

# Matching Supply with Demand: The Newsvendor Model

Kostas Stouras, Ph.D.

University of Virginia (Darden Business School)

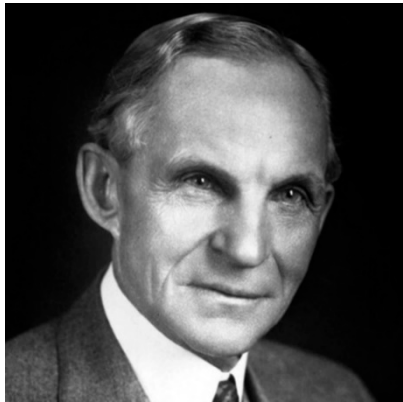
Operations Management Department

kostas@virginia.edu

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# The Ford model T: Standardization



“Any customer can have a car painted any color that he wants so long as it is **black**”

Henry Ford (1909)

100 years ago business used to be an individual sport:  
**One** product, produced by one company **locally**.  
Had a very **long** life cycle (~15 years).



### California, US

Apple designs the iPhone at its headquarters in California. It sends out orders for parts to dozens of companies all around the globe.



**Texas Instruments**  
makes the **touchscreen controller**

**Micron**  
makes the **flash memory**

**Dialog semiconductors**  
makes the **power management components**

**ST Microelectronics**  
makes the **accelerometers and gyroscope**

**Samsung**  
makes **memory and applications processor**

**Cirrus Logic**  
makes the **audio controller**

**Murata**  
makes the **Bluetooth and WiFi components**

**Infineon**  
makes the **phone network components**

### Shenzhen, China

iPhones are assembled in China by Taiwanese manufacturer Foxconn. As China becomes more economically developed, the rising cost of labour, energy and property could put pressure on Apple's margins.



# The iPhone supply chain

Today, business is a global team sport:  
iPhone is made by a lot of different companies globally.  
Has to be changed every year and sold globally.

# Ecosystem/Community Management

Today's biggest skill is **how to manage ecosystems or communities** of firms and customers.

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How to operate in the face of uncertainties?

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Today's biggest skill is **how to manage ecosystems or communities** of firms and customers.

Problems:

1) Information risk:

How to operate in the face of uncertainties?

2) Alignment risk:

Individual vs. firm's objectives/incentives

My goal today: Learn how to better deal with these risks

# The Newsvendor Model





# The Newsvendor Model



Order newspapers overnight to sell tomorrow in the face of uncertain demand.



High demand



Low demand

Key features of model: **Make a bet** in the face of uncertainty, **no recall** to your decision, the product is **perishable**

# Quantify the uncertainty

When something is uncertain, it has a *likelihood* to happen.

E.g. “It is 60% likely to rain today”.

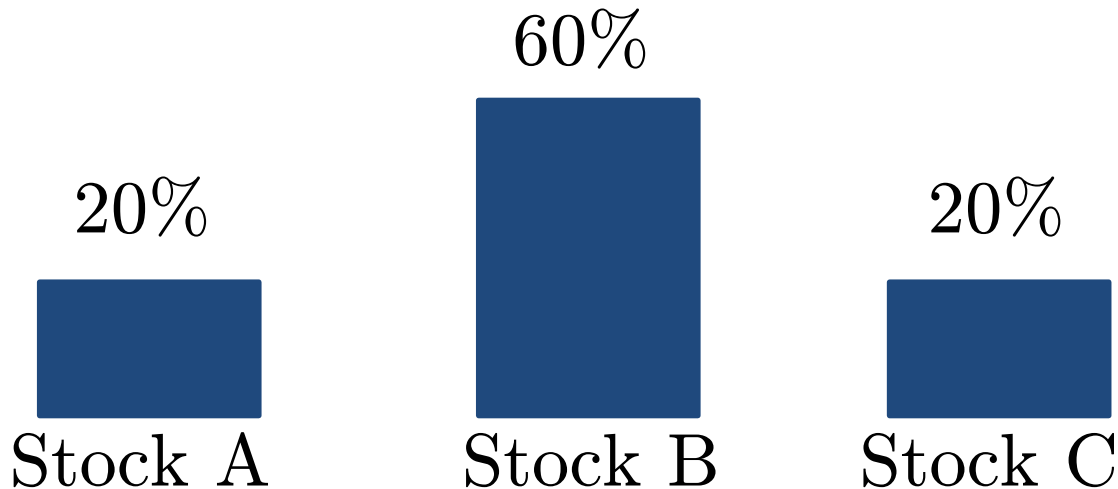
“I may be late to the class”.

# Quantify the uncertainty

When something is uncertain, it has a *likelihood* to happen.



Which stock would you invest in?

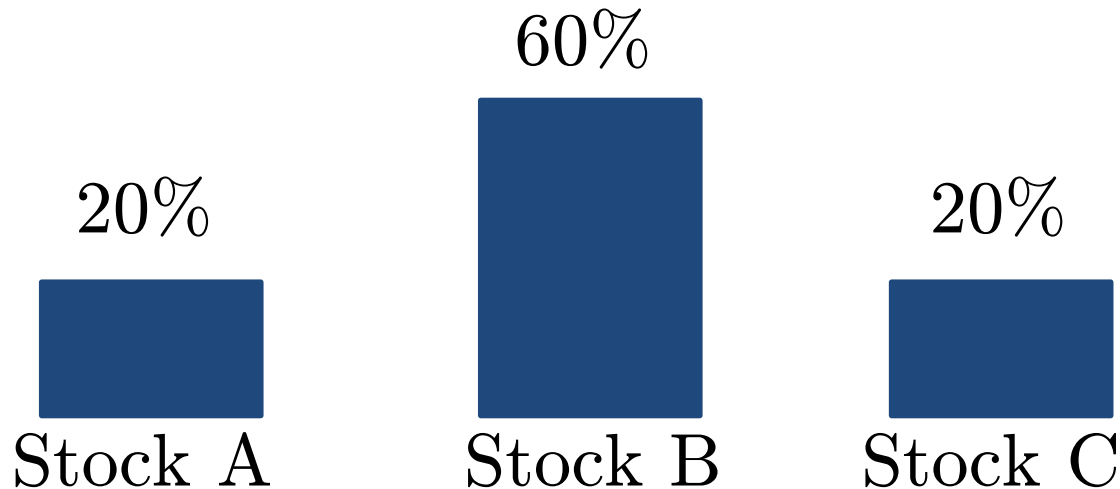


# Quantify the uncertainty

When something is uncertain, it has a *likelihood* to happen.



Which stock would you invest in?



The human mind is particularly bad in understanding something uncertain: most people choose the *most likely* outcome. This could be **wrong!**

# First key lesson for today

“In the face of uncertainty you do *not* just choose what is most likely to happen”

# Two key examples



# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

99.999%



0 L of blood

0.001%



10 L of blood



# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

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0 L of blood

What's the most likely thing to happen?

0.001%



10 L of blood

# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

99.999%



0 L of blood

What's the most likely thing to happen? (no blood is needed)

0.001%



10 L of blood

# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

99.999%



0 L of blood

What's the most likely thing to happen?

How much blood do you think they carry for Justin?

0.001%



10 L of blood

# Two key examples



Doctor's decision: How much blood to carry when Justin is on a trip?

99.999%



0 L of blood

What's the most likely thing to happen?

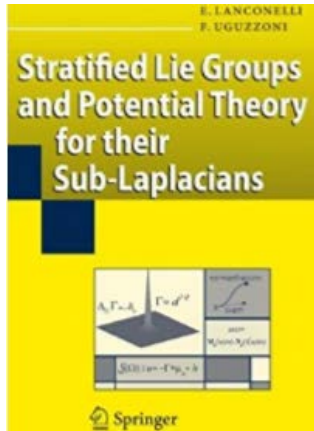
How much blood do you think they carry for Justin? (60 L of blood)

0.001%



10 L of blood

# Two key examples



Bookstore's decision: How many such books to order?

99.999%



No books

What's the most likely thing to happen?

How many to stock?

0.001%



1 book

# Second key lesson for today

“In the face of uncertainty you tilt your bet away from the most likely value in the direction where the consequences are less severe”

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“In the face of uncertainty you tilt your bet away from the most likely value in the direction where the consequences are less severe”

You don't simply want to be correct “most often”. You want to be “wrong in the right way most often” (where the consequences are least severe)!

# Another example

How many hand-outs to print today?





# Another example

How many hand-outs to print today?



“Class size is 50 Students this semester”



# How many hand-outs to print today?

What are the consequences of placing the wrong bet?



# How many hand-outs to print today?

What are the consequences of placing the wrong bet?



One too many

# How many hand-outs to print today?

What are the consequences of placing the wrong bet?



One too many



One too few

# Operations = Matching Supply with Demand



# How many Wii's to store (uncertain demand)?



2007

# How many Wii's to store (uncertain demand)?



2007



2008

# How many Wii's to store (uncertain demand)?



2007



2008

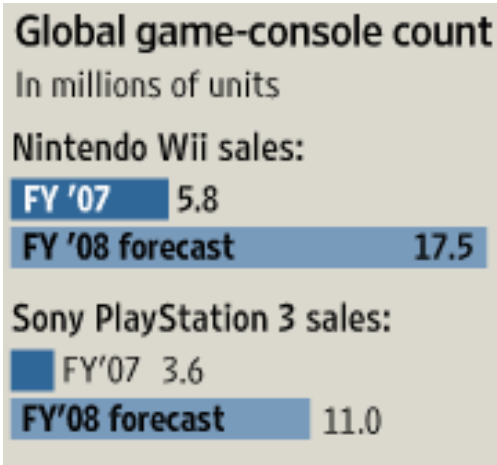


2009, etc...



# How many Wii's to store (uncertain demand)?

THE WALL STREET JOURNAL.  
**WSJ**



But Nintendo's forecast was correct! (WSJ '07)

Long queues due to shortage

# How many Wii's to store (uncertain demand)?

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## Global game-console count

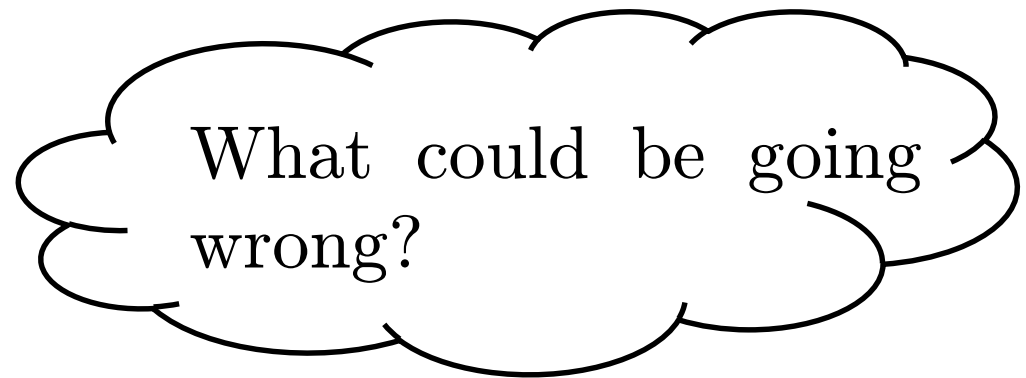
In millions of units

Nintendo Wii sales:

FY '07	5.8
FY '08 forecast	17.5

Sony PlayStation 3 sales:

FY'07	3.6
FY'08 forecast	11.0



But Nintendo's forecast  
was correct! (WSJ '07)

# The reason for Wii's demand-supply mismatch



Pros/Cons of being over/under the demand?

# The reason for Wii's demand-supply mismatch



The presence of information and alignment **risks**

Pros/Cons of being over/lower the demand?

# This intuition is very general



# Key things to remember

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- 3) Who is bearing these consequences? Align the incentives.



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Thank you! Keep in touch: [www.stouras.com](http://www.stouras.com), @stourask