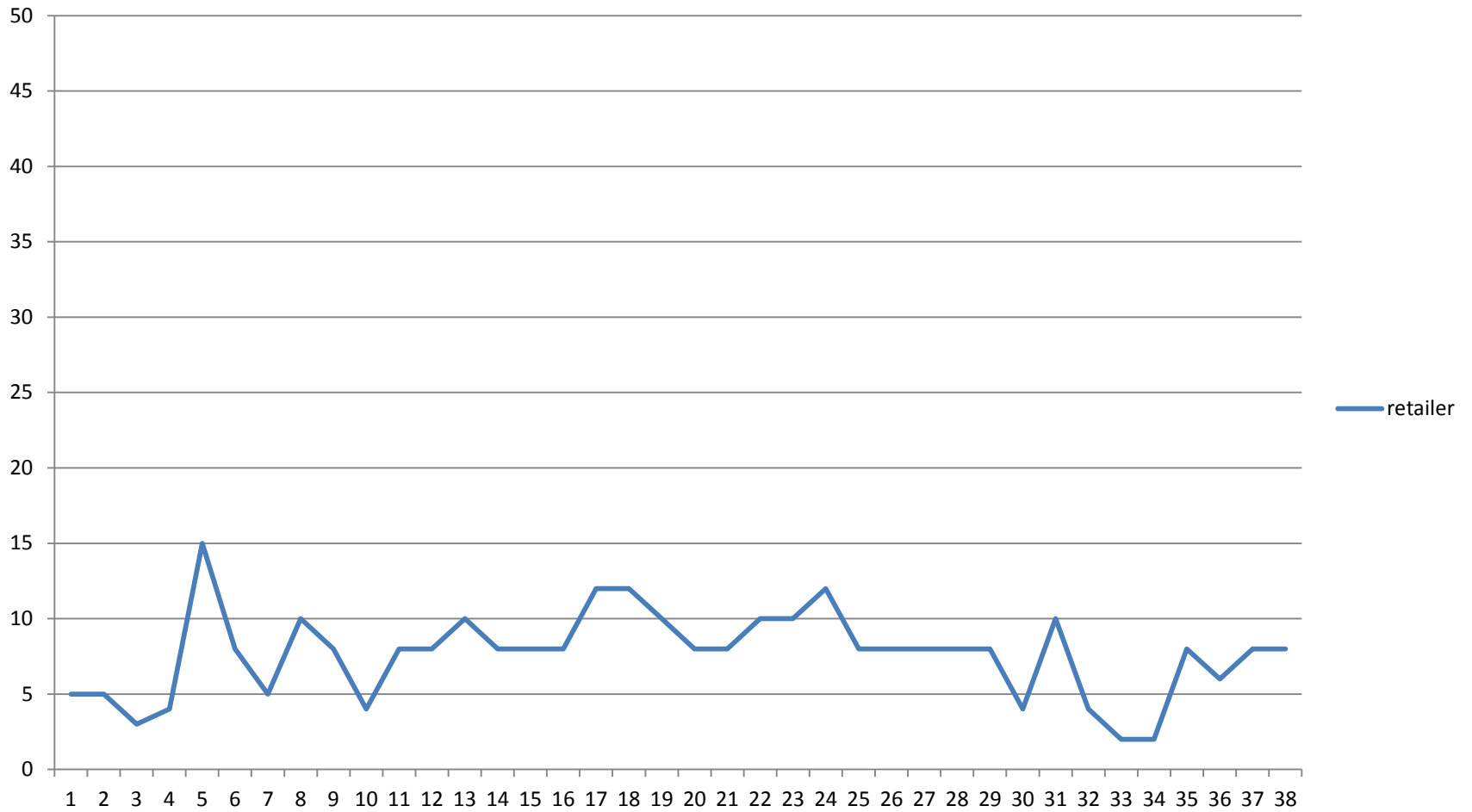
Ali baba factory inventory



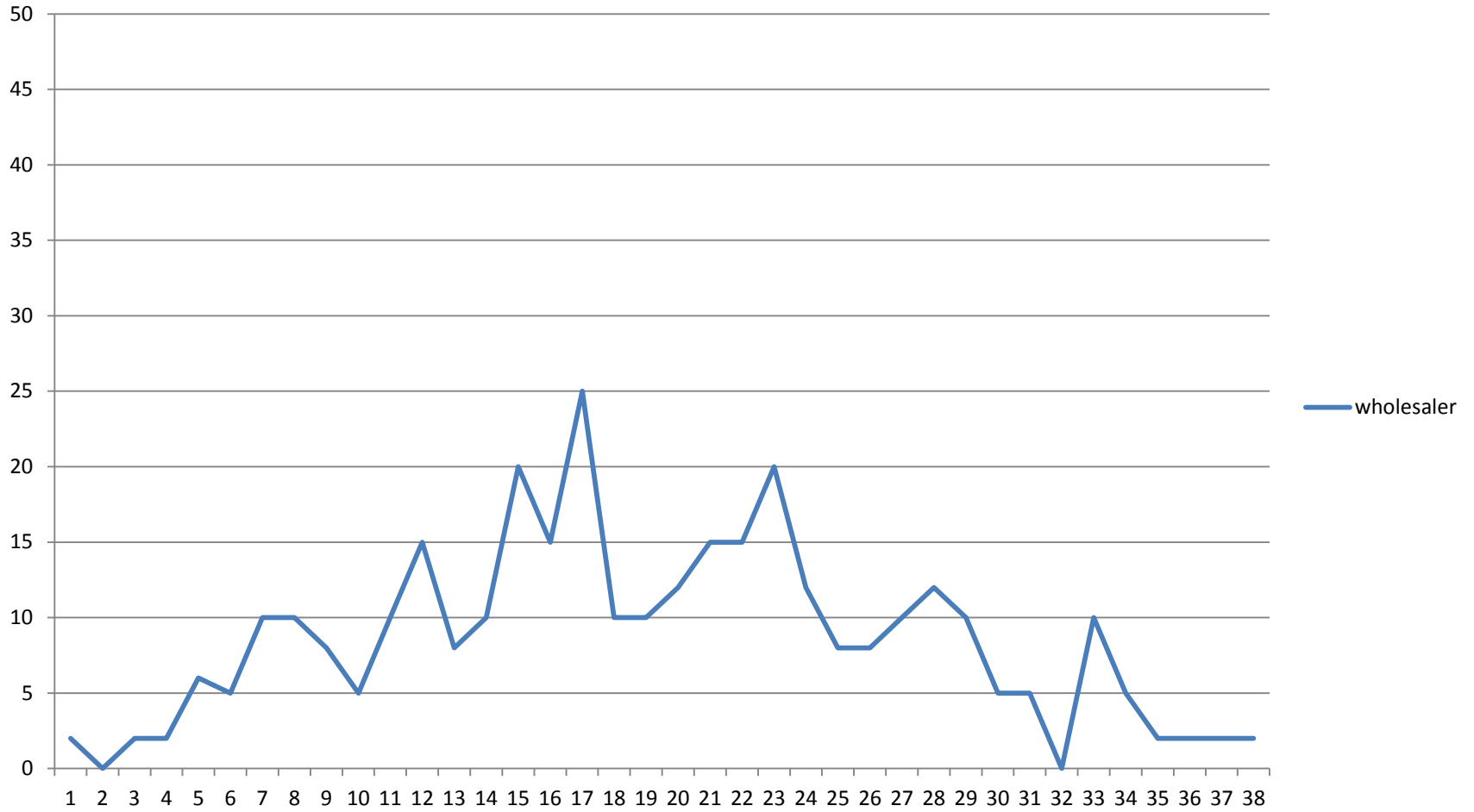
Ali Baba Amazon Inventory -- total cost = \$2219



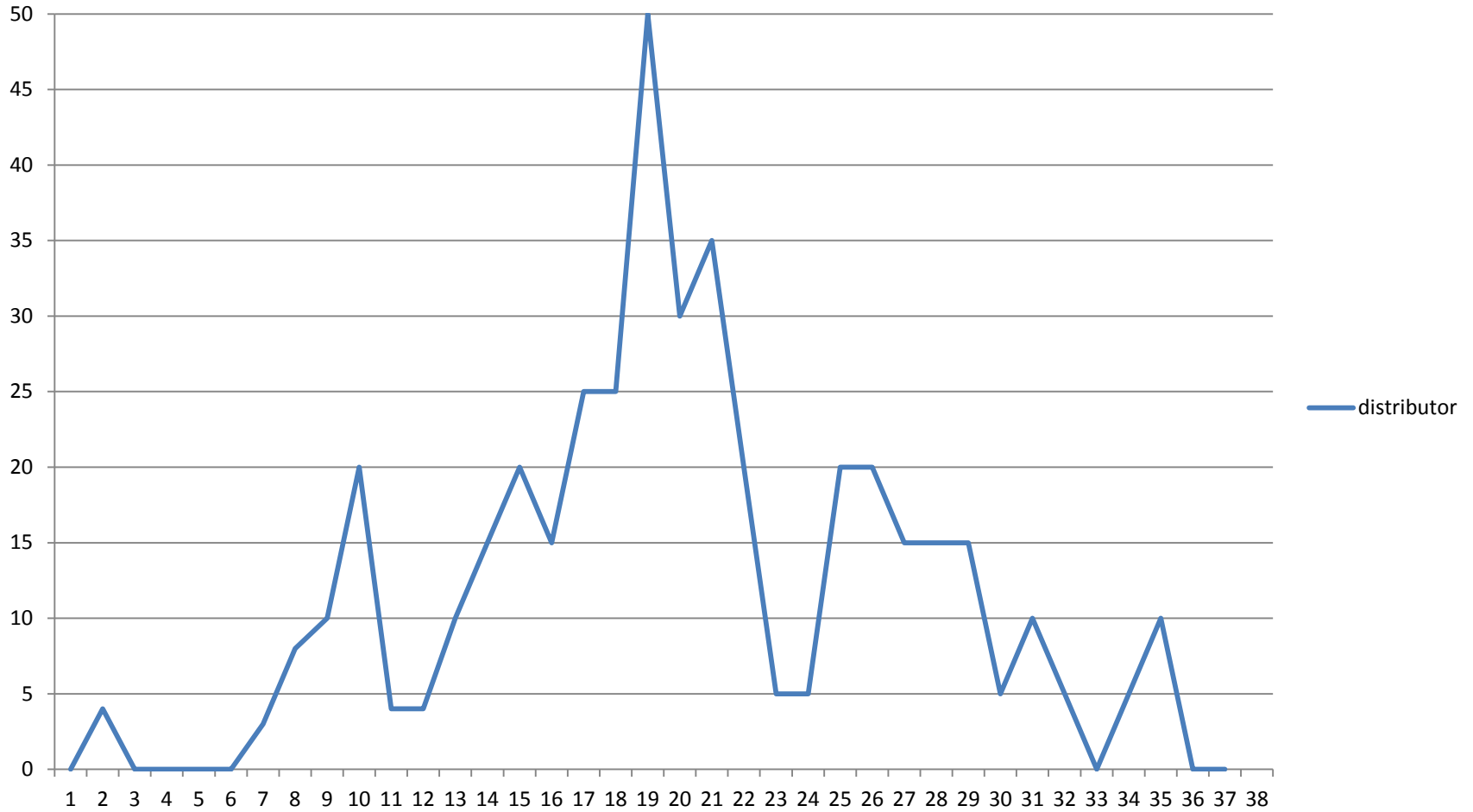
Ali baba retailer orders



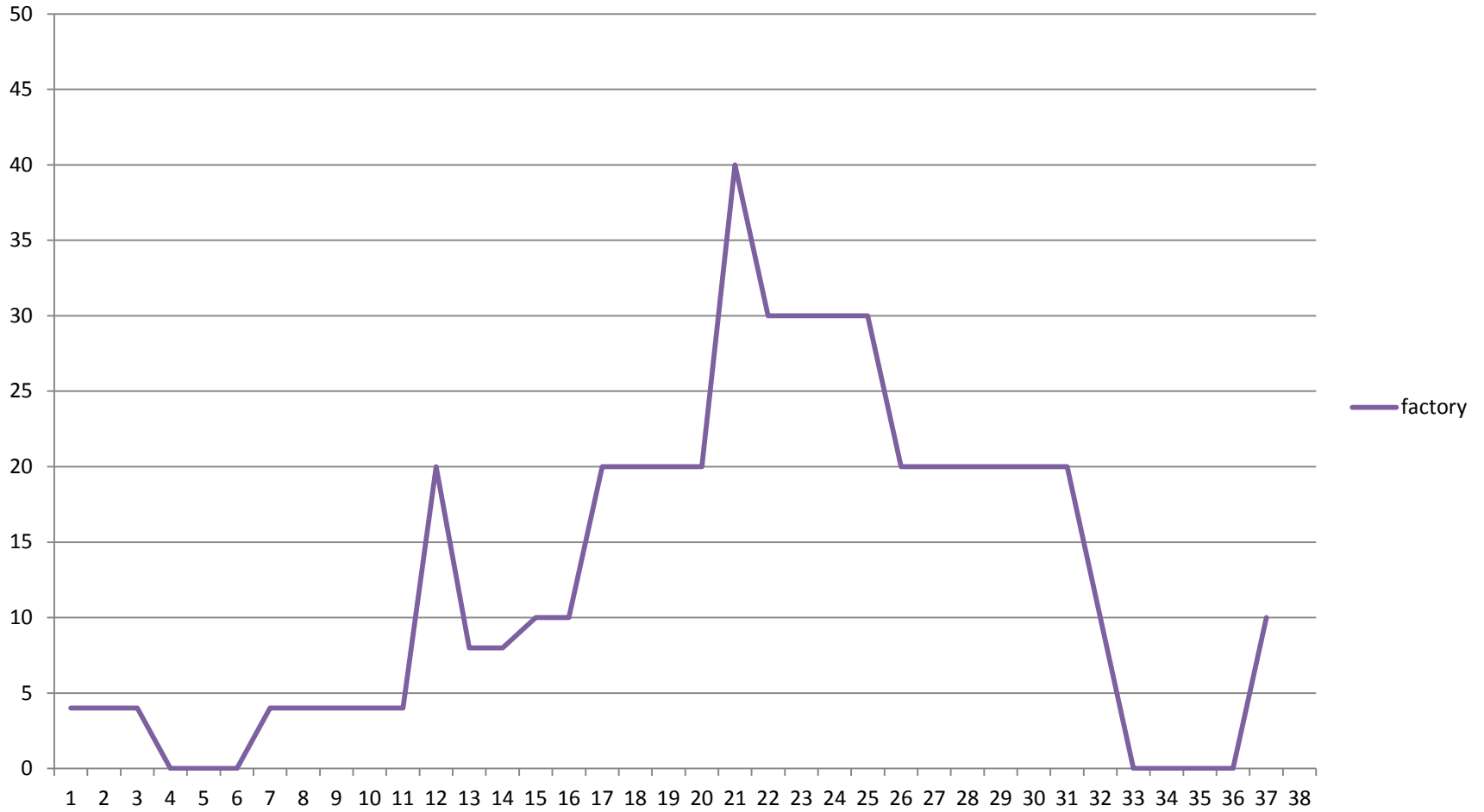
Ali baba wholesaler orders



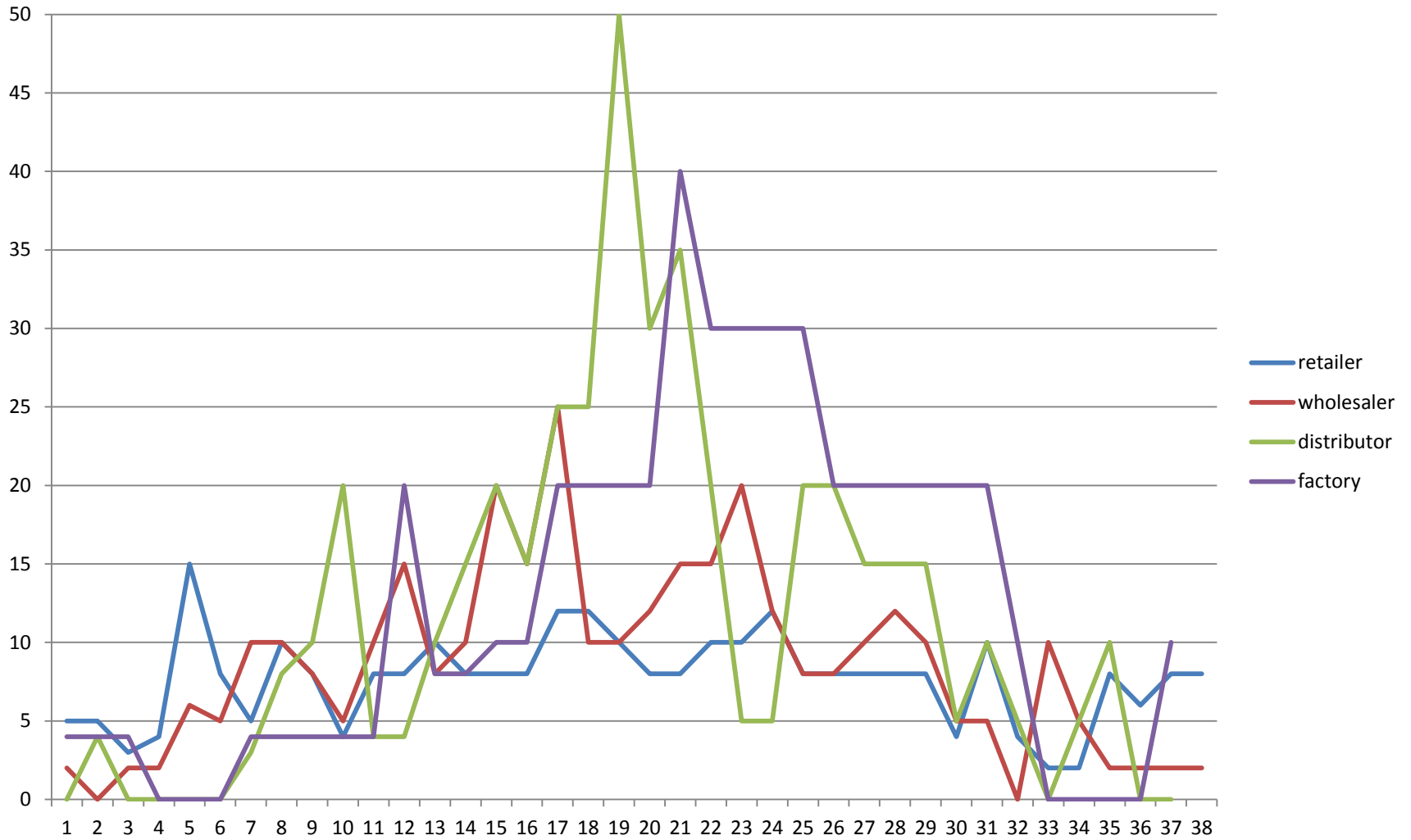
Ali baba distributor orders



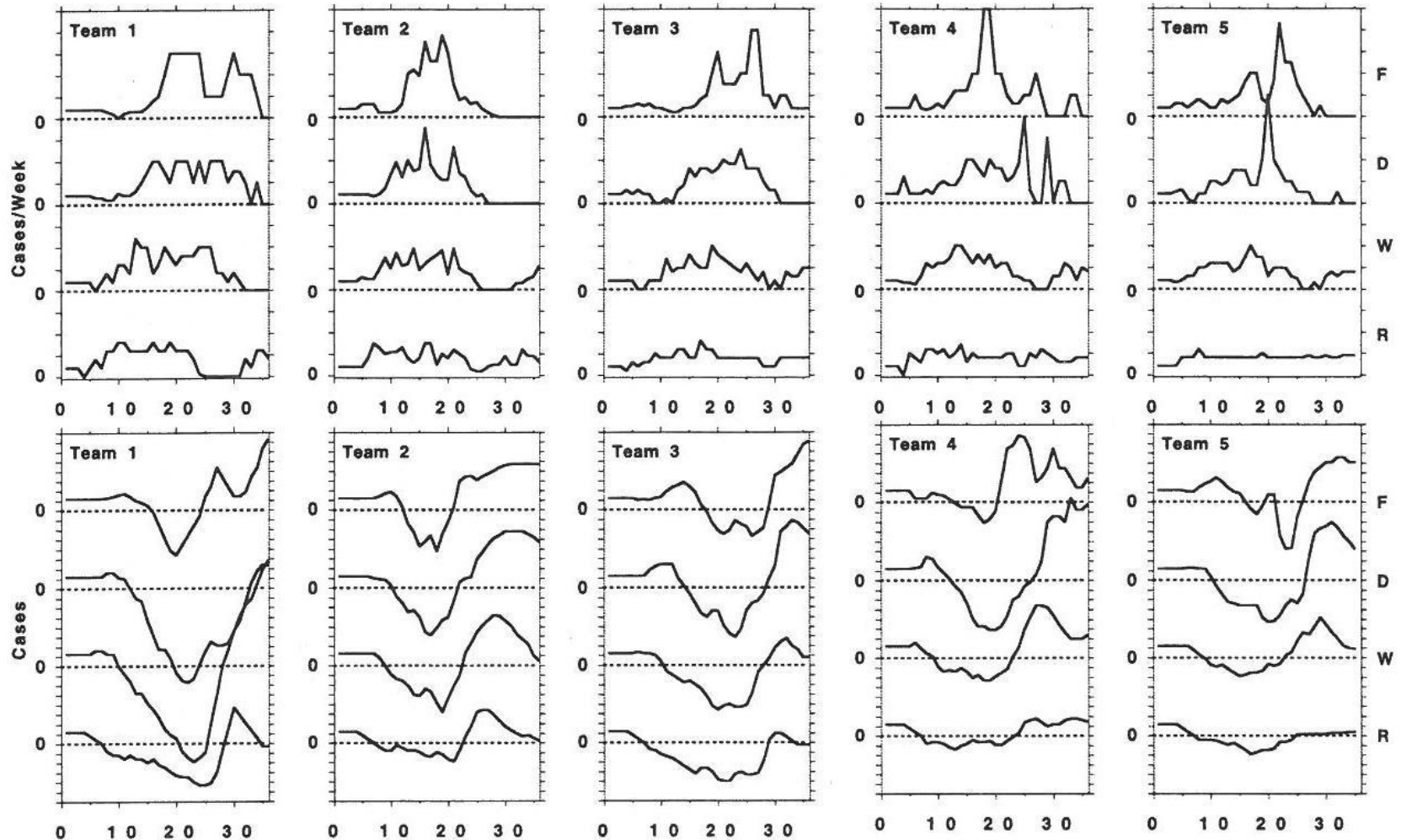
Ali baba factory orders



Ali Baba Amazon Orders



Typical Results of the Beer Game



Patterns of Behavior in the Beer Game

Thousands of people have played the beer game. Though *events* such as the magnitude and timing of orders differ from game to game, the *pattern of behavior* is always the same:

- Oscillation
 - Inventories and orders fluctuate with about a 20 week cycle.
- Amplification
 - The oscillation grows larger as you move from the retailer to the factory
- Delay
 - Peaks and troughs occur later as you move from the retailer to the factory

Overheard During the Beer Game

“We would like to know what the hell is going on at the other end of the table.”

“Send anything! Please, we are thirsty.”

“We are shopping around for better suppliers.”

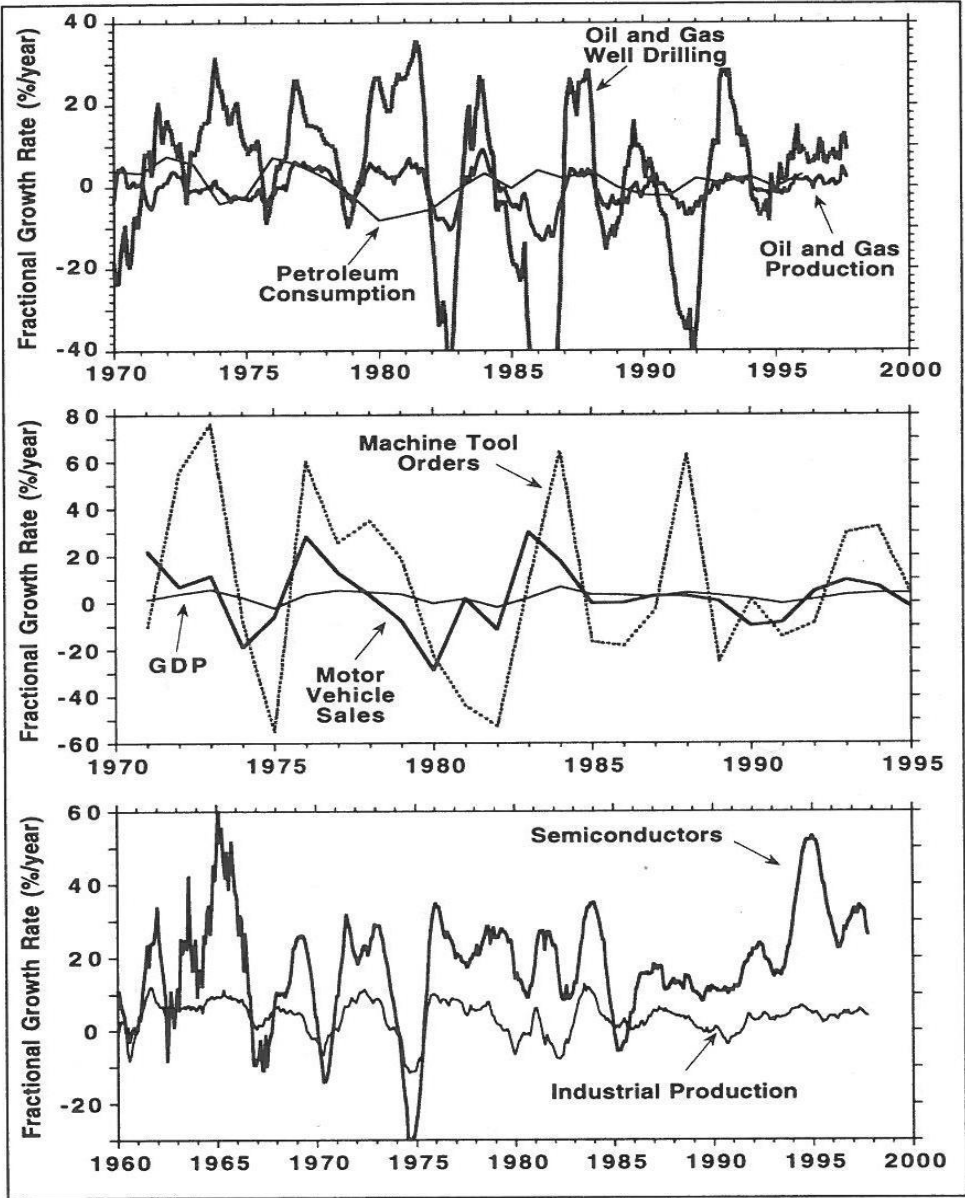
“If they could stabilize demand we’d be doing OK.”

“We are doing OK but we have a little backlog.”

[Backlog was 285 cases]

“Why are they doing this to us when we are all on the same team.”

Supply Chain Volatility: Examples



Lessons of the Beer Game

- **The structure of our systems creates their behavior**
 - 'Structure' is more than the formal structure of the organization. It includes the 'plumbing' of the system, patterns of information flow and communication, and the mental models we use to interpret information and make decisions.
- **Leverage lies in redesigning the structure of our systems**
 - By changing the time delays and 'plumbing' of the system, the flows information, and our mental models, we can dramatically improve system performance.
- **Systems thinking is essential**
 - High leverage points are often distant from the symptoms of difficulty; feedback loops across organizational and functional boundaries.
- **Developing systems thinking is everyone's job**
 - Building shared understanding with customers, suppliers, and colleagues is fundamental to successful organizational learning.

Lessons of the Beer Game: Organizational Learning Disabilities*

- **"I am my position"**
 - We identify with our roles and see ourselves as small and helpless parts of an overwhelming machine.
- **The enemy is out there**
 - We believe problems are caused by outside forces beyond our control.
- **Events cause events**
 - We focus our explanations on events rather than patterns of behavior, coming to believe the future is random and capricious.
- **Proactive management is needed**
 - Being proactive usually means reacting even more aggressively to the pressure of events, often intensifying the problem.
- **We will learn from experience**
 - We believe we can learn from experience but we never directly confront many of the most important consequences of our actions.

* Adapted from P. Senge, The Fifth Discipline

Project Ideas

Strategies

- Work in teams – we might enlist an LGO student(s)
- You propose your own project
 - Research
 - Start-up
 - Other connections
- We propose project
 - Not necessarily clear cut
 - You are still the “entrepreneur”
 - Take it as far as you want

Air Liquide

- Explore feasibility of delivering Oxygen to hospitals in developing countries
 - Choice of technology
 - Design of supply chain; make-buy choices
 - Business model, including financing
 - Cameroon and Ghana are possible target markets

ARTI- Tanzania

- How to improve the operation of new production line for Ag-waste charcoal briquettes
 - Grinder
 - Mixer
 - Extruder
- Likely to require consideration of upstream and downstream operations
- D-Lab scale-up partner

WeCycler

- As the business continues to expand, a project could:
 - Look at how to achieve more efficient routing of vehicles
 - Examine how to improve customer retention
- D-Lab scale-up partner

Ghonsla

- Examine transportation of product (insulation panels) from manufacturing facility to sales region
- Focus on cost and time
- Likely to require consideration of upstream and downstream operations, which are linked by the transportation
- D-Lab scale-up partner

Organic Waste processing with BSF

- Mapping of supply chain
- Make – Buy choices
- Cost modeling

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