



# ***Self-Organizing Markets And Time***

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**“Remember: no matter where you go... there you are.”**

# Where Have We Been, Where Are We, And Where Are We Going?



- I. Surface self-organization – 2D
- II. Spatial self-organization – 3D
- III. Market self-organization – 2D, 3D, 4D, and 5D
- IV. Summary

## Surface Self-Organization – 2D

# What Is The Purpose Of This?



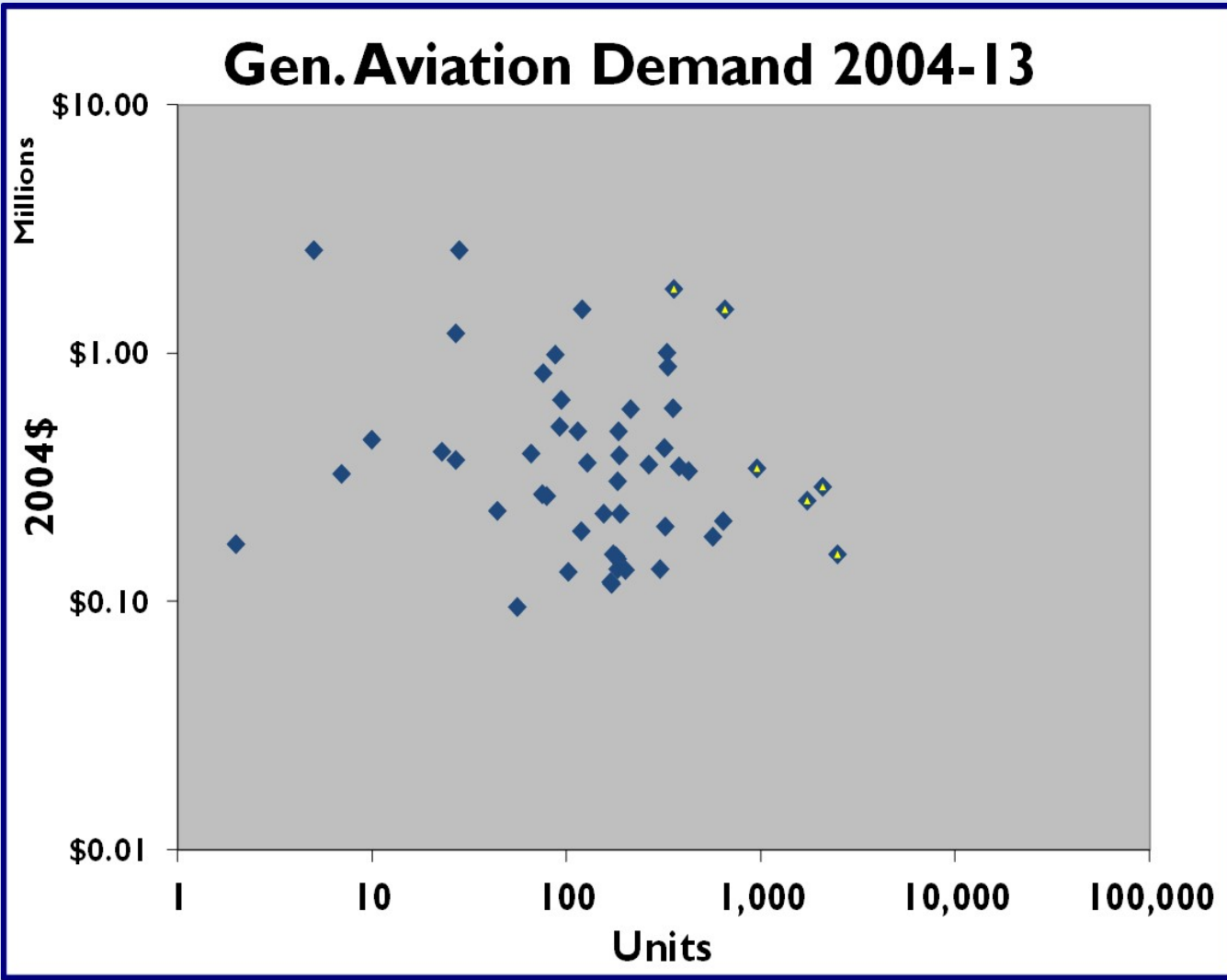
Penguins huddle for warmth and coordinate movements to and from the perimeter



Players huddle to get information

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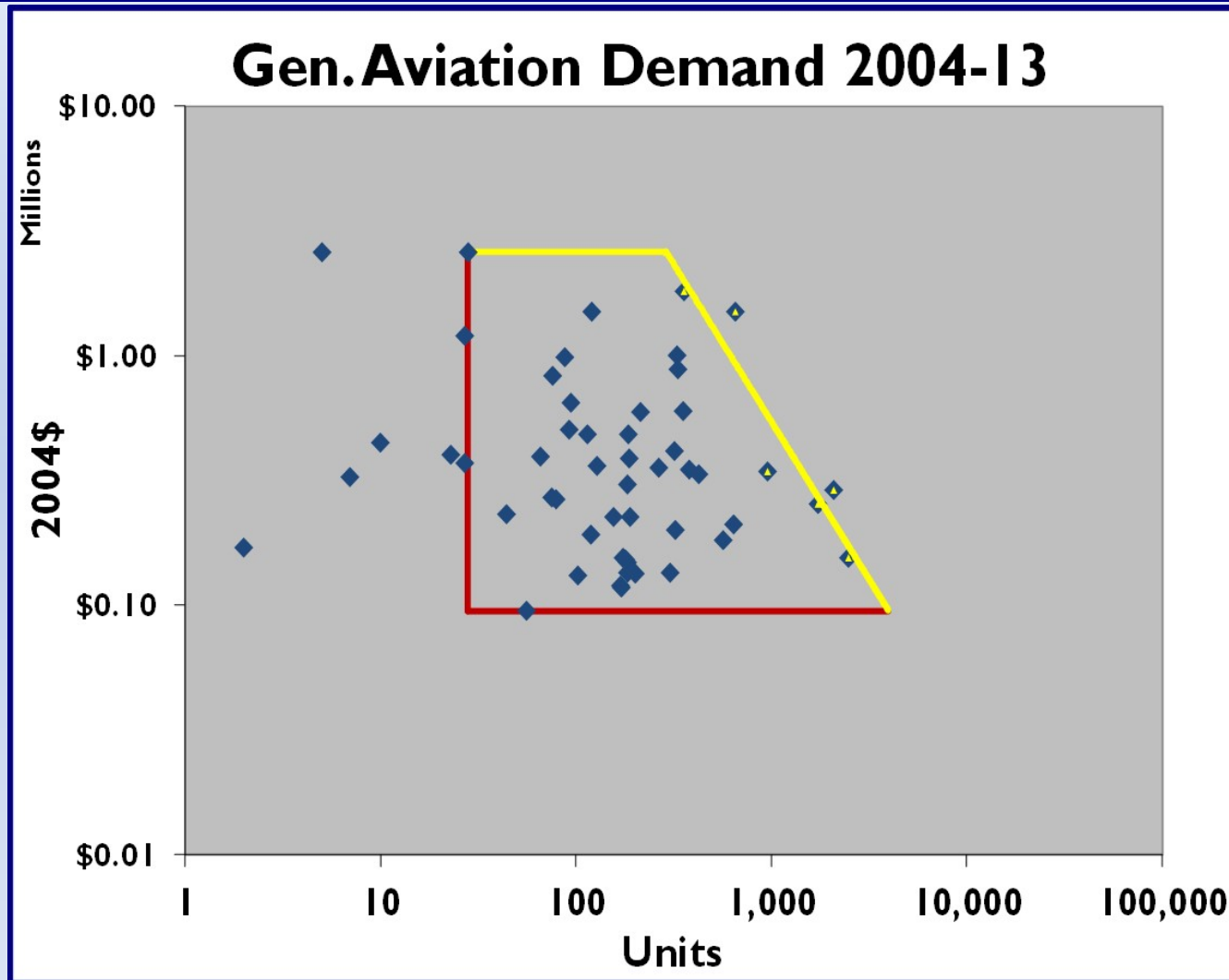
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There appear to be some huddling behavior here – what can we say about it?

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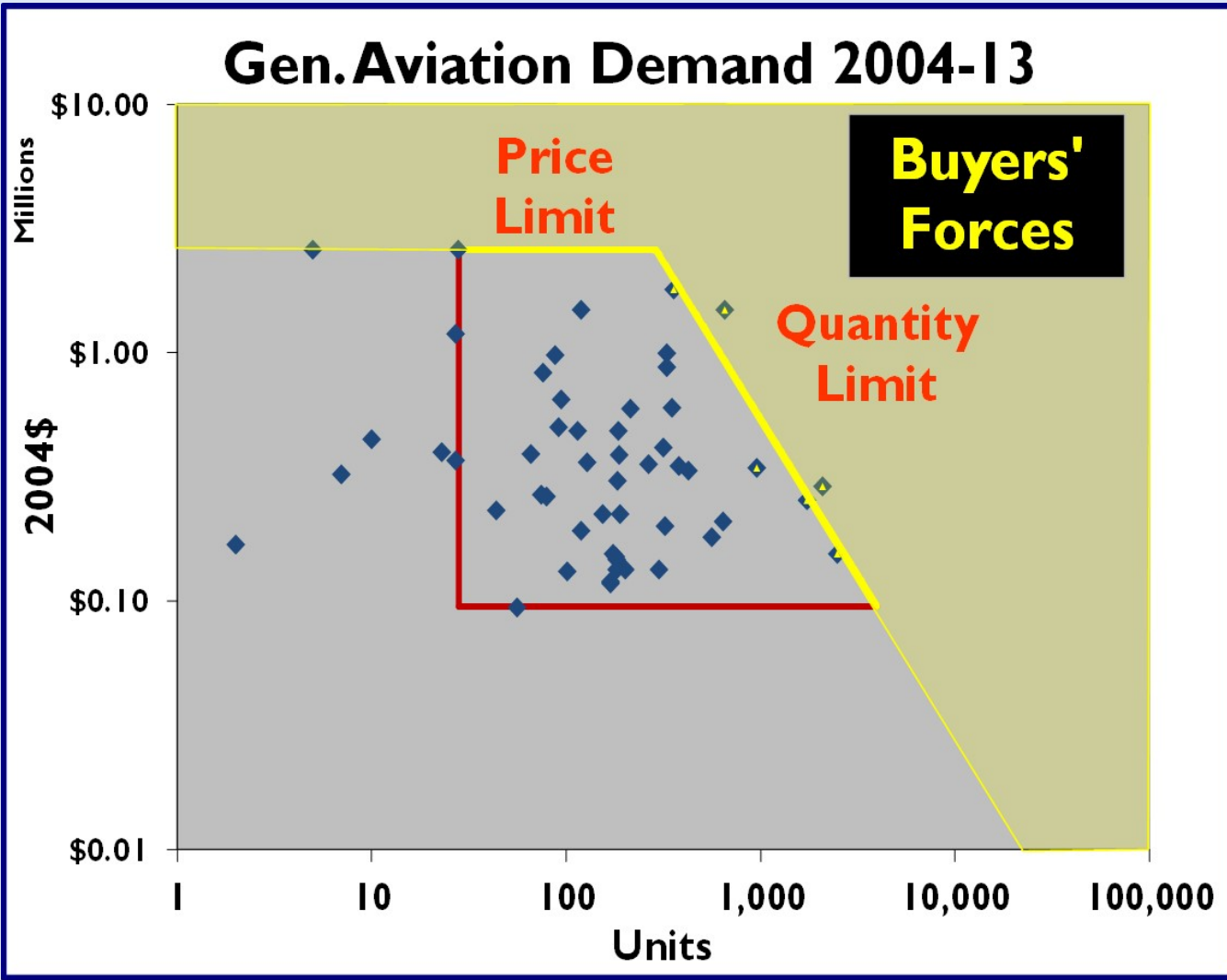
# What Limits The Upper, Lower, Inner And Outer Bounds?



Excepting a few outliers, the entire group lies within definite boundaries

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# How Does This Affect Buyers?

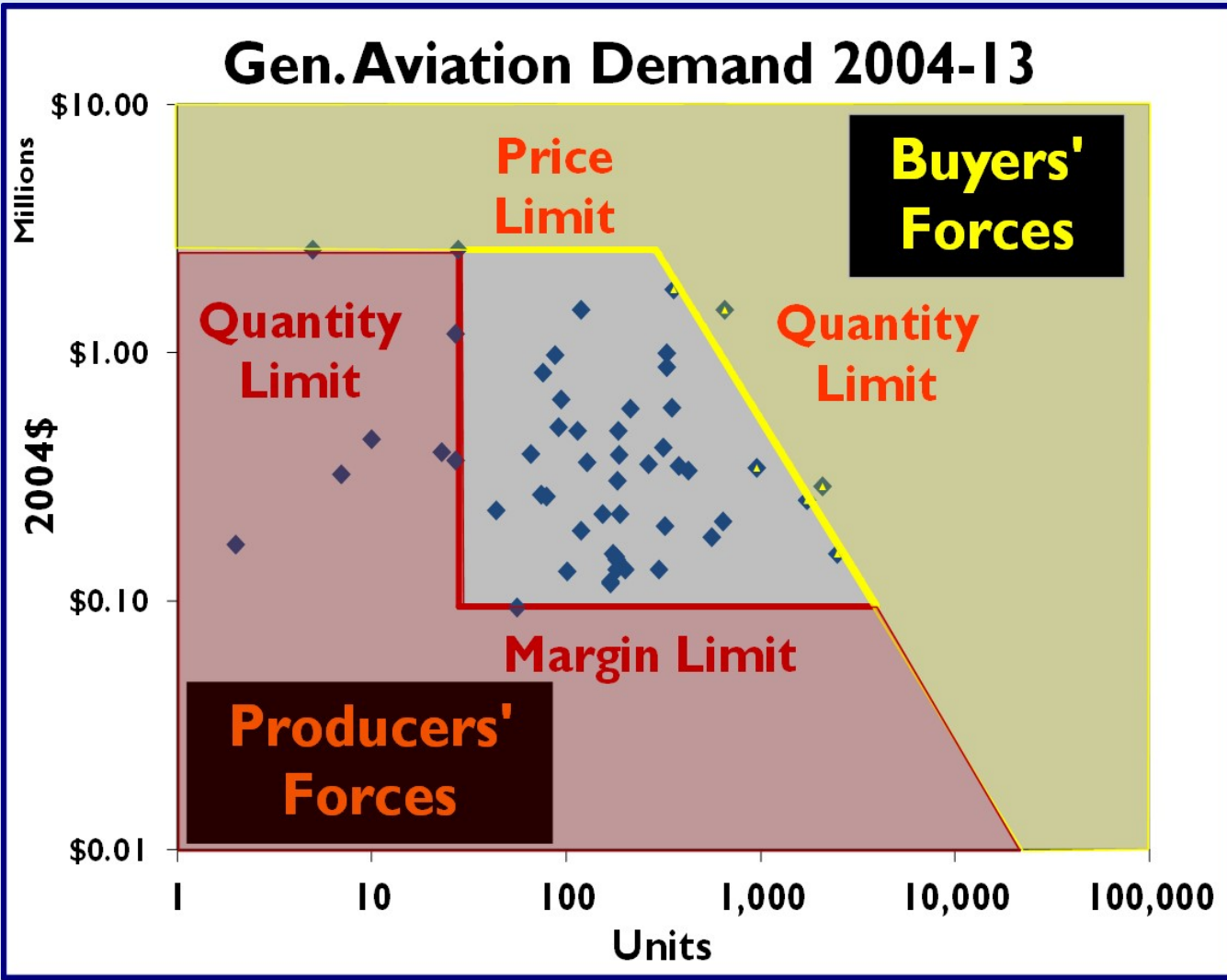


Quantity limits reflect buyer saturation; product forms define price limits

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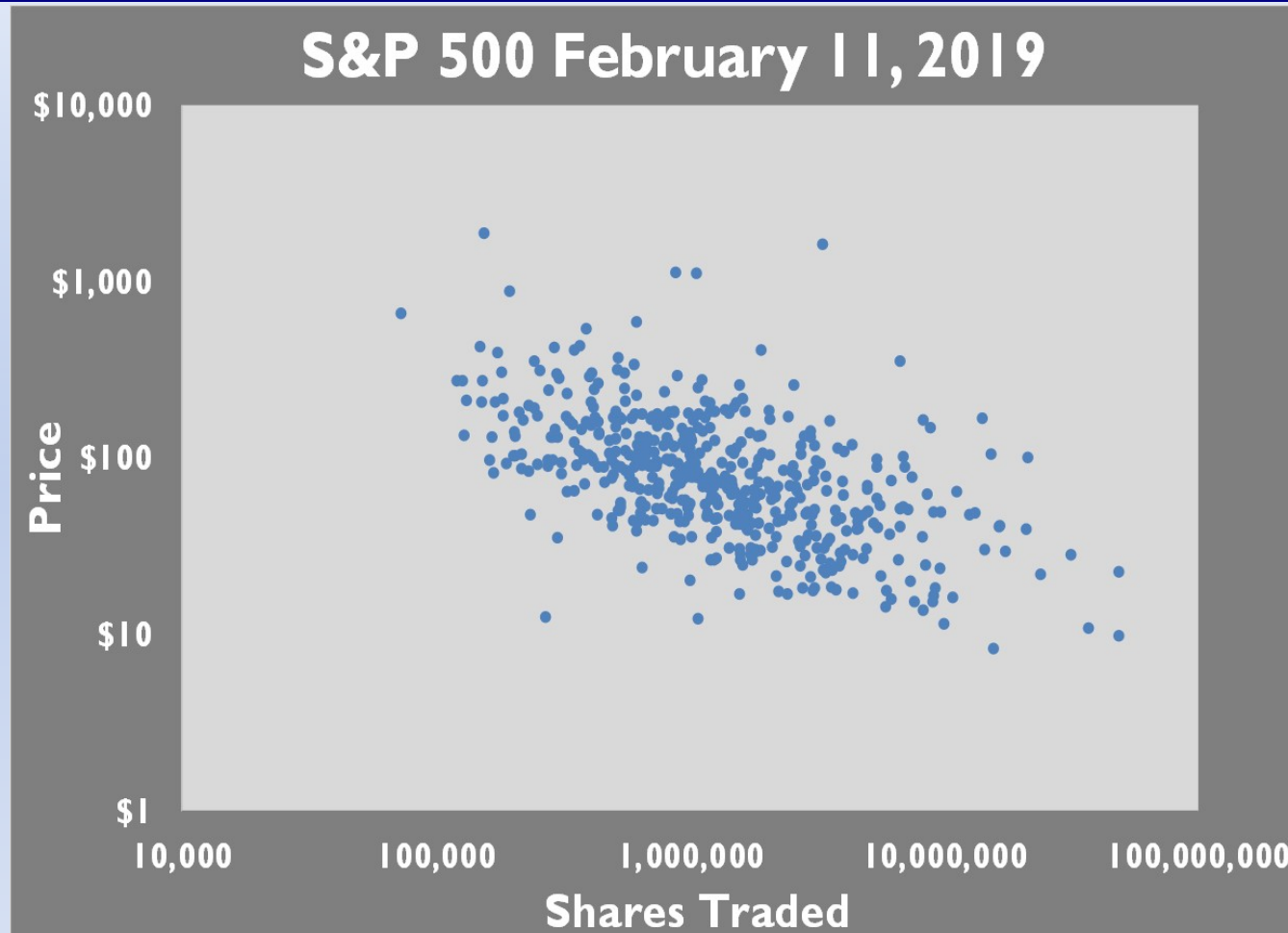
# How Does This Affect Sellers?



Producers need sufficient quantities and margins to keep learning and profits

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# Is The Previous Example An Anomaly?



A chart like this exists for all large, mature stock markets every day

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## Spatial Self-Organization – 3D

# What Is This And What Is Its Purpose?



A tightly packed murmuration of starlings, a Sort Sol, protects itself from predators

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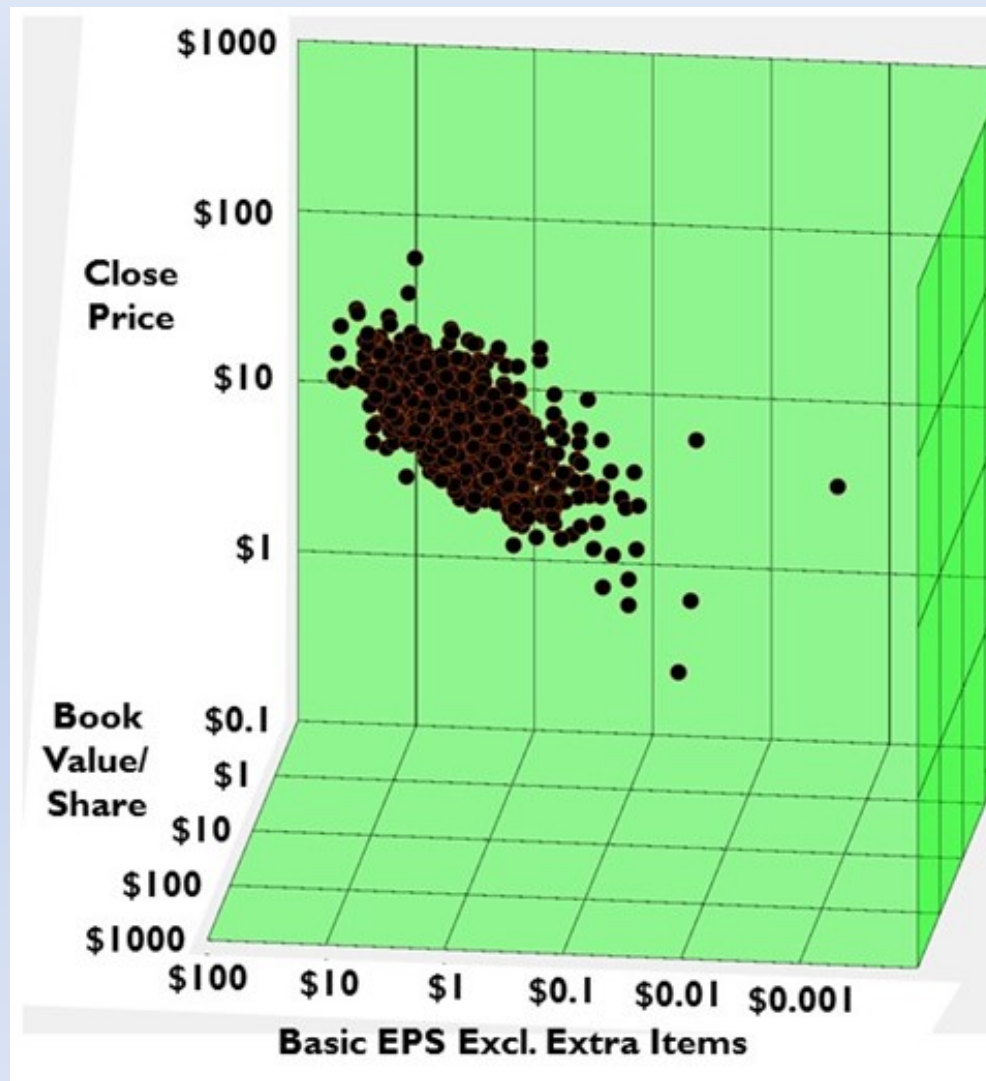


## A squadron of F-117A fighters protects against predators

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# What Does This Have To Do With Markets?



1002 stocks, March 31, 2007

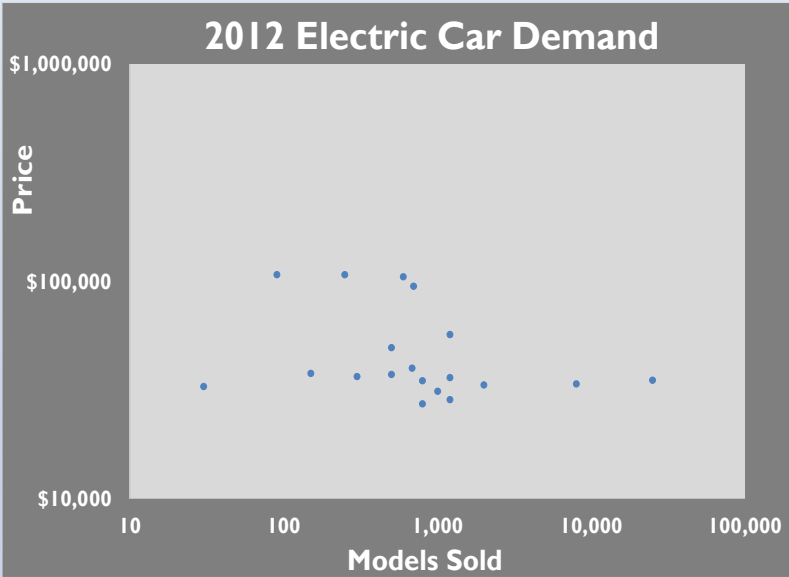
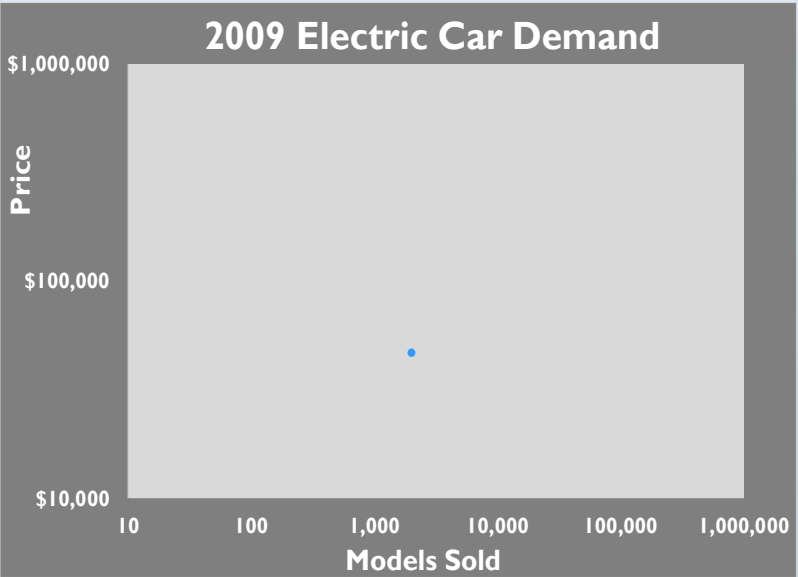
## Market self-organization – 2D, 3D, 4D, and 5D

# How Does Demand Change Over Time?



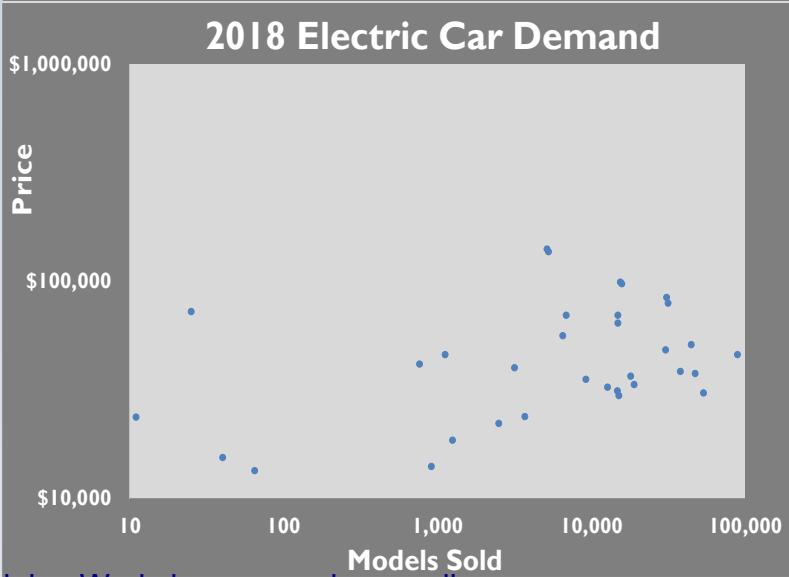
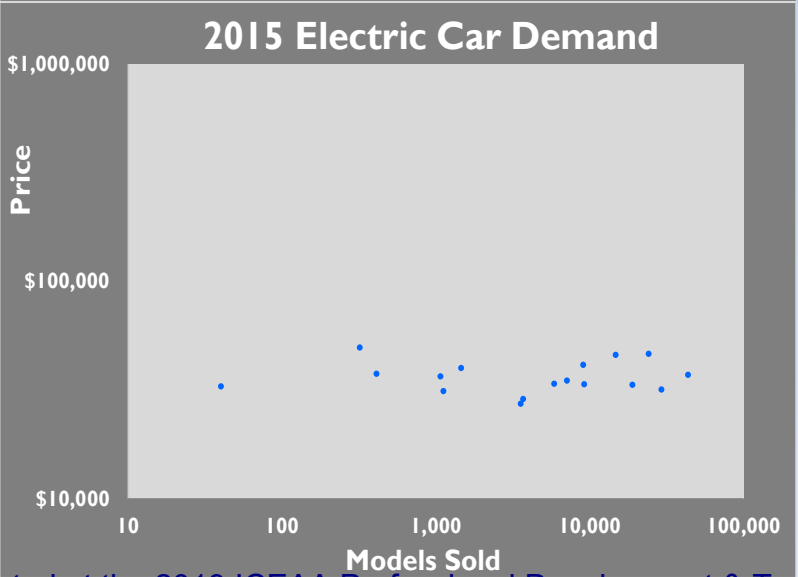
Market start

Others enter



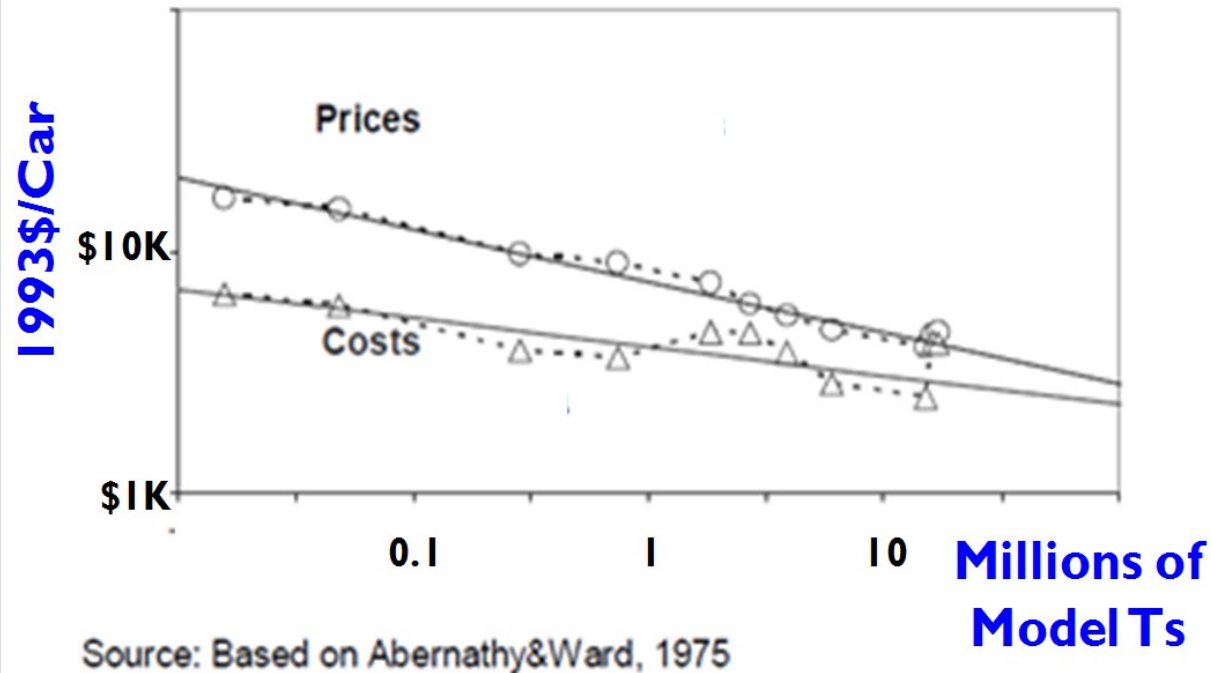
Customers need price reductions

Others enter





## Learning Lowered Model T Costs; Its Prices Fell on Saturation



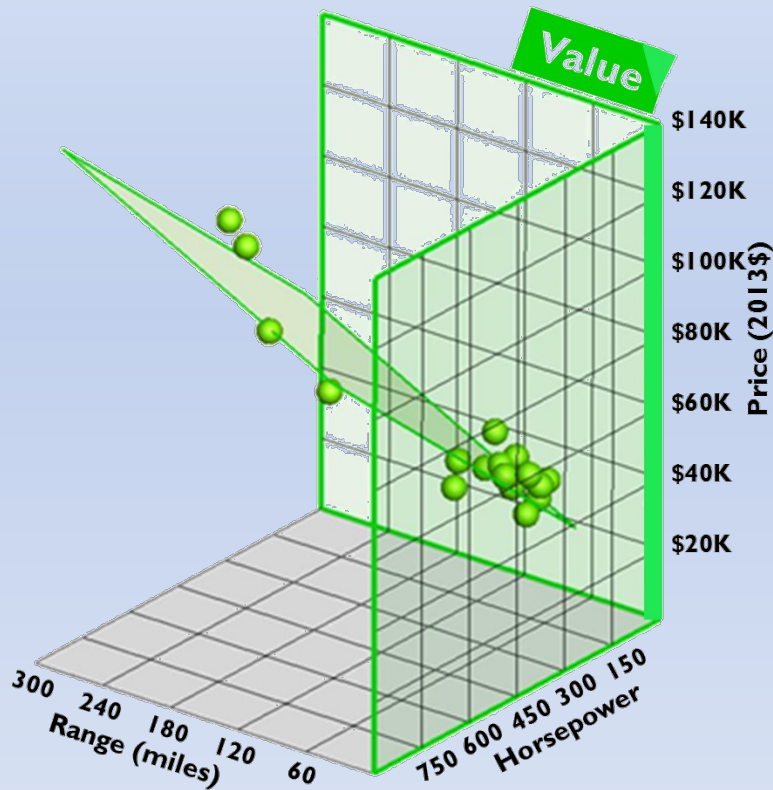
When prices exceeds costs, producers sell at a profit via **sustainable disequilibrium**:

Production stops when costs exceed product values

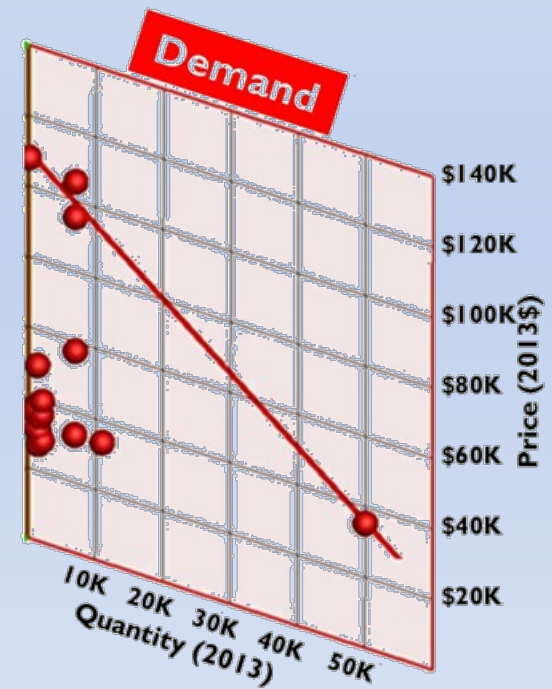
# What's Happening With Electric Cars?



In the same year, Value was a function of range and horsepower



In 2013, the market had a Demand Frontier

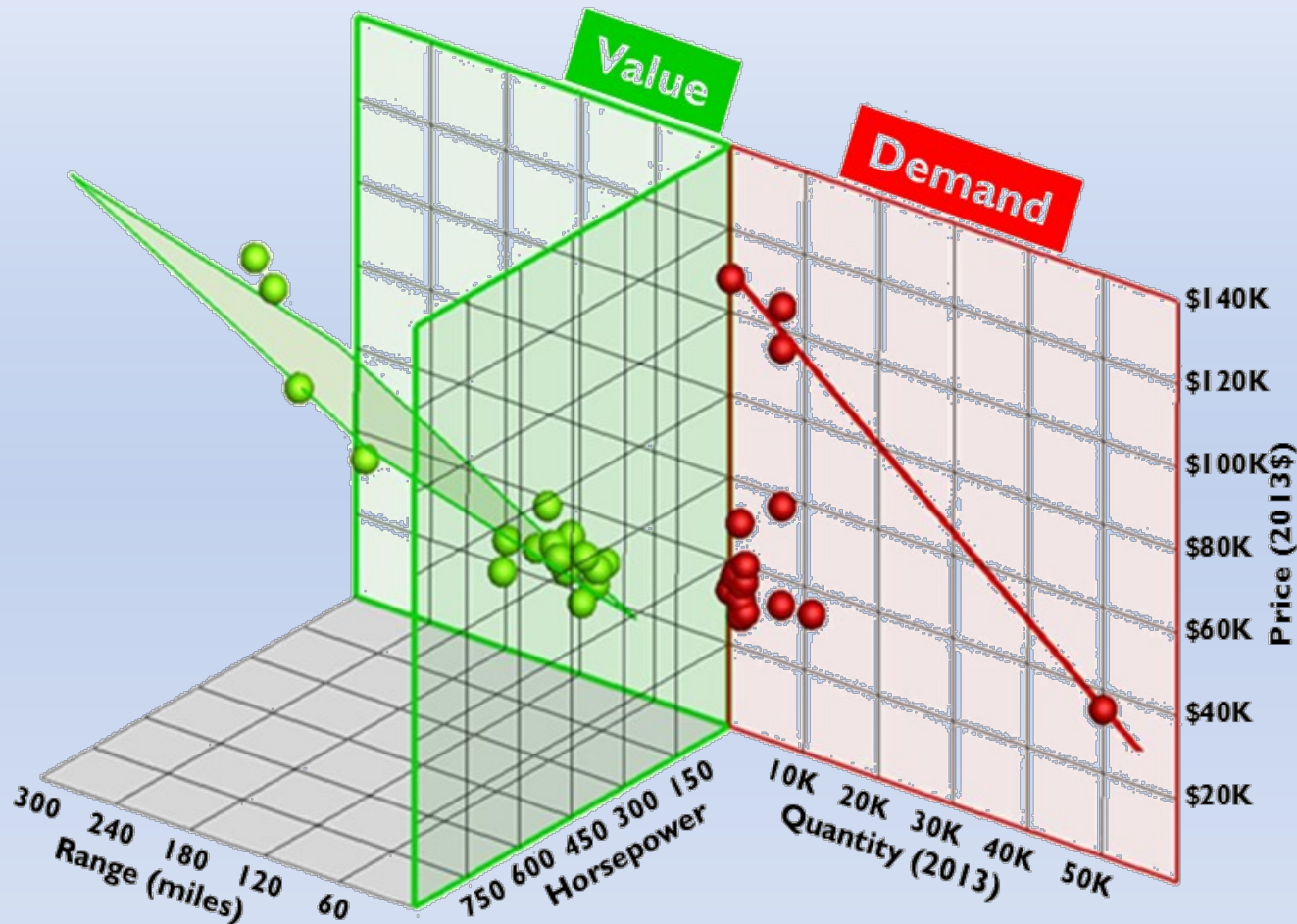


The 2D Demand Plane and the 3D Value Space share something in common

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# Demand Plane And Value Space Share The Price Axis, Forming 4D Systems

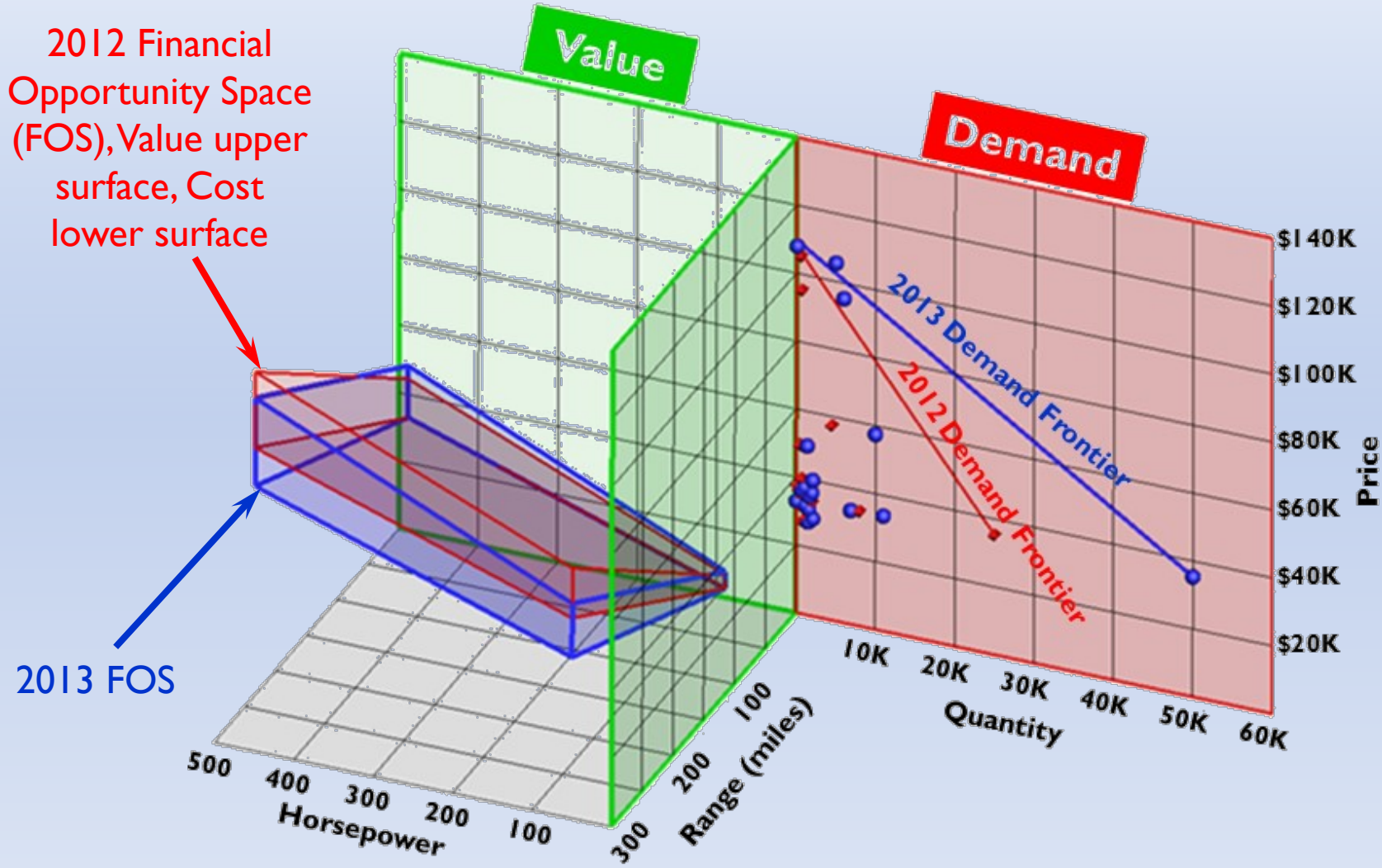


4D systems use ordered quads  
about an origin of (0,0,0,0)

Manufacturer	Model	HP	Range miles	2013 Qty	Price
Commuter Cars	Tango T600	805	120	100	\$108,000
Tesla	Model S Sig	362	265	7000	\$95,400
Tesla	Model S Sig Perf	416	265	7000	\$105,400
Nissan	Leaf	110	75	50000	\$35,340

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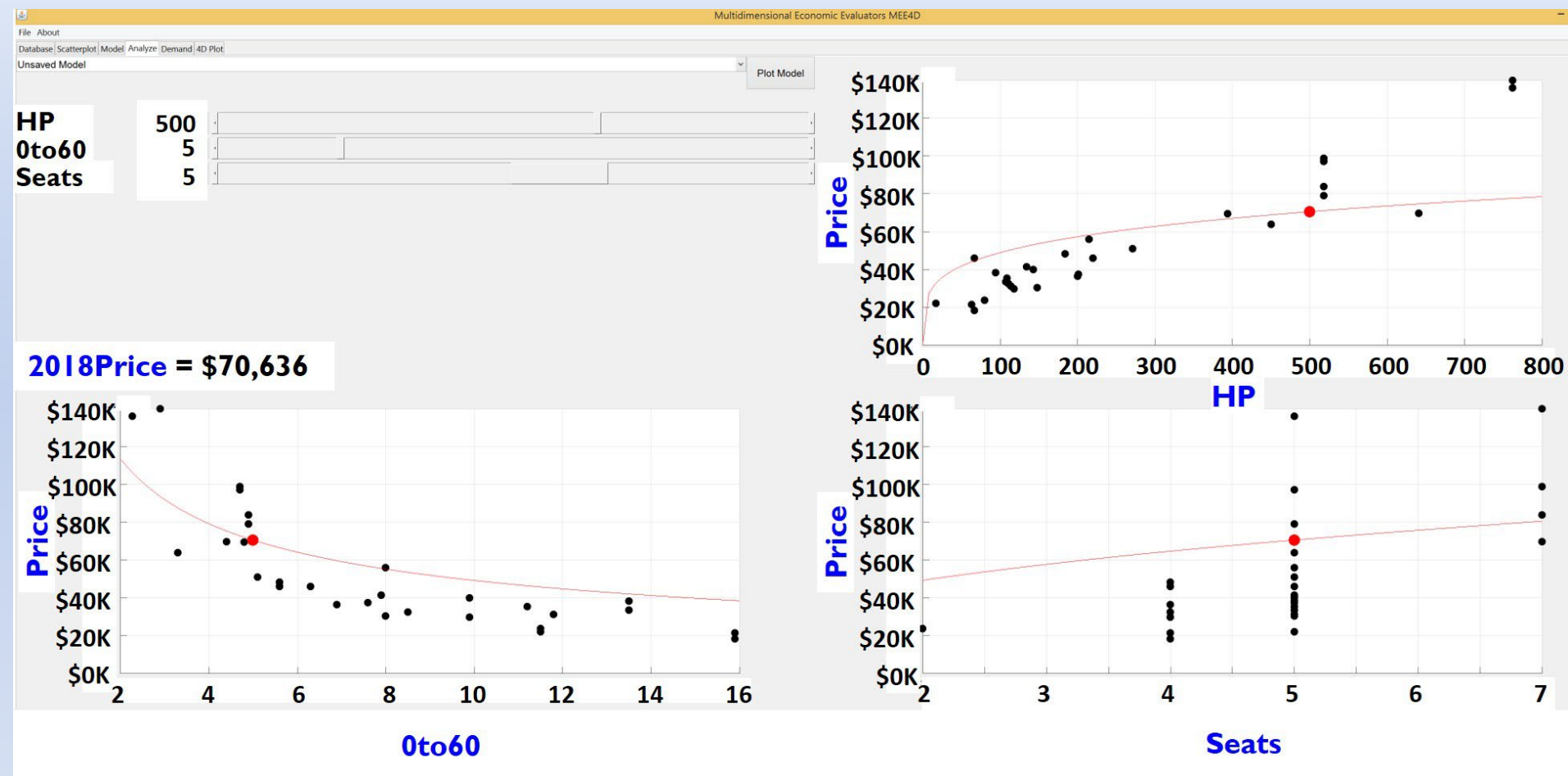
# Adding Time To 4D Systems Turns Them Into 5D Systems



5D systems use ordered quads plus time, displayed as (0,0,0,0,T)

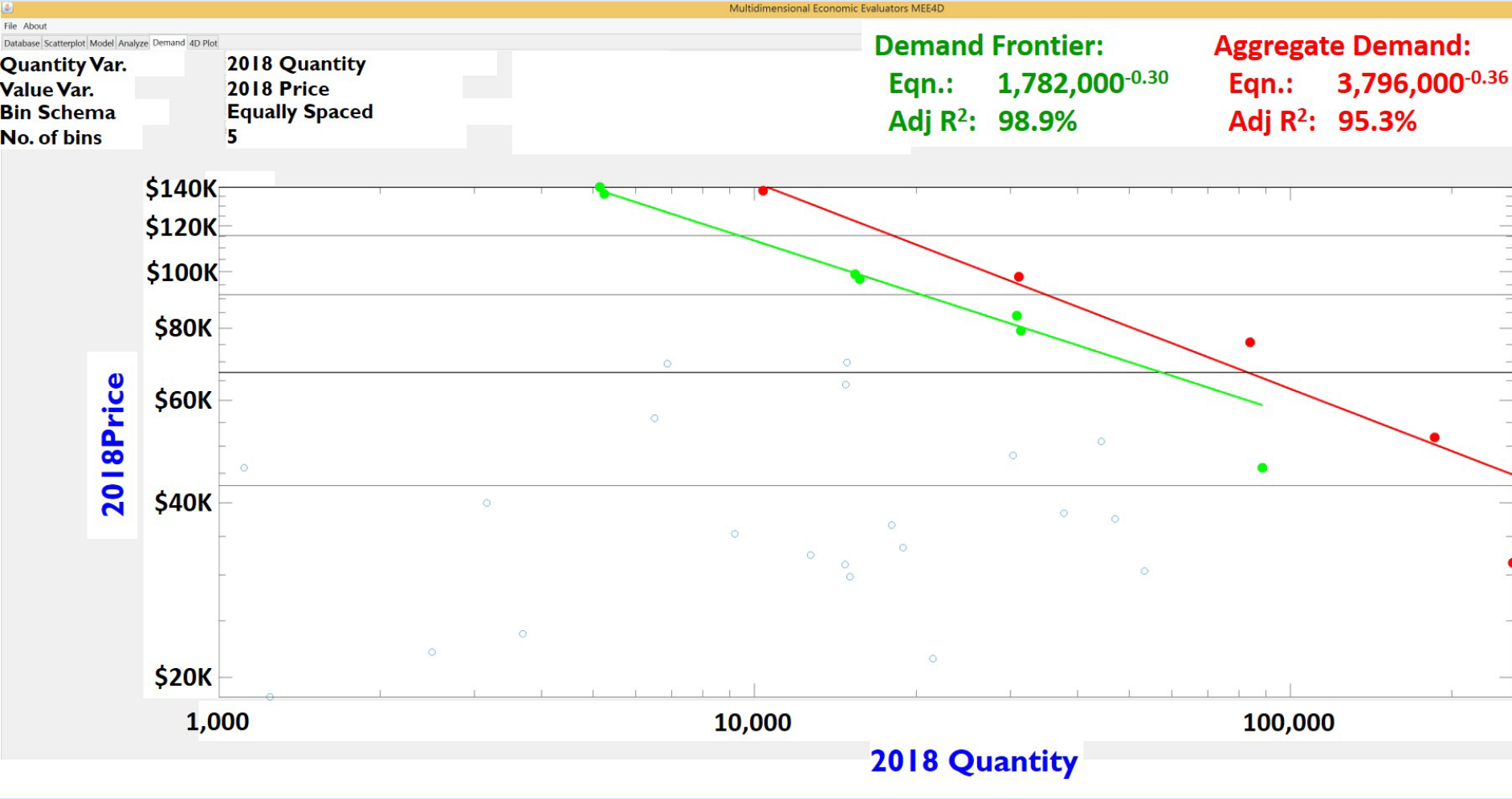
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# Electric Car Value Changed: In 2018, It Looked Like This



Value in 2018 was a function of horsepower, 0-60 time and seating capacity

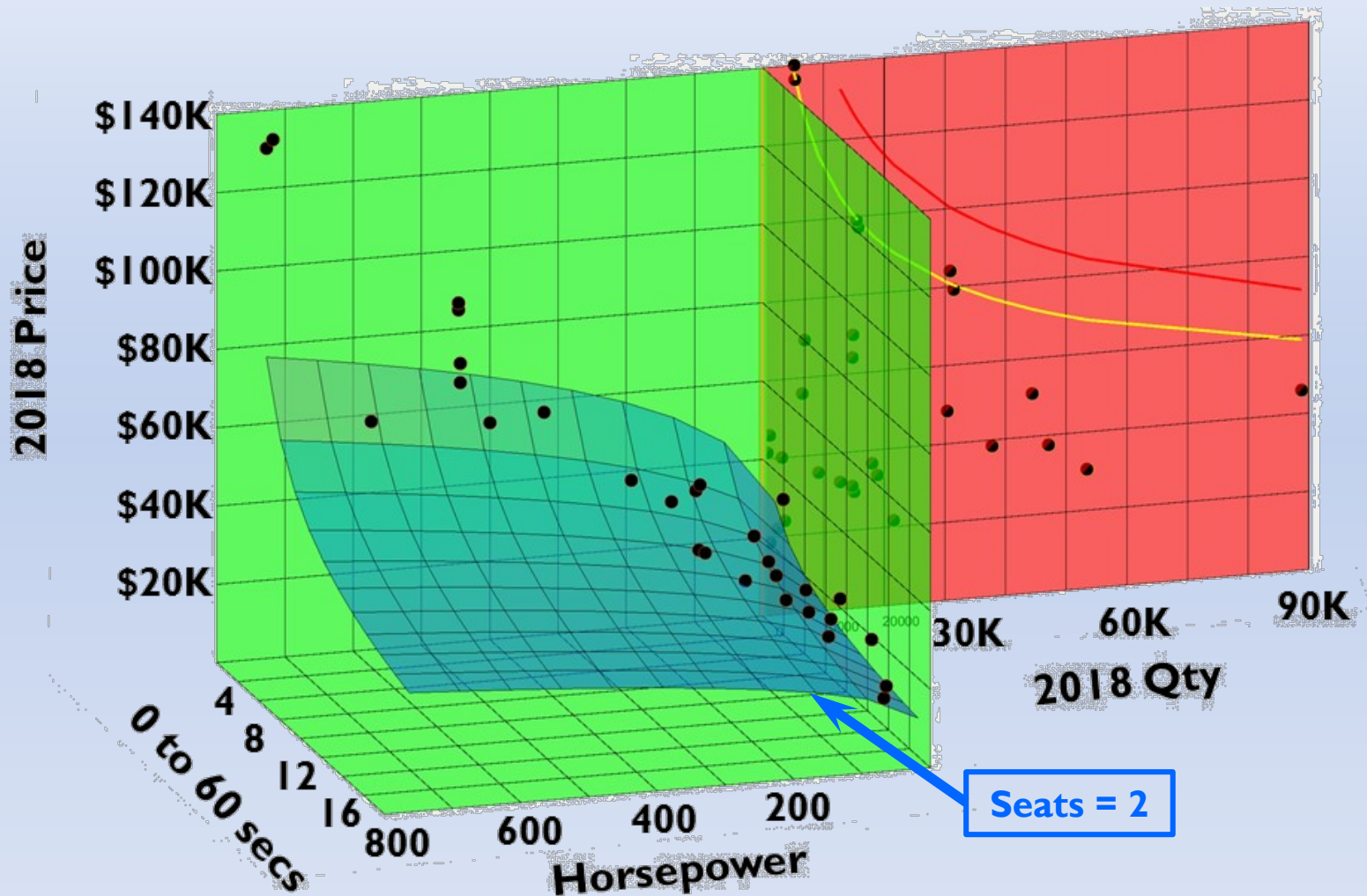
# Demand Changed Too



The Demand Frontier's slope (-0.30) mimics that of Aggregate Demand (-0.36), a phenomenon we see in mature markets

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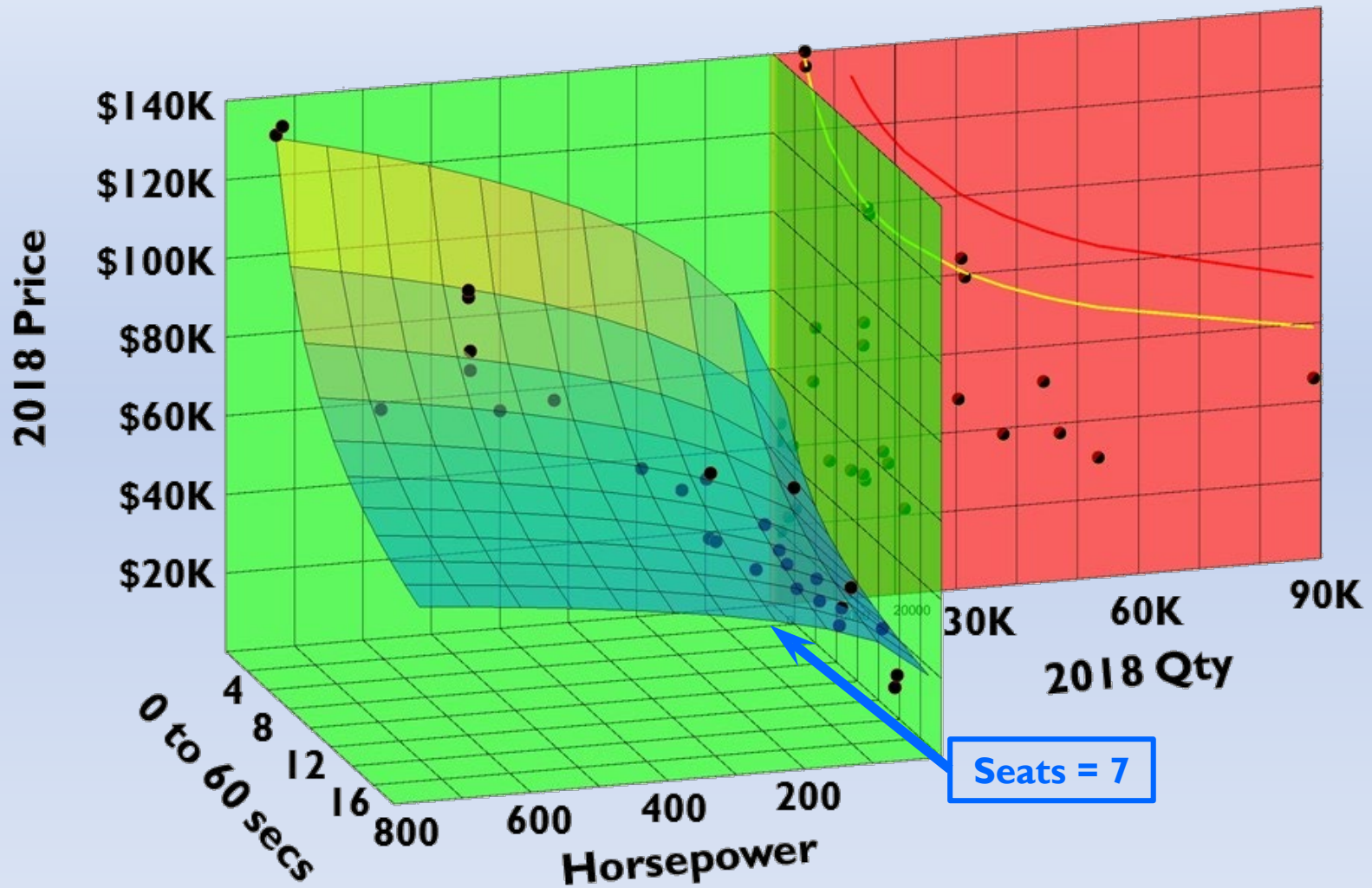
# What Does The 2018 Electric Car Market Look Like In 4D?



Value goes up with added horsepower, down with slower 0-60 times

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# What If We Changed The Number Of Seats?



Going from 2 seats to 7 seats more than doubles the vehicle Value

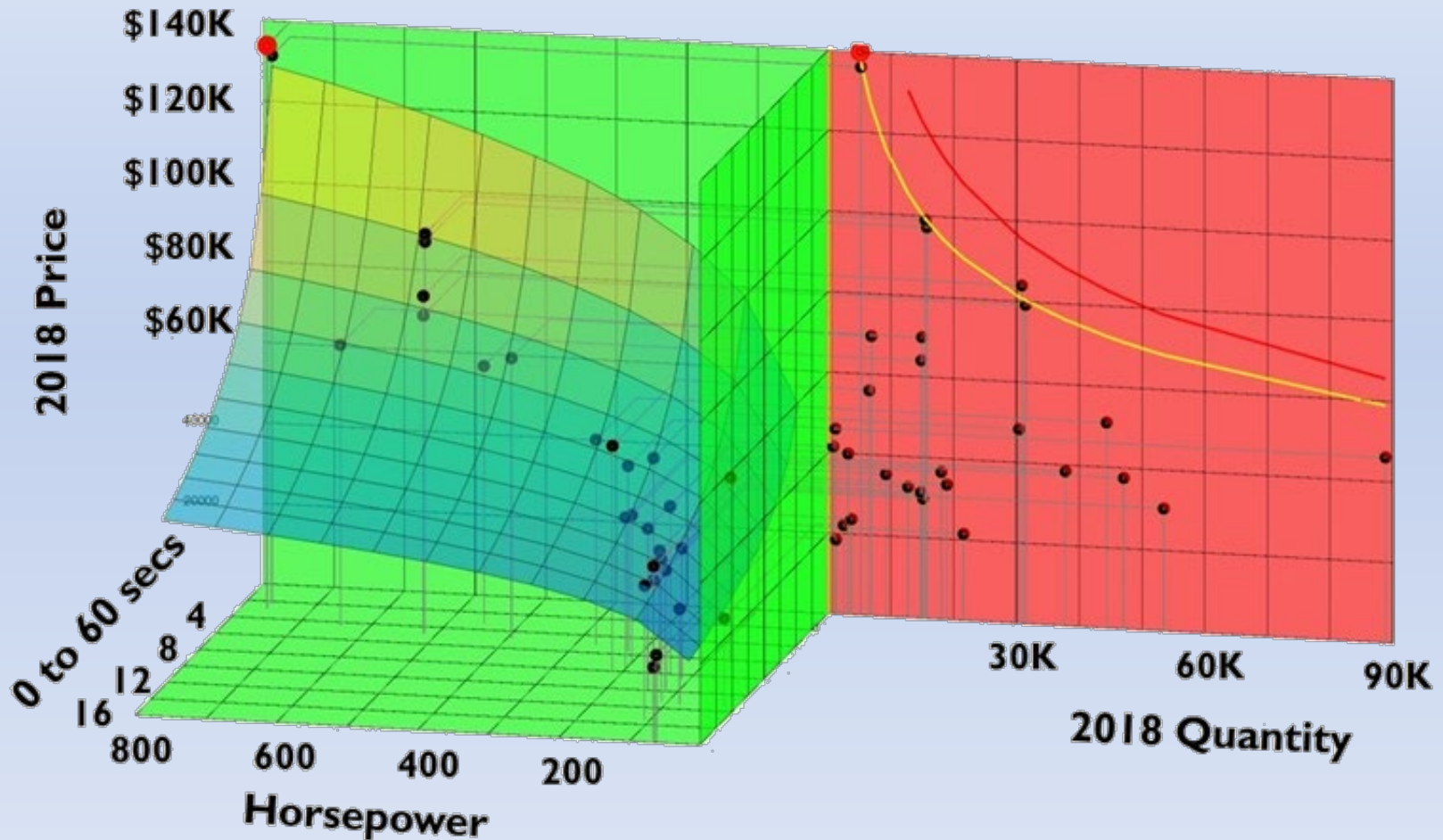
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# The Electric Car Market Has Self-Organized Its Value And Demand



**Tesla Model X P100D:** HP=762; 0to60=2.9; 2018 Qty=5143; 2018\$ = \$140K



It demonstrates flocking (for Value) and huddling (for Demand) behaviors

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- Self-organization is common
  - Animals
  - People
  - Markets
- Demand Planes and Value Spaces
  - Self-organize
  - Share price axes to form 4D markets
    - Are linked, opposing, nonnegative systems (like Tug-of-War)
    - Can be altered by other factors
- Adding time to 4D systems reveals 5D systems
- Markets move over time, we need to map and analyze them