# تحليل اقتصاد جزئي
## ٢٠١ قصد

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# فهرس المحتويات

- العرض والطلب وتوزان السوق
- مرونات الطلب والعرض
- عرض المنشاة واشكال السوق
- الإنتاج و التكاليف في الاجل القصير و الطويل
- سلوك المستهلك باستخدام أسلوب المنفعة
- نظريات اللعبة

# العرض والطلب وتوزان السوق

الفصل الأول

٢٠٢٢/٠٩/١٤

# فهرس المحتوى

# أولا: مفهوم الطلب والعرض

- **الطلب (DEMAND)**

**العلاقة بين عدة أسعار افتراضية لسلعة أو خدمة في السوق، وإجمالي عدد الوحدات التي يرغب المستهلكون في شرائها عند كل سعر افتراضي من هذه الأسعار. "جدول الطلب"**

- **العرض (SUPPLY)**

**العلاقة بين عدة أسعار افتراضية لسلعة أو خدمة في السوق، وإجمالي عدد الوحدات التي يرغب المنتجون في بيعها عند كل سعر افتراضي. "جدول العرض"**

# قانون الطلب و العرض

| السعر (بالدولار) | جنيفر | بيث | جيم | ديف | هانك | جيل | السوق |
|---|---|---|---|---|---|---|---|
| ٧,٠٠ | ٠,٠ | ٠,٠ | ٠,٥ | ١,٠ | ١٣,٠ | ٠,٠ | ١٤,٥ |
| ٦,٥٠ | ٠,٠ | ٠,٠ | ٠,٥ | ١,٥ | ١٣,٠ | ٠,٠ | ١٥,٠ |
| ٦,٠٠ | ٠,٠ | ٠,٠ | ١,٠ | ٢,٥ | ١٣,٠ | ٠,٠ | ١٦,٥ |
| ٥,٥٠ | ٠,٠ | ٠,٠ | ١,٠ | ٣,٠ | ١٣,٠ | ٠,٠ | ١٧,٠ |
| ٥,٠٠ | ٠,٠ | ٠,٠ | ١,٠ | ٣,٠ | ١٣,٠ | ٠,٠ | ١٧,٠ |
| ٤,٥٠ | ٠,٠ | ٠,٠ | ٢,٠ | ٥,٠ | ١٣,٠ | ٠,٠ | ٢٠,٠ |
| ٤,٠٠ | ٠,٠ | ٠,٠ | ٢,٠ | ٥,٠ | ١٣,٠ | ٠,٠ | ٢٠,٠ |
| ٣,٥٠ | ١,٥ | ٠,٠ | ٢,٠ | ٥,٠ | ١٣,٠ | ٠,٠ | ٢١,٥ |
| ٣,٠٠ | ٢,٥ | ٠,٠ | ٤,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٣٤,٥ |
| ٢,٥٠ | ٤,٠ | ٠,٠ | ٤,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٣٦,٠ |
| ٢,٠٠ | ٨,٠ | ٠,٠ | ٨,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٤٤,٠ |
| ١,٥٠ | ١٠,٧ | ٦,٣ | ٨,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٥٣,٠ |
| ١,٠٠ | ١٤,٧ | ٦,٣ | ٨,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٥٧,٠ |
| ٠,٥٠ | ١٤,٧ | ٦,٣ | ٨,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٥٧,٠ |
| ٠,٠٠ | ١٤,٧ | ٦,٣ | ٨,٠ | ١٥,٠ | ١٣,٠ | ٠,٠ | ٥٧,٠ |

| السعر (بالدولار) | كويك مارت | فيل إير أب | المزارع جيم | السوق |
|---|---|---|---|---|
| ٧,٠٠ | ٥٠,٠ | ٢٠٠,٠ | ٢٠,٠ | ٢٧٠,٠ |
| ٦,٥٠ | ٥٠,٠ | ٢٠٠,٠ | ٢٠,٠ | ٢٧٠,٠ |
| ٦,٠٠ | ٥٠,٠ | ٢٠٠,٠ | ٢٠,٠ | ٢٧٠,٠ |
| ٥,٥٠ | ٥٠,٠ | ١٨٠,٠ | ٠,٠ | ٢٣٠,٠ |
| ٥,٠٠ | ٥٠,٠ | ١٦٠,٠ | ٠,٠ | ٢١٠,٠ |
| ٤,٥٠ | ٥٠,٠ | ١٣٠,٠ | ٠,٠ | ١٨٠,٠ |
| ٤,٠٠ | ٤٠,٠ | ١١٥,٠ | ٠,٠ | ١٥٥,٠ |
| ٣,٥٠ | ٣٥,٠ | ٩٥,٠ | ٠,٠ | ١٣٠,٠ |
| ٣,٠٠ | ٢٥,٠ | ٨٥,٠ | ٠,٠ | ١١٠,٠ |
| ٢,٥٠ | ١٠,٠ | ٢٦,٠ | ٠,٠ | ٣٦,٠ |
| ٢,٠٠ | ٠,٠ | ١٠,٠ | ٠,٠ | ١٠,٠ |
| ١,٥٠ | ٠,٠ | ٥,٠ | ٠,٠ | ٥,٠ |
| ١,٠٠ | ٠,٠ | ٠,٠ | ٠,٠ | ٠,٠ |
| ٠,٥٠ | ٠,٠ | ٠,٠ | ٠,٠ | ٠,٠ |
| ٠,٠٠ | ٠,٠ | ٠,٠ | ٠,٠ | ٠,٠ |

# استخدام العرض والطلب لتفسير السوق

ما هو الغرض الأساسي من استخدام العرض والطلب؟

| السعر (بالدولار) | العرض | الطلب | الفائض | العجز |
|---|---|---|---|---|
| ٧,٠٠ | ٢٧٠,٠ | ١٤,٥ | ٢٥٥,٥ | ٠,٠ |
| ٦,٥٠ | ٢٧٠,٠ | ١٥,٠ | ٢٥٥,٠ | ٠,٠ |
| ٦,٠٠ | ٢٧٠,٠ | ١٦,٥ | ٢٥٣,٥ | ٠,٠ |
| ٥,٥٠ | ٢٣٠,٠ | ١٧,٠ | ٢١٣,٠ | ٠,٠ |
| ٥,٠٠ | ٢١٠,٠ | ١٧,٠ | ١٩٣,٠ | ٠,٠ |
| ٤,٥٠ | ١٨٠,٠ | ٢٠,٠ | ١٦٠,٠ | ٠,٠ |
| ٤,٠٠ | ١٥٥,٠ | ٢٠,٠ | ١٣٥,٠ | ٠,٠ |
| ٣,٥٠ | ١٣٠,٠ | ٢١,٥ | ١٠٨,٠ | ٠,٠ |
| ٣,٠٠ | ١١٠,٠ | ٣٤,٥ | ٧٥,٥ | ٠,٠ |
| ٢,٥٠ | ٣٦,٠ | ٣٦,٠ | ٠,٠ | ٠,٠ |
| ٢,٠٠ | ١٠,٠ | ٤٤,٠ | ٠,٠ | ٣٤,٠ |
| ١,٥٠ | ٥,٠ | ٥٣,٠ | ٠,٠ | ٤٨,٠ |
| ١,٠٠ | ٠,٠ | ٥٧,٠ | ٠,٠ | ٥٧,٠ |
| ٠,٥٠ | ٠,٠ | ٥٧,٠ | ٠,٠ | ٥٧,٠ |
| – | ٠,٠ | ٥٧,٠ | ٠,٠ | ٥٧,٠ |

# الفائض والعجز

- متى يحدث العجز او الفائض في الإنتاج؟
- ماذا يحدث عندما سكون السعر اقل من السعر التوازني؟
- ماذا يحدث عندما يكون السعر اعلى من السعر التوازني؟

# أمثلة...

- منظمة أوبك (OPEC)

- قرار بتخفيض الإنتاج بمقدار ١٠٠ الف برميل يوميا.

# العوامل المؤثرة على  الطلب والعرض

**س/ ماهي العوامل المؤثرة على منحنى الطلب والعرض؟**

**١- منحنى الطلب؟**

**٢- منحنى العرض؟**

**س٢/  وضع تأثير هذه العوامل بيانيا!**

# مرونات الطلب والعرض

| If . . . | It Is Called . . . |
|---|---|
| $\frac{\%\text{ change in quantity}}{\%\text{ change in price}} = \infty$ | Perfectly elasti |
| $\frac{\%\text{ change in quantity}}{\%\text{ change in price}} > 1$ | Elastic |
| $\frac{\%\text{ change in quantity}}{\%\text{ change in price}} = 1$ | Unitary |
| $\frac{\%\text{ change in quantity}}{\%\text{ change in price}} < 1$ | Inelastic |
| $\frac{\%\text{ change in quantity}}{\%\text{ change in price}} = 0$ | Perfectly inelastic |

# تمارين على المرونات

من الجدول السابق ( شريحة رقم 9) احسب ما يلي

**1- معامل مرونه الطلب** عندما يتغير سعر السلعه من 6 دولار الآ 6.5 دولار؟ اشرح!

2- **معامل مرونه العرض** عندما يتغير سعر السلعه من 6 دولار الى 6.5 دولار؟ اشرح!

# عرض المنشاة واشكال السوق

## انواع الاسواق وخصائص كل سوق:

1- سوق المنافسة الكاملة ( Perfect Competition)

خصائص السوق ! مثال :

2- المنافسة الاحكتارية ( Monopolistic Competition )

خصائص السوق ! مثال :

3- سوق احتكار القلة ( Oligopoly)

خصائص السوق ! مثال :

4- سوق الاحتكار ( Monopoly)

خصائص السوق ! مثال :

# 1- سوق المنافسة الكاملة ( Perfect Competition)

يطلق على السوق سوق منافسة كامله اذا تحققت الشروط التالية:

1- وجود اعداد كبيرة من المستهلكين و المنتجين.

2- المنشات او الشركات تنتج سلع متجانسه.

3- المنشات او الشركات تستطيع الدخول و الخروج من السوق.( لا توجد تحديات وصعوبات في الدخول للسوق)

4-توفر المعلومات للمنتج و المستهلك لاتخاذ قرار الانتاج و الشراء.

مثال:

# 2- المنافسة الاحكتارية ( Monopolistic Competition )

يطلق على السوق سوق منافسه احتكارية اذا تحققت الشروط التالية:

1- وجود اعداد كبيرة من المستهلكين و المنتجين.

2- المنشات او الشركات تنتج **سلع غير متجانسه.**

3- المنشات او الشركات تستطيع الدخول و الخروج من السوق.

4-توفر المعلومات للمنتج و المستهلك لاتخاذ قرار الانتاج و الشراء.

5- المنتجون لا يحددون السعر ( PRICE TAKERS)

مثال:

# 3- سوق احتكار القلة ( Oligopoly)

يطلق على السوق سوق منافسه احتكارية اذا تحققت الشروط التالية:

1- وجود اعداد قليله من المنتجين 3-5 منتجين.

2- المنشات او الشركات تنتج **سلع غير متجانسه.**

3- المنتجين يحددون السعر ( PRICE MAKERS)

مثال:

# 4- سوق الاحتكار ( Monopoly)

يطلق على السوق سوق احتكاري اذا تحققت الشروط التالية:

1- وجود منتج واحد للسلعه و اعداد كبيره من المشترين.

2- المنتج يحدد السعر ( PRICE MAKER)

مثال:

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production &Cost LR Vs. SR.

1-انواع التكاليف

2-الفرق بين التكاليف الطويلة والقصيرة الاجل!

3-دالة الانتاج في الاجل الطول والاجل القصير!

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production Cost in LR Vs. SR.

انوا التكاليف :

| الرمز | المسمى | التكلفة |
|---|---|---|
| FC | Fixed Cost | تكاليف ثابته |
| VC | Variable Cost | تكاليف متغير |
| MC | Marginal Cost | تكاليف حدية |
| ATC | Average Total Cost | التكاليف الحدية المتوسطة |
| MR | Marginal Revenue | العائد الحدي |
| TR | Total Revenue | مجموع الارباح |

1- Marginal revenue (MR): $MR = \Delta TR / \Delta Q$

**2- Marginal cost (MC): MC = $\Delta TC / \Delta Q$ .**

3- Average cost (AC): $AV = TC/Q$

**4- Variable cost (VC): VC= Cost Per Unit * Total Number of Units.**

# التكاليف المتغيرة ، الثابتة، والكلية
# Variable, Fixed, and Total Costs

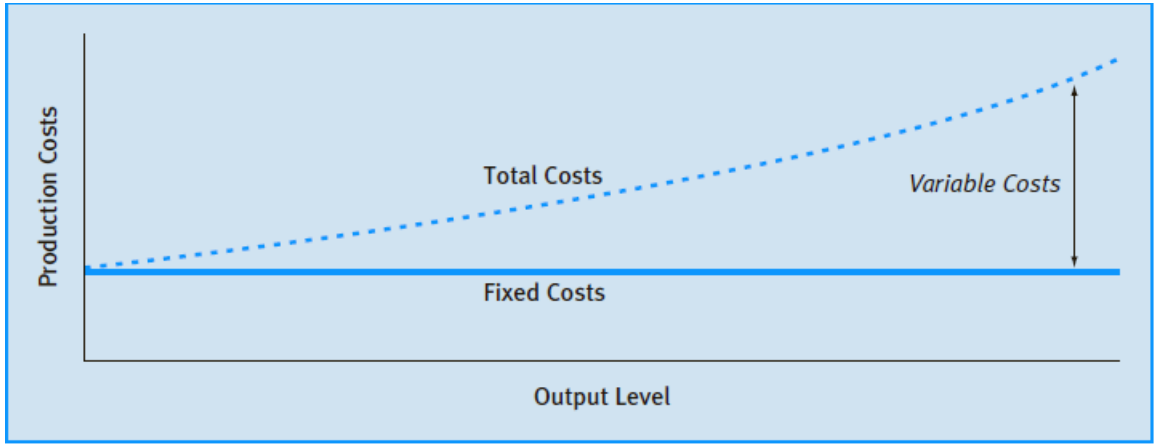
**مثال: افترض صاحب منشأة لصناعة الحلويات.**

توظيف العمالة، بناء مستودع، تشتري المكونات لصناعة الحلاوة.

رأس مال المصنع : مليون ريال، راتب الموظفين 50 الف ريال سنويا، تكلفة انتاج الحلاة ب 0.50 هللة.
افترض ما يلي:
1- ان انتاج 1000 قطعة حلاوة تحتاج 10 عمال.
2- ان انتاج 2000 قطعة حلاوة تحتاج 20 عامل.

**احسب مجموع التكاليف !**

# منحنى التكاليف
# Cost Curves



# تمرين
# Exercise

ملف اكسل مستقل

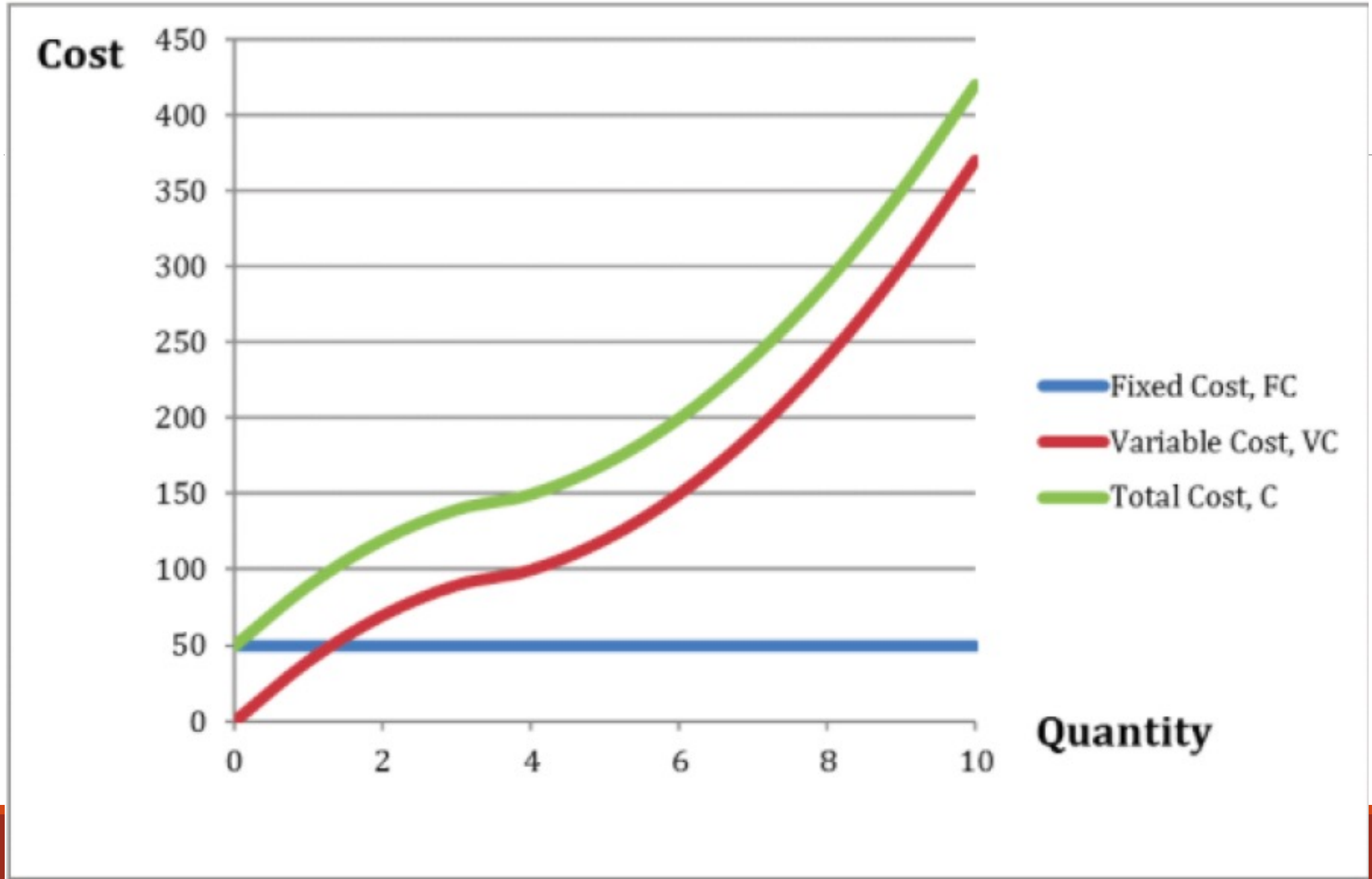
**1- احسب مايلي:**

1- التكاليف الثابته  2- التكاليف المتغيرة

3- التكاليف الحرية  4- متوسط التكاليف الحدية

4- الارباح

**2- وضح بيانيا التكاليف .**


Cost
450
400
350
300
250
200
150
100
50
0
0
2
4
6
8
10
Quantity
Fixed Cost, FC
Variable Cost, VC
Total Cost, C

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production &Cost LR Vs. SR.

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## اولا: المنافسة الكاملة

انواع التكاليف لسوق المنافسة الكاملة.

الرسم البياني للتكاليف في الاجل الطويل والقصير لسوق المنافسة الكاملة!

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production &Cost LR Vs. SR.

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## ثانيا: المنافسة الاحتكارية

انواع التكاليف لسوق **المنافسة الاحتكارية**

الرسم البياني للتكاليف في الاجل الطويل والقصير لسوق **المنافسة الاحتكارية**

!

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production &Cost LR Vs. SR.

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## ثالثا: احتكار القلة

انواع التكاليف لسوق **احتكار القلة**.

الرسم البياني للتكاليف في الاجل الطويل والقصير لسوق **احتكار القلة** !

# الإنتاج و التكاليف في الاجل القصير و الطويل
# Production &Cost LR Vs. SR.

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**رابعا: احتكار كامل**

انواع التكاليف لسوق **احتكار كامل** .

الرسم البياني للتكاليف في الاجل الطويل والقصير لسوق **احتكار كامل!**

# الخلاصة.....

**<u>فى نهاية المحاضرة تطرقنا الى:</u>**

انواع الاسواق وخصائصها

**انواع التكاليف في الاجل القصير لكل من " المنافسة الكاملة، المنافسة الاحتكارية، احتكار قلة، احتكار كامل"**

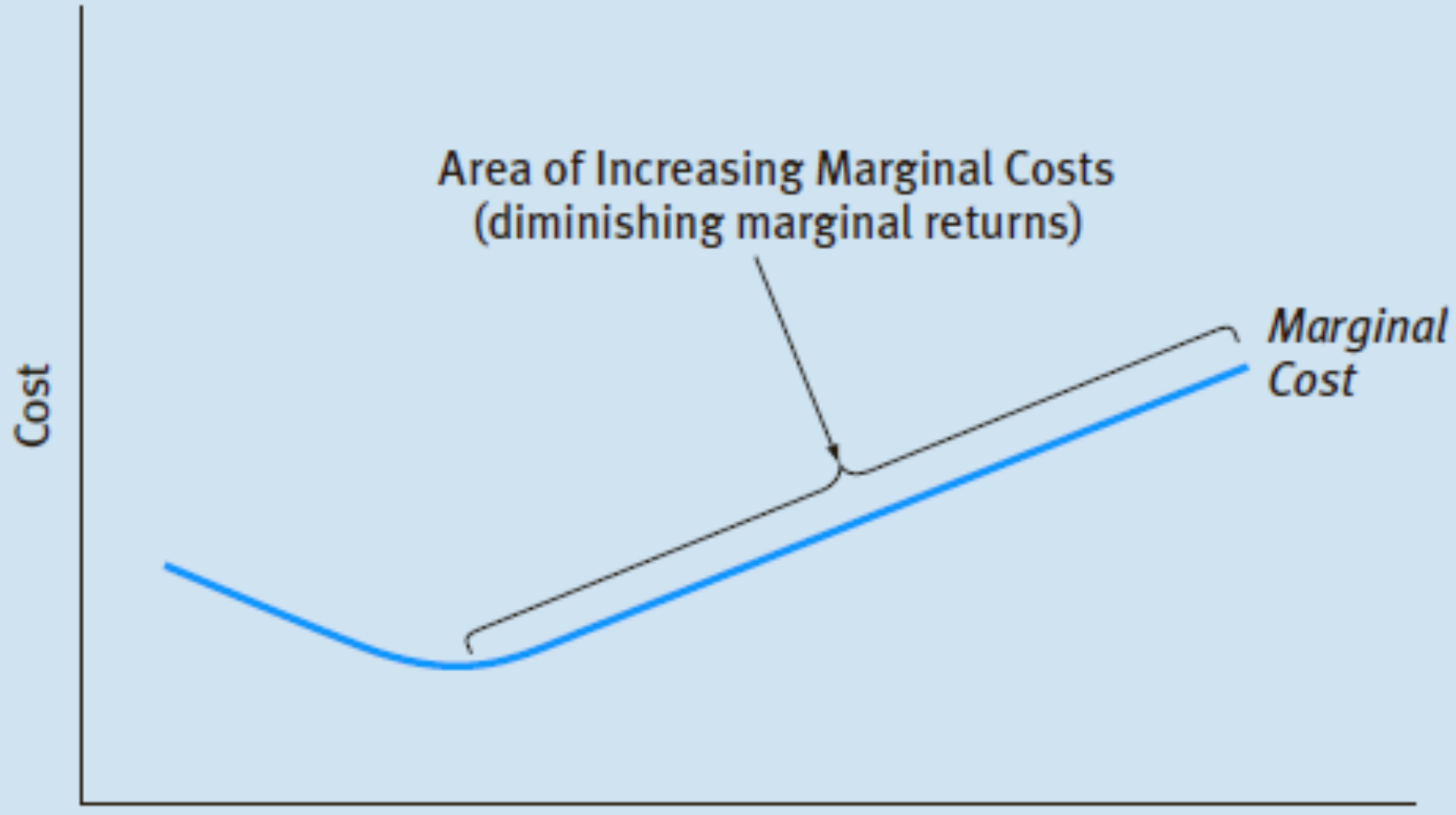
انواع التكاليف في الاجل الطويل لكل من " المنافسة الكاملة، المنافسة الاحتكارية، احتكار قلة، احتكار كامل"

# وفورات الحجم
# Economies Of Scale & Scope

ماهي عناصر الانتاج!

ماهو الفرق بين الاجل الطويل و القصير ؟

زيادة مدخلات عناصر الانتاج ← لزيادة الانتاج او الواحدات الانتاجية

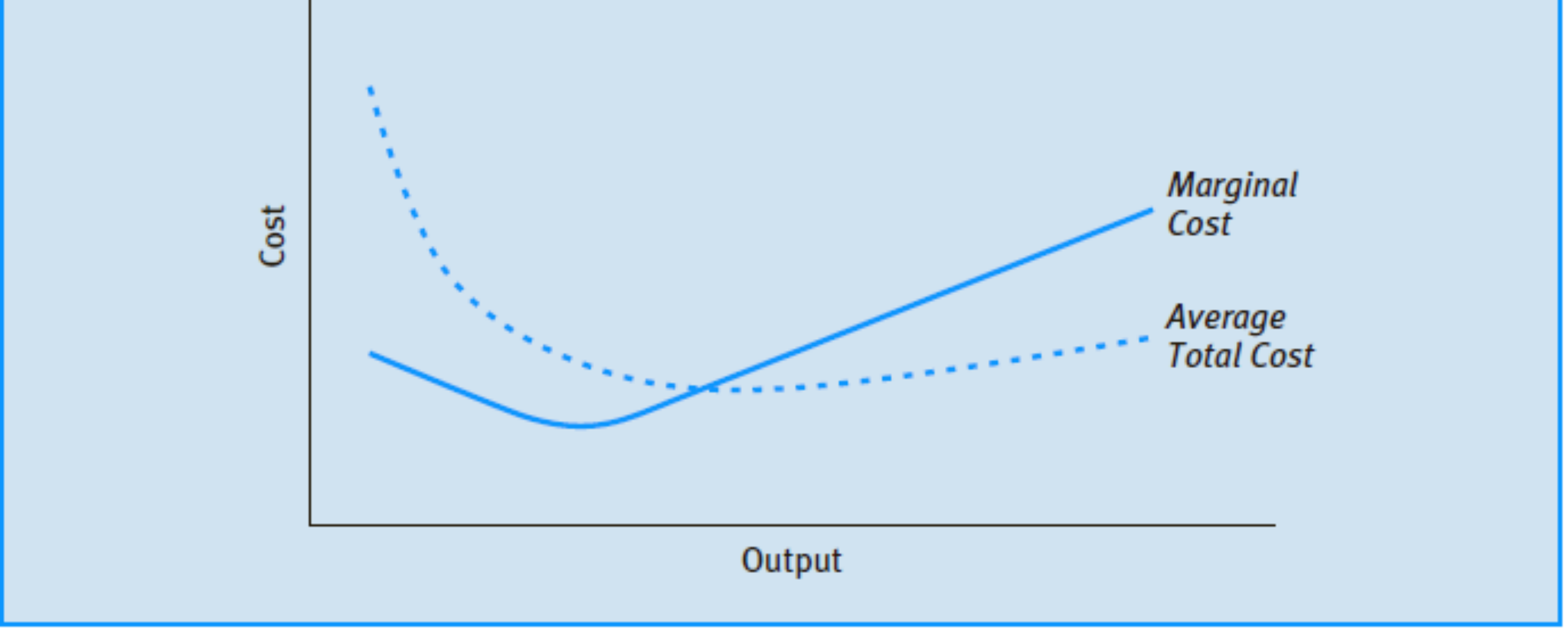

Area of Increasing Marginal Costs
(diminishing marginal returns)
Marginal
Cost
Cost

# Law of diminishing marginal returns

**"قانون تناقص الغلة " Law of diminishing marginal returns**

التوسع في العملية الانتاجية" انتاج الوحدات" يؤدي الى امخفاض في الانتاجية الحدية.

**وضح لماذا الانتاجية الحدية ينخفض بزيادة الانتاج؟**


Cost
Output
Marginal Cost
Average Total Cost

# " الاجل الطويل " Long Run

## عناصر الانتاج فى الاجل الطويل!

## انواع وفرات الحجم:

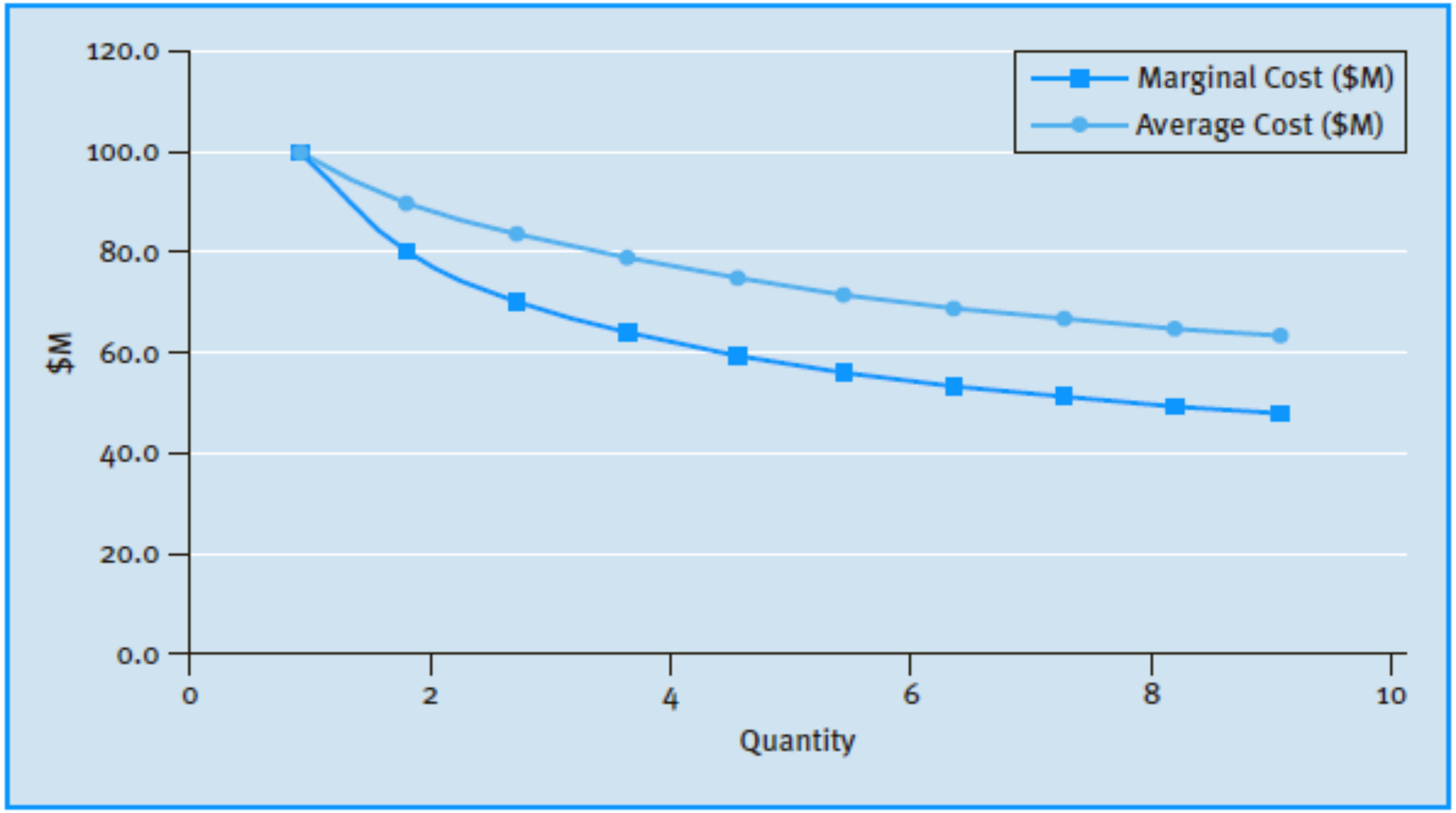
**1- تناقص الغلة "Decreasing Return Of Scale "**

2-ثبات الغلة"Constant Return Of Scale"

**3-تزايد الغلة"Increasing Return Of Scale"**

| Quantity | Marginal Cost ($M) | Total Cost ($M) | Average Cost ($M) |
|---|---|---|---|
| 1 | 100.0 | 100.0 | 100.0 |
| 2 | 80.0 | 180.0 | 90.0 |
| 3 | 70.2 | 250.2 | 83.4 |
| 4 | 64.0 | 314.2 | 78.6 |
| 5 | 59.6 | 373.8 | 74.8 |
| 6 | 56.2 | 429.9 | 71.7 |
| 7 | 53.4 | 483.4 | 69.1 |
| 8 | 51.2 | 534.6 | 66.8 |
| 9 | 49.3 | 583.9 | 64.9 |
| 10 | 47.7 | 631.5 | 63.2 |

# Airplane Manufacturing Costs




# Airplane Manufacturing Learning Curve

# وفرات الحجم "Economies of Scope "
## دمج الشركات او الشراكة

شركات الالبان!

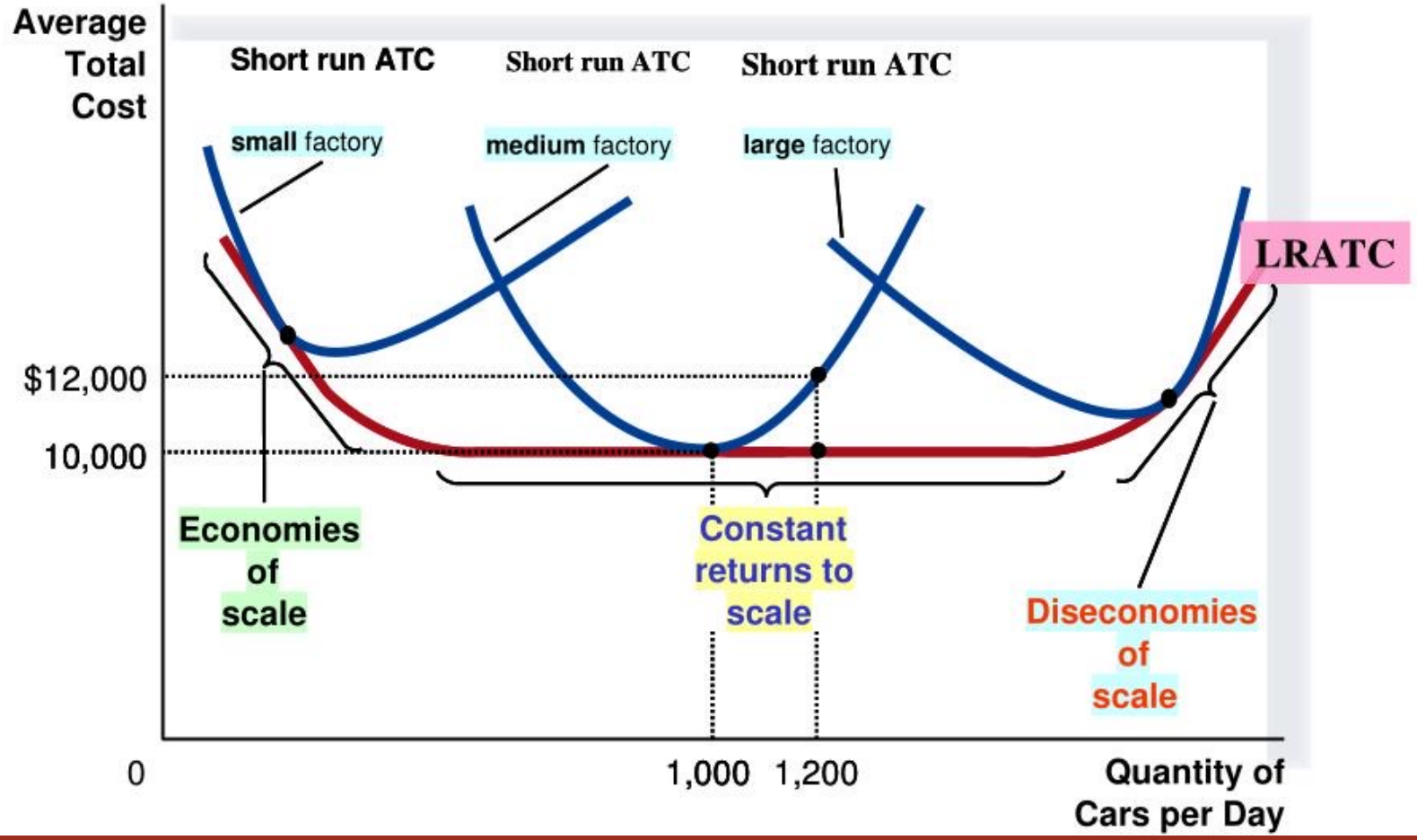
$$Cost(Q_1, Q_2), < \ Cost(Q_1) + Cost(Q_2)$$

# الاقتصادات التي لا تحقق وفورات الحجم
# Diseconomies Of Scale

التكاليف المتوسطة تتزايد نتيجة زيادة الانتاج.

# Long Run vs. Short Run ATC

- LRATC is always below or on short run ATC curve
  - you can be more efficient in long run!




# Economies Diseconomies Of Scale

| Quantity | Marginal Cost ($) | Sale Price ($) | Marginal Return ($) |
|---|---|---|---|
| 1 | 10,000 | 20,000 | 10,000 |
| 2 | 11,000 | 20,000 | 9,000 |
| 3 | 12,000 | 20,000 | 8,000 |
| 4 | 13,000 | 20,000 | 7,000 |
| 5 | 14,000 | 20,000 | 6,000 |

# Exercise
# تمرين

# التمييز السعري
# Price Discrimination

اسعار الاجهزة و الحواسب الالكترونية.

Dell, ASUS, HP,..... الخ.

* المستهلكين وتاثيرهم بالسعر

* كيف الشركة تستهدف تلبي جميع شرائح المجتمع" المستهلكين"

* كيف تحقق الشركة ارباح اعلى !

| Price ($) | Quantity | Revenue ($) | MR ($) | MC ($) | Profit ($) |
|---|---|---|---|---|---|
| 7 | 1 | 7 | 7 | 1.50 | 5.50 |
| 6 | 2 | 12 | 5 | 1.50 | 9.00 |
| 5 | 3 | 15 | 3 | 1.50 | 10.50 |
| 4 | 4 | 16 | 1 | 1.50 | 10.00 |
| 3 | 5 | 15 | −1 | 1.50 | 7.50 |
| 2 | 6 | 12 | −3 | 1.50 | 3.00 |
| 1 | 7 | 7 | −5 | 1.50 | −3.50 |

# التمييز السعري كيف يعمل؟

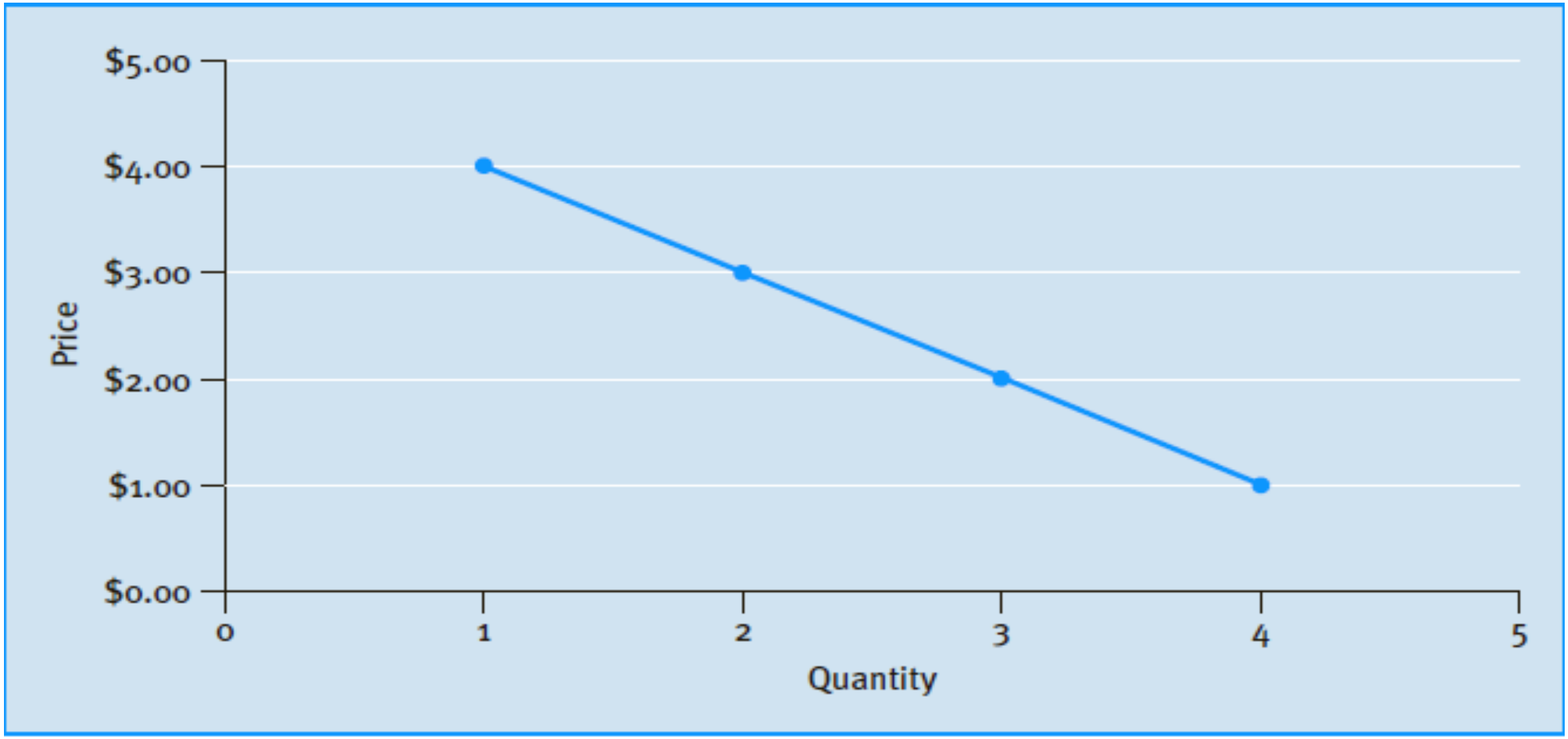
## High-Value Consumers

| Price ($) | Quantity | Revenue ($) | MR ($) | MC ($) | Total Profit ($) |
|---|---|---|---|---|---|
| 7 | 1 | 7 | 7 | 1.50 | 5.50 |
| 6 | 2 | 12 | 5 | 1.50 | 9 |
| 5 | 3 | 15 | 3 | 1.50 | 10.50 |

## Low-Value Consumers

| Price ($) | Quantity | Revenue ($) | MR ($) | MC ($) | Total Profit ($) |
|---|---|---|---|---|---|
| 4 | 1 | 4 | 4 | 1.50 | 2.50 |
| 3 | 2 | 6 | 2 | 1.50 | 3 |
| 2 | 3 | 6 | 0 | 1.50 | 1.50 |
| 1 | 4 | 4 | (2) | 1.50 | (2) |

وضح بيانيا؟




# Demand Curve for Low-Value Consumers

# التمييز السعري الغير مباشر
# Indirect Price Discrimination

ماذا يحدث في حالة ان المنتج لا يبستطيع تحرير نوع المستهلك !

كيف يتم استهداف المستهلكين ؟

مثال!

| Software Version | Home Users ($) | Commercial Users ($) |
|---|---|---|
| Full-featured version | 175 | 500 |
| Disabled version | 150 | 200 |

| Strategy | Implementation | Total Profit |
|---|---|---|
| 1. Sell only to commercial users at a single high price. | Price full-featured version at $500; do not sell home version. | $500 |
| 2. Sell to all users at a single low price. | Price full-featured version at $175. | $175 + $175 = $350 |
| 3. Price discriminate: price high to the commercial users; price low to the home users. | Price disabled version at $150; price full-featured version at $449. | $150 + $449 = $599 |

# سلوك المستهلك
# Consumer Behavior

## المنفعة " Utility":

المنفعة هي مقياس تفضيل مجموعة من السلع والخدمات.

او مقياس مدى رضاك او سعادتك من شراء او استهلكك من سلعه او خدمة ما.

مثال!

# Utility & Marginal utility
# المنفعة و المنفعة الحدية

## المنفعة الحدية " Marginal Utility":

هي المنفعة العائدة من استهلاك وحدة إضافية من السلع والخدمات.

$$MU = \frac{Total\ Utility}{Change\ in\ the\ number\ of\ unit}$$

مثال!

# Types Of Marginal Utility
# انواع المنفعة الحدية

**"Positive Marginal Utility " منفعة حدية إيجابية**

**"Negative Marginal Utility " منفعة حدية سلبية**

**"Zero Marginal Utility " منفعة حدية صفرية**

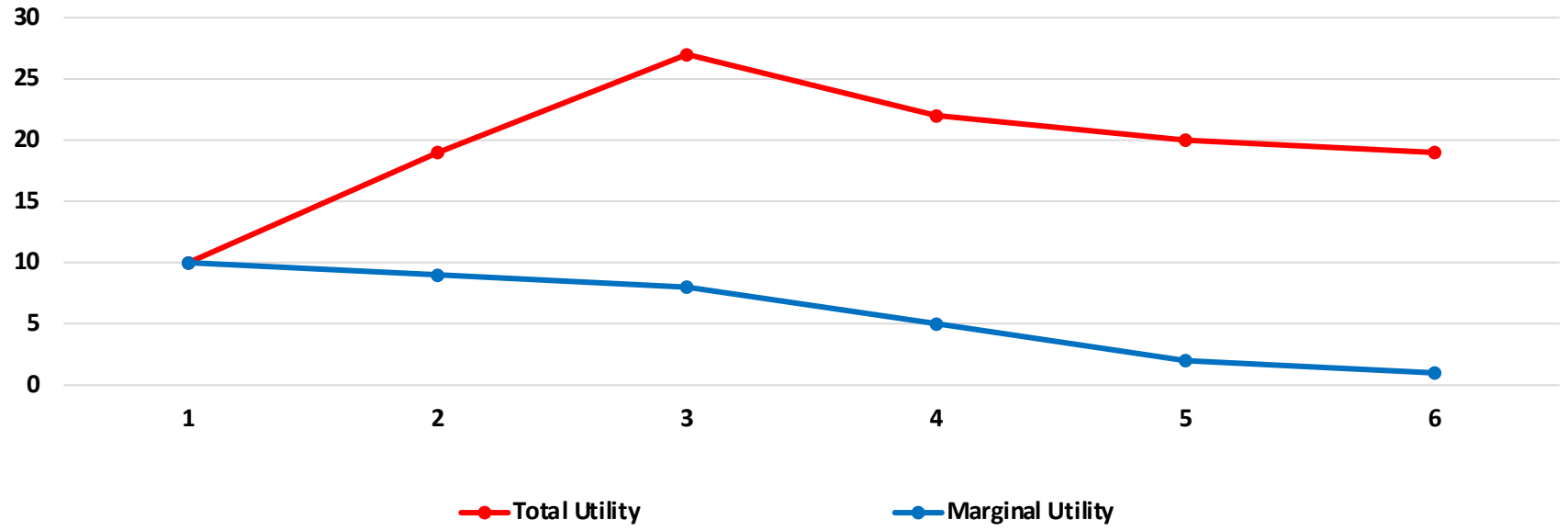
# قانون تناقص المنفعة
# The Law of Diminishing Marginal Utility

**LDMU**:

That the additional utility gained from an increase in consumption decreases with each subsequent increase in the level of consumption.

# “Exercise” تمرين

| Units | Total Utility | Marginal Utility |
|---|---|---|
| 1 | 10 | 10 |
| 2 | 19 | 9 |
| 3 | 27 | 8 |
| 4 | 22 | 5 |
| 5 | 20 | 2 |
| 6 | 19 | 1 |




# Graph Showing Total Utility and Marginal Utility

# "Exercise 2" تمرين

| Units | Total Utility (TU) | Marginal Utility (MU) |
|---|---|---|
| 1 | 10 | |
| 2 | 18 | |
| 3 | 24 | |
| 4 | 28 | |
| 5 | 30 | |
| 6 | 30 | |
| 7 | 28 | |

| Units | Total Utility | Marginal Utility |
|---|---|---|
| 1 | 10 | 10 |
| 2 | 18 | 8 |
| 3 | 24 | 6 |
| 4 | 28 | 4 |
| 5 | 30 | 2 |
| 6 | 30 | 0 |
| 7 | 28 | -2 |

# Marginal Utility, Maximum Utility, Utility Of Money

$$MU = \frac{Total\ Utility}{Change\ in\ the\ number\ of\ unit}$$

$$MU_m = \frac{MU}{p}$$

# *Assuming the following*

Having two goods, X and Y. good price for X is SAR 1, and the good price for Y is SAR2.

The consumer’s income is SAR 10.

1- Complete the table

2- Determine the  Consumer's Equilibrium

3- Determine MU

| Units | Total Utility | Marginal Utility | $\frac{MU_X}{P_X}$ | Units | Total Utility | Marginal Utility | $\frac{MU_y}{y}$ |
|---|---|---|---|---|---|---|---|
| 1 | 10 | 10 | 10 | 1 | 24 | 24 | 12 |
| **2** | **18** | **8** | **8** | 2 | 44 | 20 | 10 |
| 3 | 25 | 7 | 7 | 3 | 62 | 18 | 9 |
| 4 | 31 | 6 | 6 | **4** | **78** | **16** | **8** |
| 5 | 36 | 5 | 5 | 5 | 90 | 12 | 6 |
| 6 | 40 | 4 | 4 | 6 | 96 | 6 | 3 |
| 7 | 43 | 3 | 3 | 7 | 100 | 4 | 2 |

# اختيار المستهلك
# Consumer Choice

## Agenda

- Budget Constraint
- Utility Maximization Problem (UPM)
- Learning By Doing

# Budget Constraint
# قيد الميزانية

The budget constraint is the set of bundles that the consumer can afford, given the price of each good and her income.

*Example*:
The budget set for good $x$ (food) and $y$ (clothing) is

$$p_x x + p_y y \leq \mathrm{I}.$$

where $p_x$ is the price of each unit of food;
$p_y$ is the price of each unit of clothing;

$I$ is the consumer's available income to spend on food and clothing.

# Budget Constraint

The budget set says that the total SAR the consumer spends on food, $p_x x$, plus the total SAR she spends on clothing, $p_y y$, cannot exceed her available income, $I$.

If $p_x$ =SAR 10 and $p_Y$ =SAR 0, and $I$=SAR 400,her budget constraint is

$$10x + 20y \leq 400.$$

# Budget Constraint

Bundles $(x, y)$ that satisfy: $p_x x + p_y y < \mathrm{I}$

- the consumer does not use all her income.

- $p_x x + p_y y = \mathrm{I}$
- the consumer spends all her income.

- We refer to $p_x x + p_y y = I$ as the ***budget line.***

*How do you get the vertical and horizontal intercepts?*

**1- START WITH THE BUDGET LINE**

$$p_x x + p_y y = \mathrm{I}$$

**2- SOLVE IT FOR y:**

$$p_y y = I - p_x x$$

**3- Divide both sides by $p_y$;**

$$y = \frac{I}{p_y} - \frac{p_x}{p_y}\, x$$

**4- Setting $y = 0$, and solving for x we find the horizontal intercept at**

$$p_x x + p_y 0 = \mathrm{I}\ , \qquad x = \frac{I}{p_x}$$

# Graph of a Budget Line

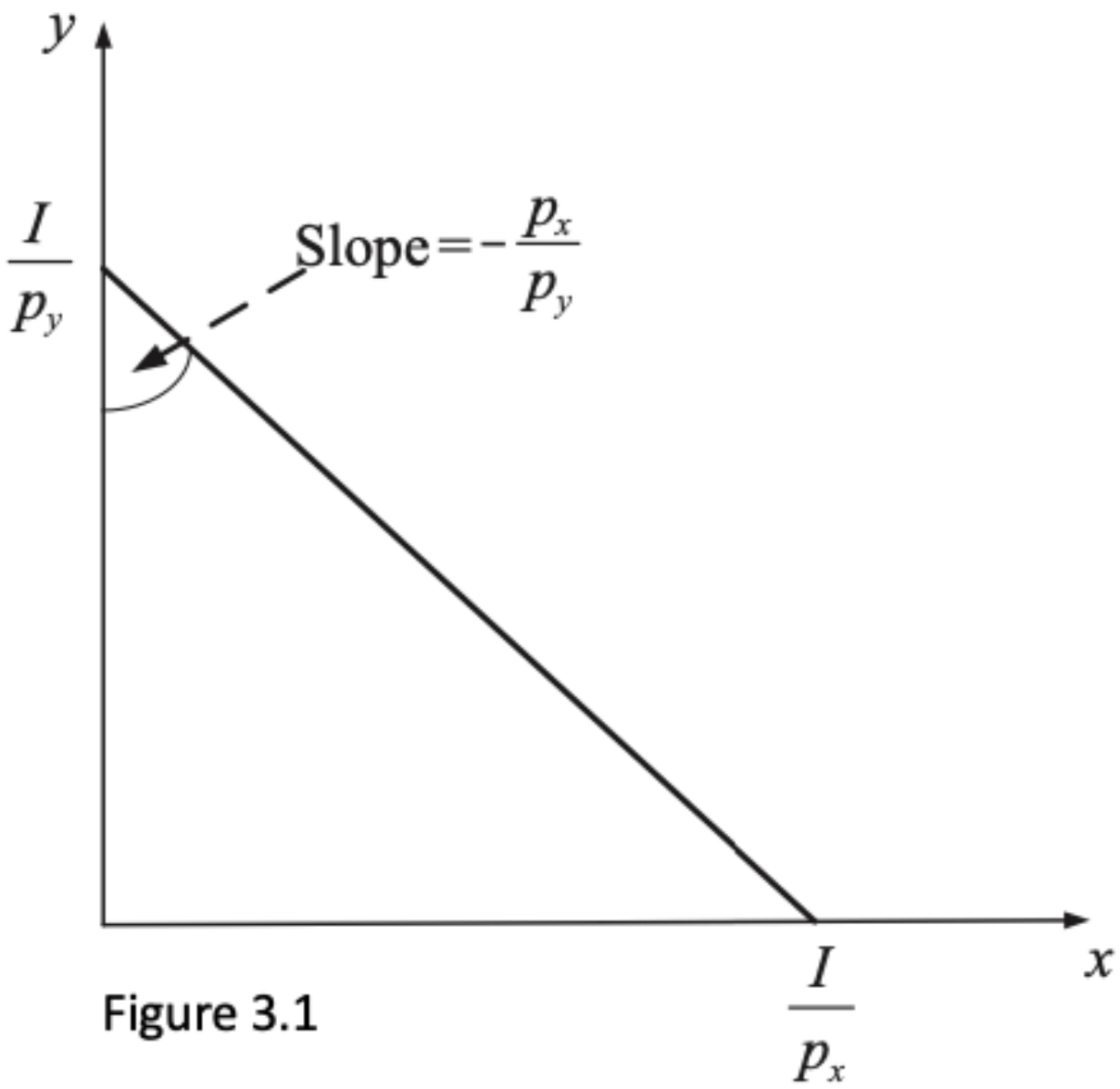



Figure 3.1

# Exercise

Sultan has an income of I = SAR 800 per month, the price of food is $P_x$ = SAR 20

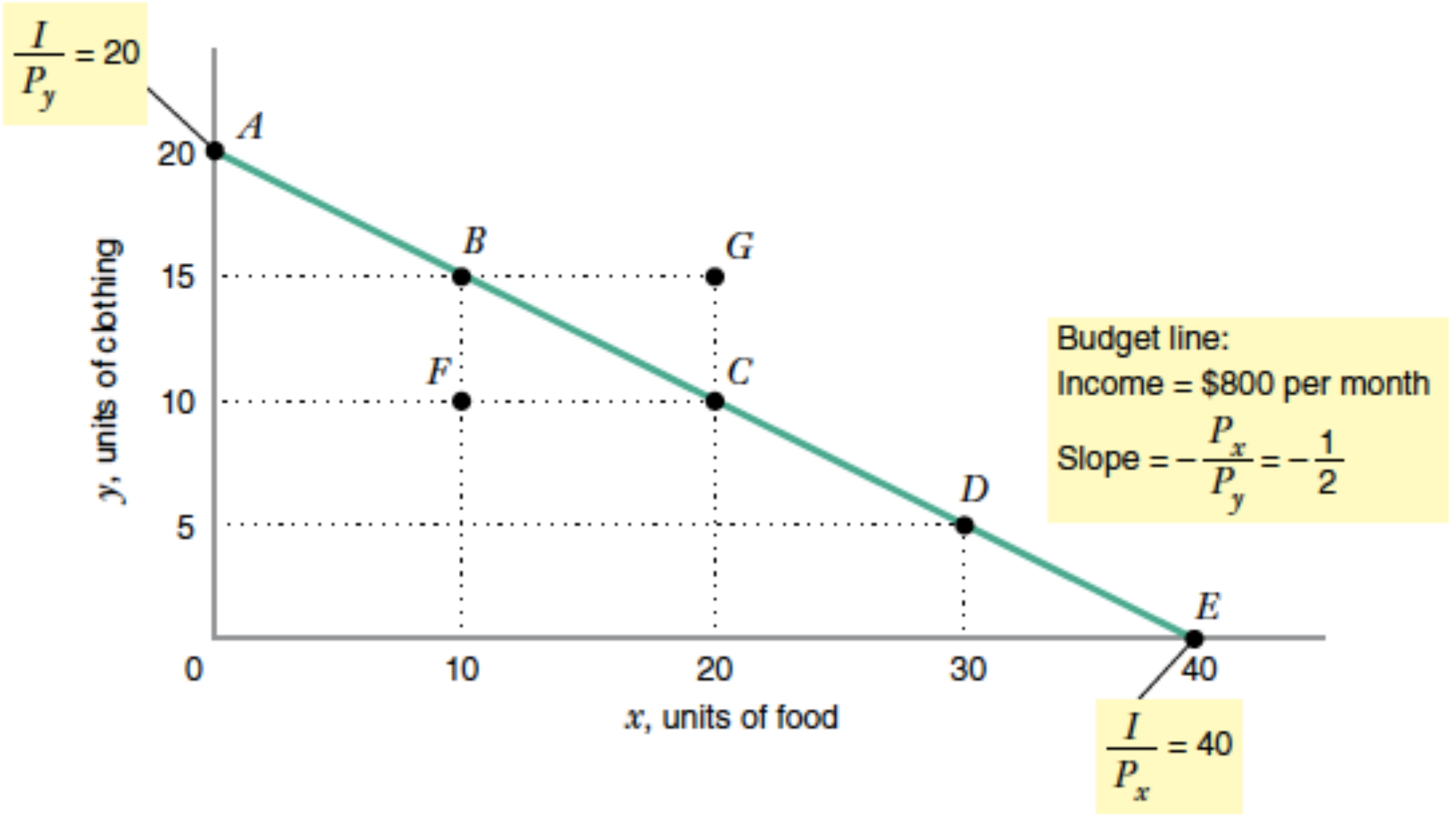
per unit, and the price of clothing is $P_y$ = SAR 40 per unit.

***Find the following:***

1- The vertical and horizontal intercepts?

2- Find the slope

3- Plot the budget line


$\frac{I}{P_y} = 20$
A
B
G
F
C
D
E
20
15
10
5
0
10
20
30
40
y, units of clothing
x, units of food
Budget line:
Income = $800 per month
Slope $= -\frac{P_x}{P_y} = -\frac{1}{2}$
$\frac{I}{P_x} = 40$

## The slope of the budget line tells us that

how many units of the good on the vertical axis a consumer must give up to obtain an additional unit of the good on the horizontal axis.

Think about Sultan moving from budget B to C ?

# HOW DOES A CHANGE IN INCOME AFFECT THE BUDGET LINE?

Suppose Sultn's income rises from $I_1 =$ SAR 800 per

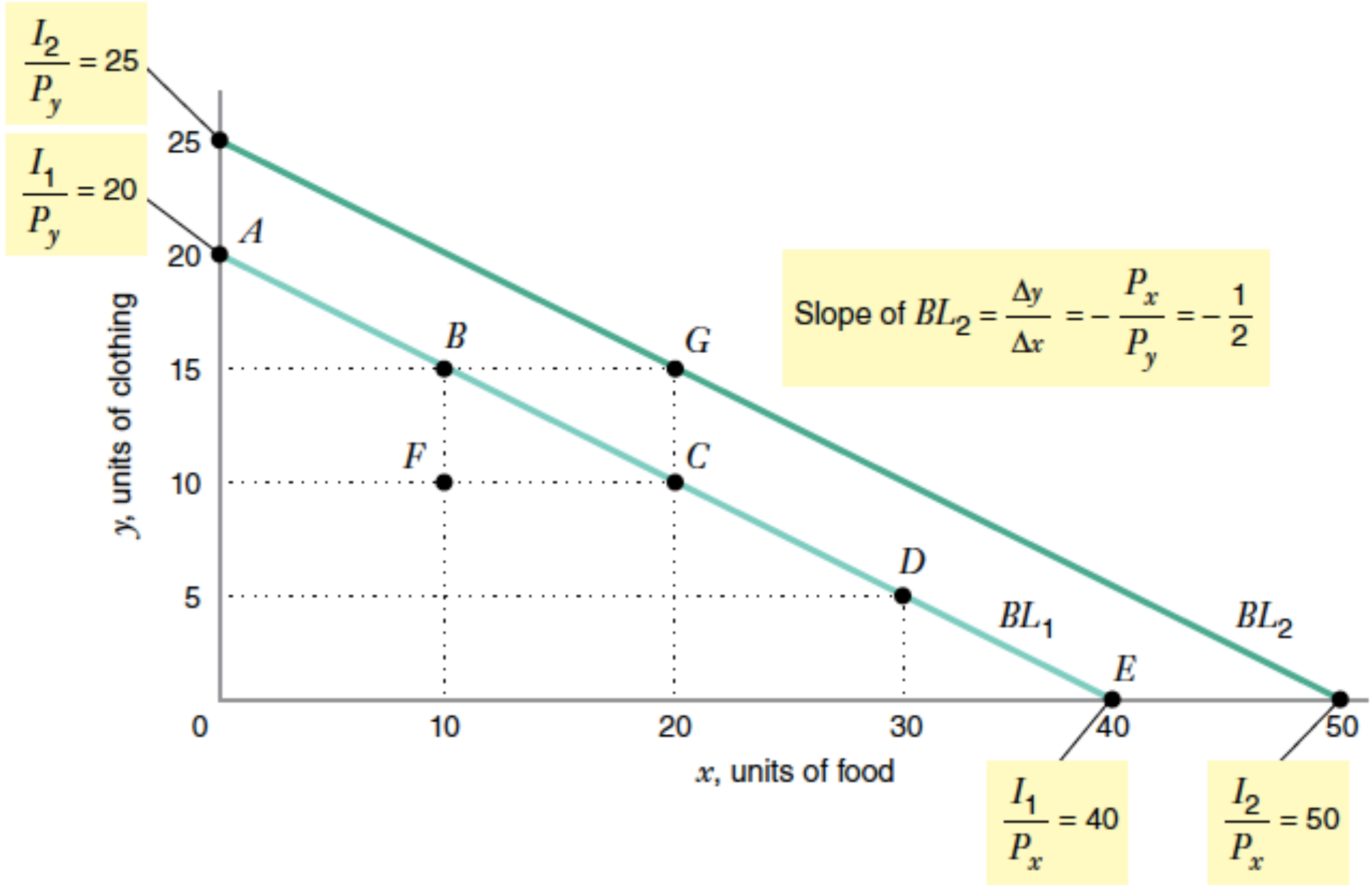
month to $I_2 =$ SAR 1,000 per month, with the prices $Px =$ SAR 20 and $P_y =$ SAR 40 unchanged.

# *Solution*

So, Sultan buys only clothing, he can now purchase $\frac{I_2}{P_y} = \frac{1{,}000}{40}$ $= 25\ units$ of clothing, corresponding to the vertical intercept of the new budget line. The extra SAR 200 of income allows him to buy an extra 5 units of y,

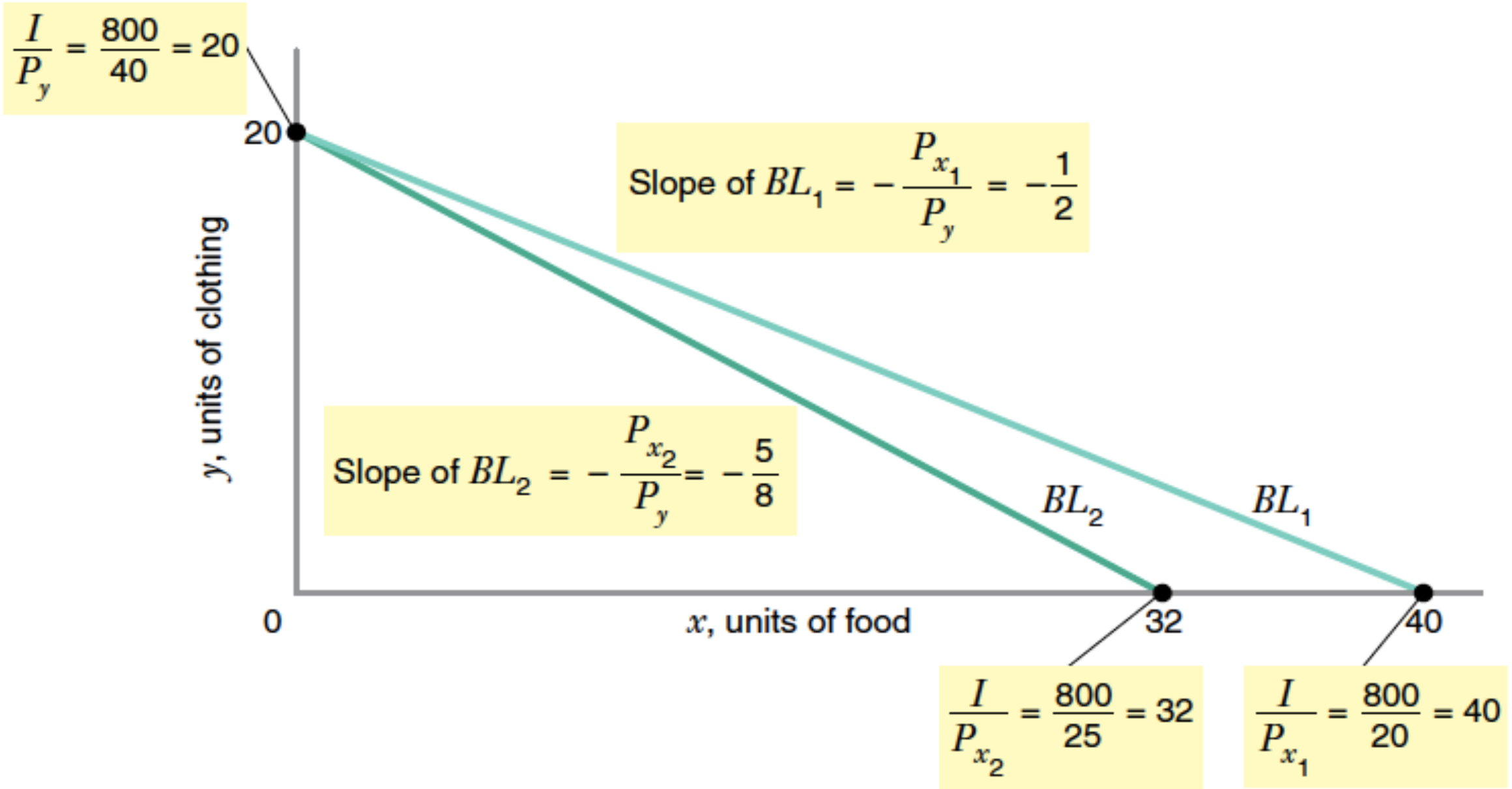
since $P_y = SAR\ 40$.

If he buys only food, he could purchase $\frac{I_2}{P_x} = \frac{1{,}000}{20} = 50\ units$, corresponding to the horizontal intercept on the new budget line.


$\frac{I_2}{P_y} = 25$
$\frac{I_1}{P_y} = 20$
25
20
15
10
5
0
A
B
G
F
C
D
E
y, units of clothing
10
20
30
40
50
x, units of food
Slope of $BL_2 = \frac{\Delta y}{\Delta x} = -\frac{P_x}{P_y} = -\frac{1}{2}$
$BL_1$
$BL_2$
$\frac{I_1}{P_x} = 40$
$\frac{I_2}{P_x} = 50$

# HOW DOES A CHANGE IN PRICE AFFECT THE BUDGET LINE?

How does Sultan's budget line change if the price of food rises from $P_{x1} = SAR\ 20$ to $P_{x2} = SAR\ 25$ per unit, while income and the price of clothing are unchanged?


$\frac{I}{P_y} = \frac{800}{40} = 20$
20
Slope of $BL_1 = -\frac{P_{x_1}}{P_y} = -\frac{1}{2}$
Slope of $BL_2 = -\frac{P_{x_2}}{P_y} = -\frac{5}{8}$
$y$, units of clothing
$BL_2$
$BL_1$
0
$x$, units of food
32
40
$\frac{I}{P_{x_2}} = \frac{800}{25} = 32$
$\frac{I}{P_{x_1}} = \frac{800}{20} = 40$

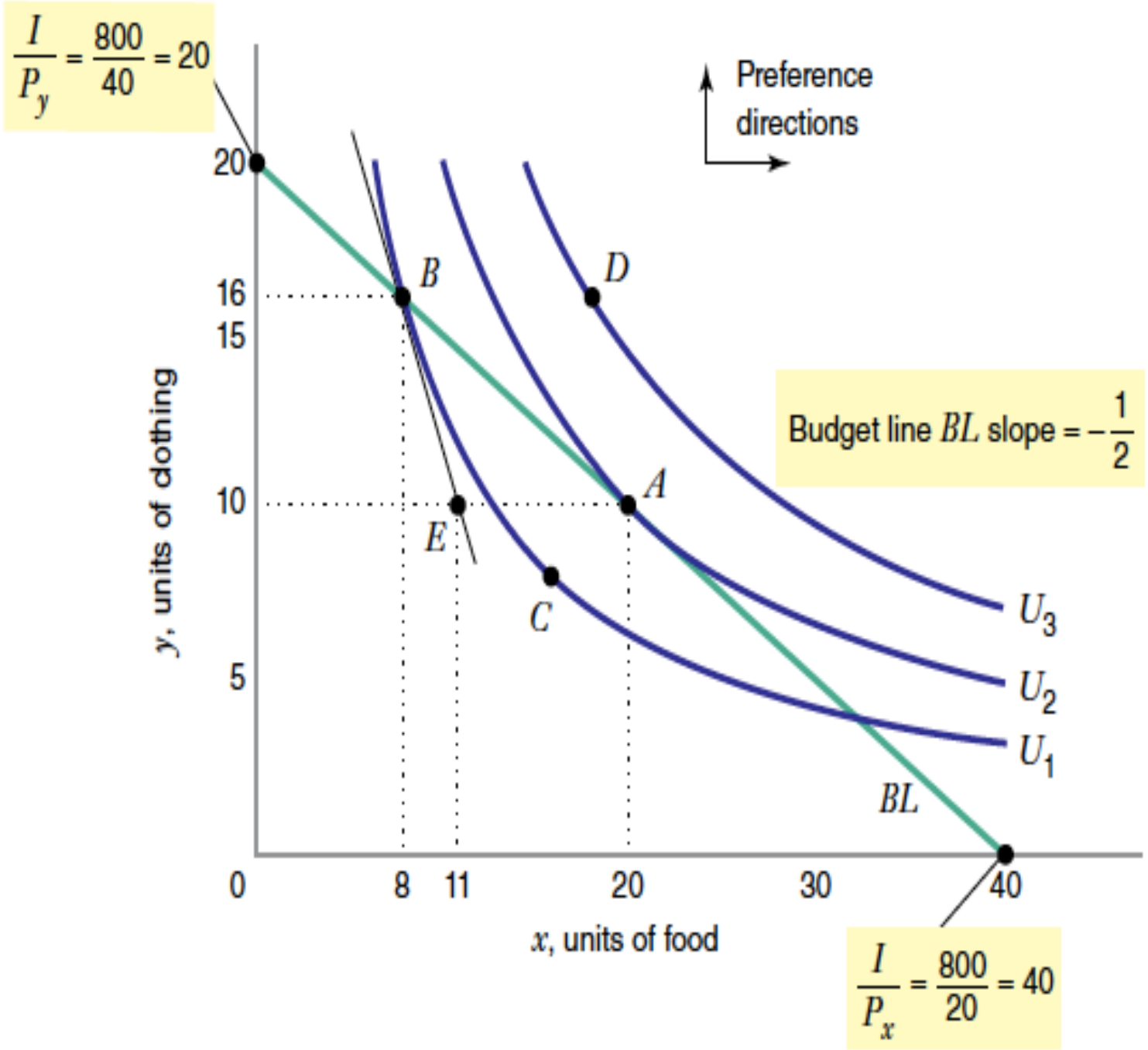
# Optimal Choice: Maximizing Utility with a Given Budget

***Utility Maximization :***

1- Consumer choice of a basket of goods that (1) maximizes satisfaction (utility) while (2) allowing him to live within his budget constraint.

OR

2- The process by which the consumer chooses utility- maximizing bundles, that are bundles that maximize her utility among all of those she can afford.




# Optimal Choice: Maximizing Utility with a Given Budget

***Note that :***an optimal consumption basket must be located on the budget line.

Mathematically,

$$\frac{MU_x}{Mu_y} = \frac{p_x}{p_y}, equavilant, \frac{Mu_x}{p_x} = \frac{Mu_y}{p_y}$$

# Learning By doing

Sultan purchases food (measured by x) and clothing (measured by y) and has the utility function $U(x, y) = xy$. His

marginal utilities $are\ MU_x = y$ and $MU_y = x$. He has a

monthly income of SAR 800. The price of food is $P_x = SAR\ 20$,

and the price of clothing is $P_y = SAR\ 40$.

***Problem*** Find Sultan's optimal consumption bundle.

# *Learning By doing 2 " In class"*

Sultan purchases food (measured by x) and clothing (measured by y) and has the utility function $U(x, y) = xy + 10x$. His

marginal utilities $are\ MU_x = ??$ and $MU_y = ??$. He has a

monthly income of SAR 800. The price of food is $P_x = SAR\ 20$,

and the price of clothing is $P_y = SAR\ 40$.

***Problem*** Find Sultan's optimal consumption bundle.

# Credit “ 5 credit”

David is considering his purchases of food (x) and clothing (y). He has the utility function $U(x, y) = xy + 10x$, with marginal utilities $MUx = y + 10$ and $MUy = x$. His income is $I = 10$. He faces a price of food $Px = \$1$ and a price of clothing $Py = \$2$.

# SPECIAL PREFERENCES

## 1-PERFECT SUBSTITUTES

In some cases, a consumer might view two commodities as perfect substitutes for one another.

Two goods are perfect substitutes when the marginal rate of substitution of one for the other is a constant.

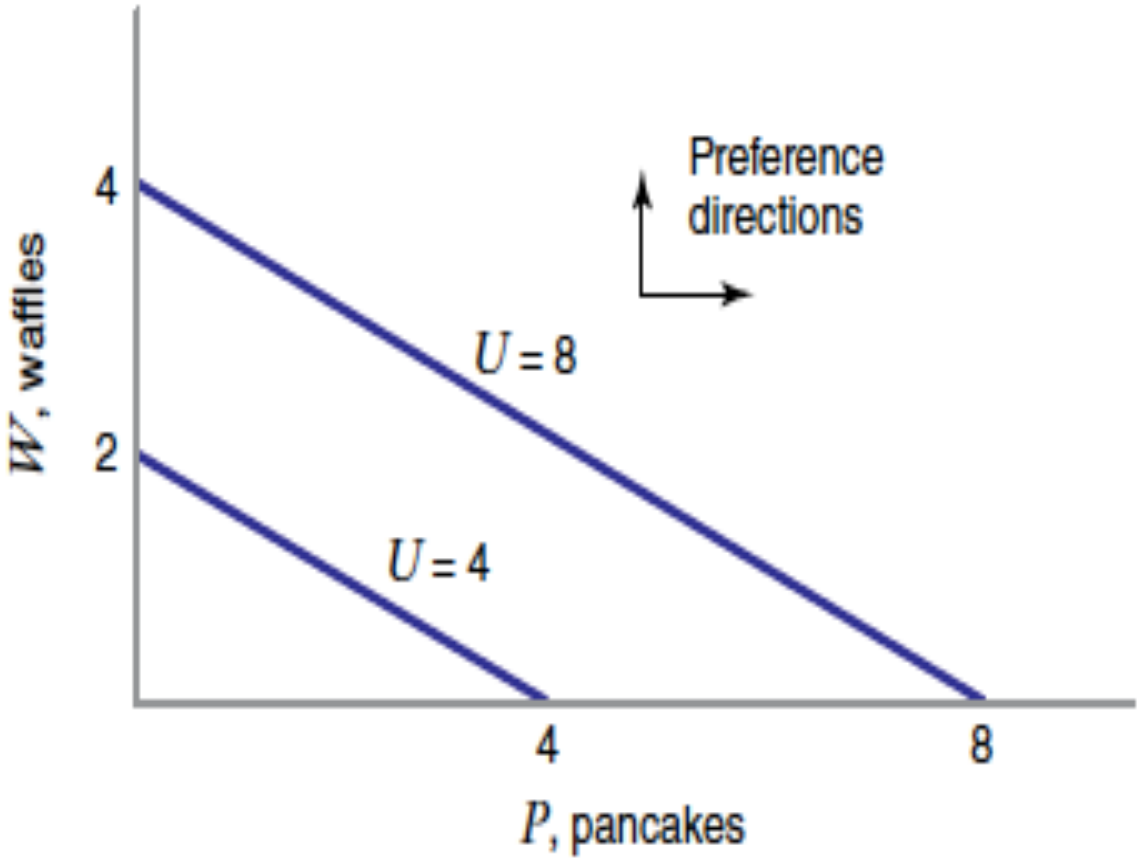



**FIGURE 3.13 Indifference Curves with Perfect Substitutes**

A consumer with the utility function $U = P + 2W$ always views two pancakes as a perfect substitute for one waffle. $MRS_{P,W} = 1/2$, and so indifference curves are straight lines with a slope of $-1/2$.

# 2-PERFECT COMPLEMENTS

In some cases, consumers might be completely unwilling to substitute one good for another.

Ex: Shoes…

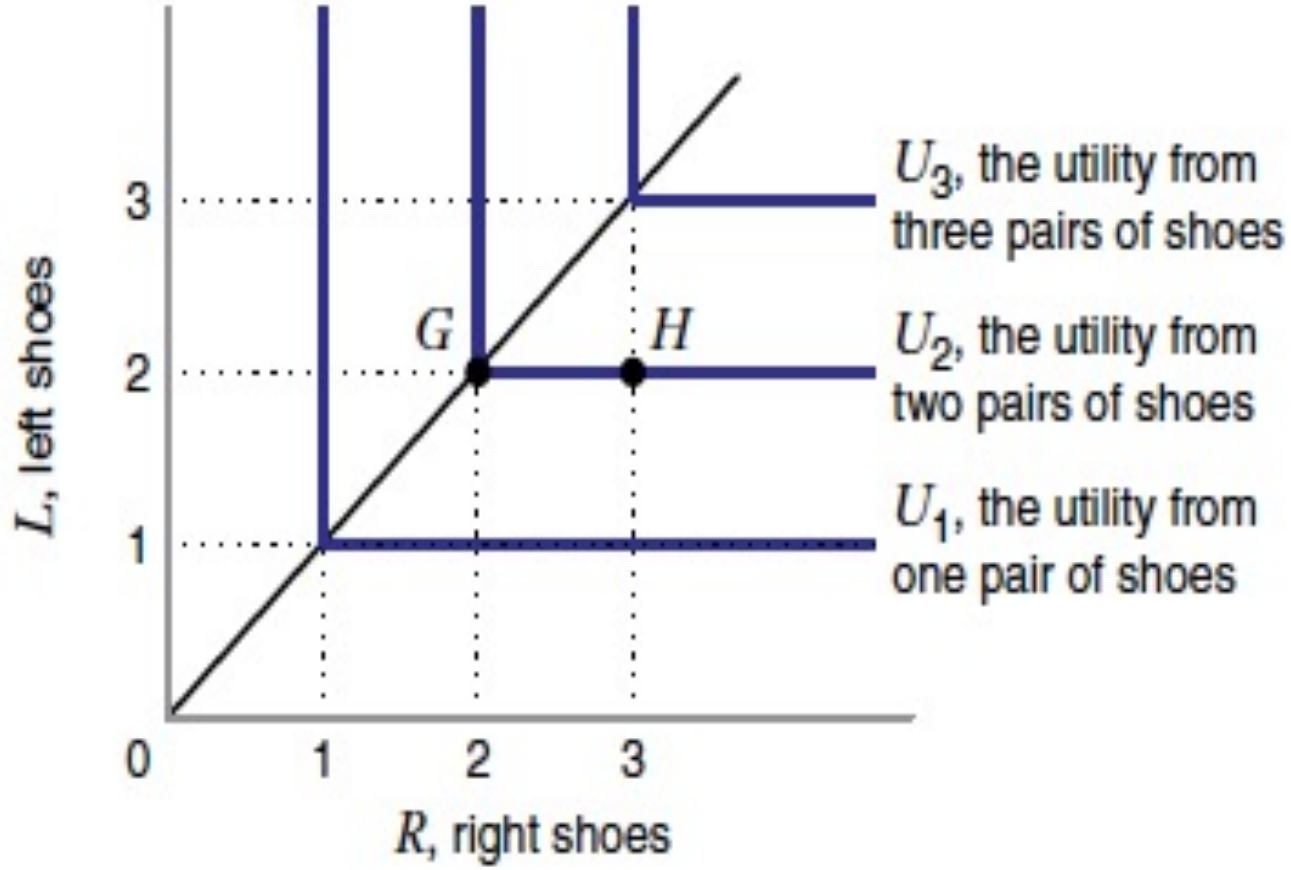
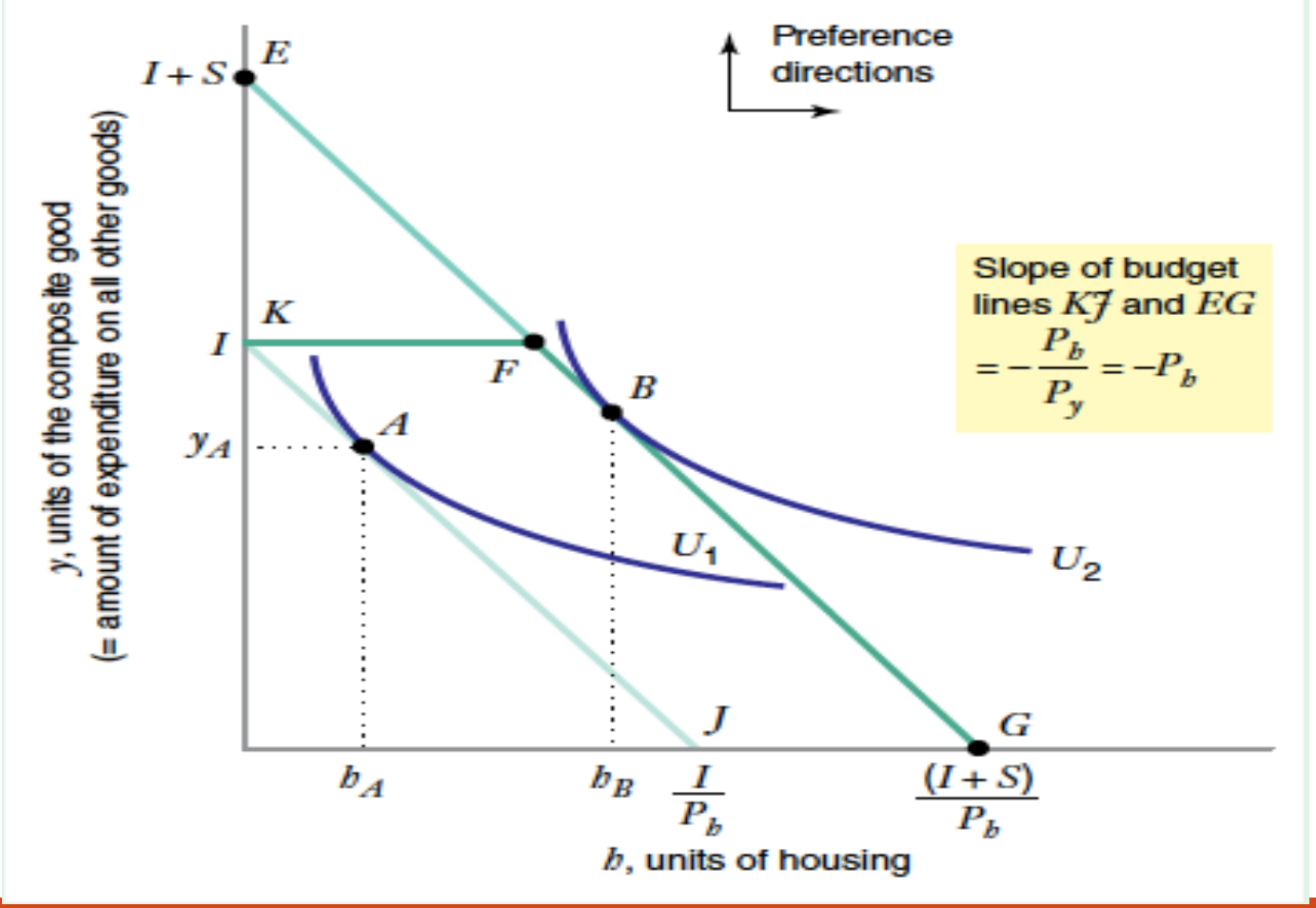


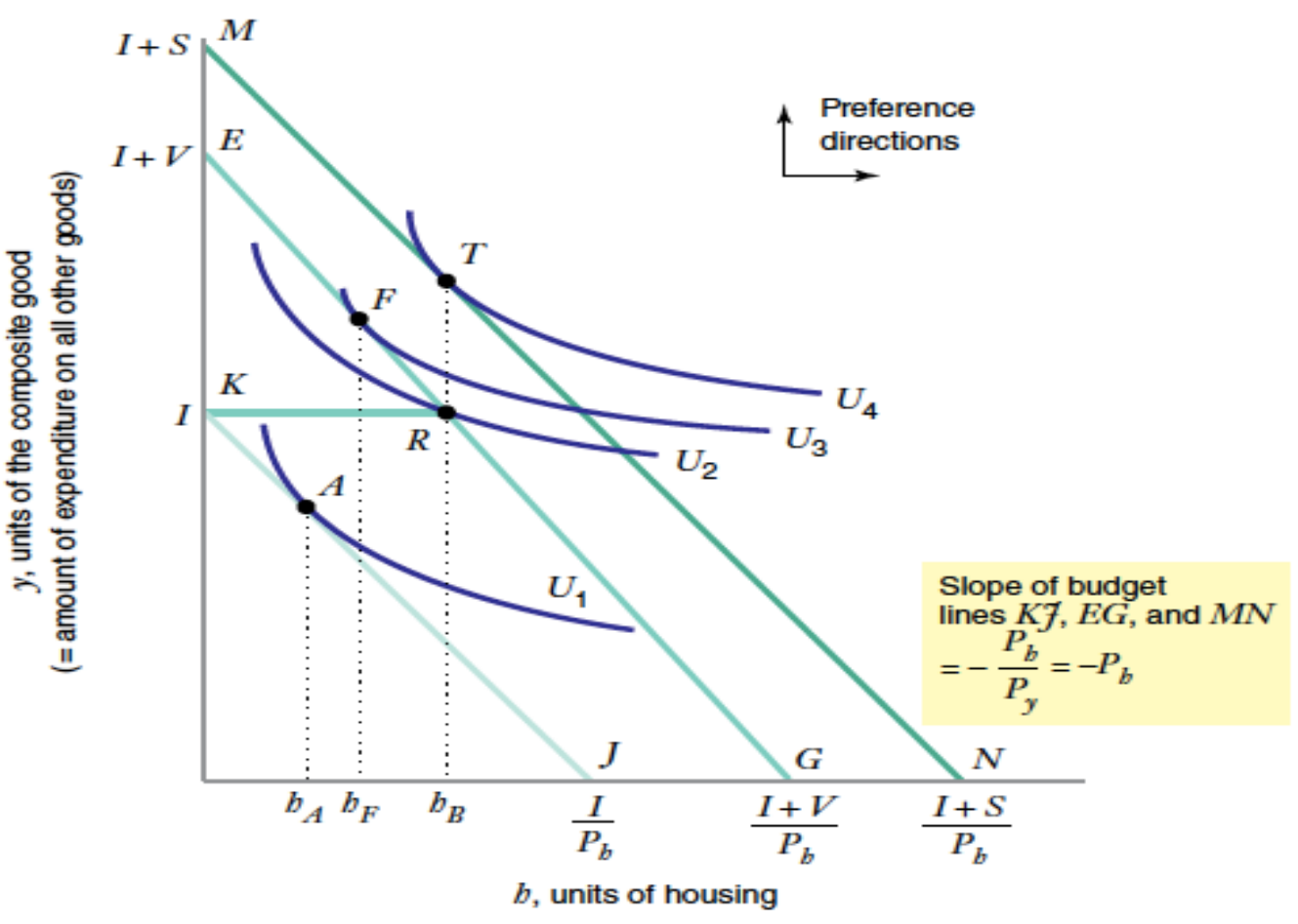

**FIGURE 3.14 Indifference Curves with Perfect Complements**

The consumer wants exactly one left shoe for every right shoe. For example, his utility at basket *G*, with two left shoes and two right shoes, is not increased by moving to basket *H*, containing two left shoes and three right shoes.

# Subsidy and Voucher



# Subsidy and Voucher



# Agenda

Lagrange Method to Solve the UPM

Expenditure Minimization Problem

Learning By Doing

Types Of Function

# MAXIMIZING UTILITY

## Maximizing Utility USING LAGRANGE MULTIPLIERS

We now show how to solve the consumer choice problem using a Lagrange multiplier.

# What is the Lagrange Multiplier ?

In mathematical optimization,

the method of Lagrange multipliers is a strategy for finding the **local maxima** and **minima of a function** subject to

**equality constraints, i.e., BUDGET CONSTRAINT**)

$$\text{Max}\, u(x, y) \qquad s.t \qquad G(x, y) \leq 0$$

# Learning By Doing in class

## Solving the Consumer Choice Problem with Lagrange Multipliers

Sultan purchases food (measured by x) and clothing (measured by y). His preferences are described by a Cobb–Douglas utility function

$U(x, y) = xy$, with $MU_x = y$ and $MU_y = x$. We also know the prices of the two goods and the monthly income: $p_x = SAR\ 20$, $P_y = SAR\ 40, I = SAR\ 800$.

# Learning By Doing 2

## Solving the Consumer Choice Problem with Lagrange Multipliers

Sultan purchases food (measured by x) and clothing (measured by y). His preferences are described by a Cobb–Douglas utility function

$U(x, y) = xy + 10x$, with $MU_x = ???$ and $MU_y = ???$. We also know the prices of the two goods and the monthly income: $p_x = SAR\ 20$, $P_y = SAR\ 40$, $and\ \ I = SAR\ 800$.

# CHANGE IN THE PRICE OF A GOOD: SUBSTITUTION EFFECT AND INCOME EFFECT

## Solving the Consumer Choice Problem with Lagrange Multipliers

Sultan purchases food (measured by x) and clothing (measured by y). His preferences are described by a Cobb–Douglas utility function

$U(x, y) = xy$, with $MU_x = y$ and $MU_y = x$. We also know the prices of the two goods and the monthly income: $p_x = SAR\ 20$, $P_y = SAR\ 80, I = SAR\ 800$.

# CHANGE IN THE PRICE OF A GOOD: SUBSTITUTION EFFECT AND INCOME EFFECT

Sultan purchases food (measured by x) and clothing (measured by y). His preferences are described by a Cobb–Douglas utility function

$U(x, y) = xy$, with $MU_x = y$ and $MU_y = x$. We also know the prices of the two goods and the monthly income: $p_x = SAR\ 20,\ P_y = SAR\ 40, I = SAR\ 1400$

# Types of Function

1) Cobb-Douglas Function

$$U(x, y) = x^2 y$$

2) Leontief

$$U(x, y) = \min(x, y)$$

3) Linear

$$u(x, y) = 10x + xy + 2x$$

# Cost Minimization Function

- Isocost Lines and isoquant
- Cost-Minimization Problem
- Input Demands
- Cost Functions
- Type of Costs
- Average and Marginal Cost
- Economies of Scale, Scope, and Experience

# Isocost Lines

## An isocost line:

is the set of input combinations that yield the same total cost for the firm.

An **Isocost** line is analogous to a budget line from the theory of consumer choice.

That is, the combinations of L and W for which

$$TC = wL + rK$$

, where

w > 0 is the price of every unit of labor (wage per hour);

r > 0 is the cost of each unit of capital (interest rate);

TC is a given total cost that the firm incurs.

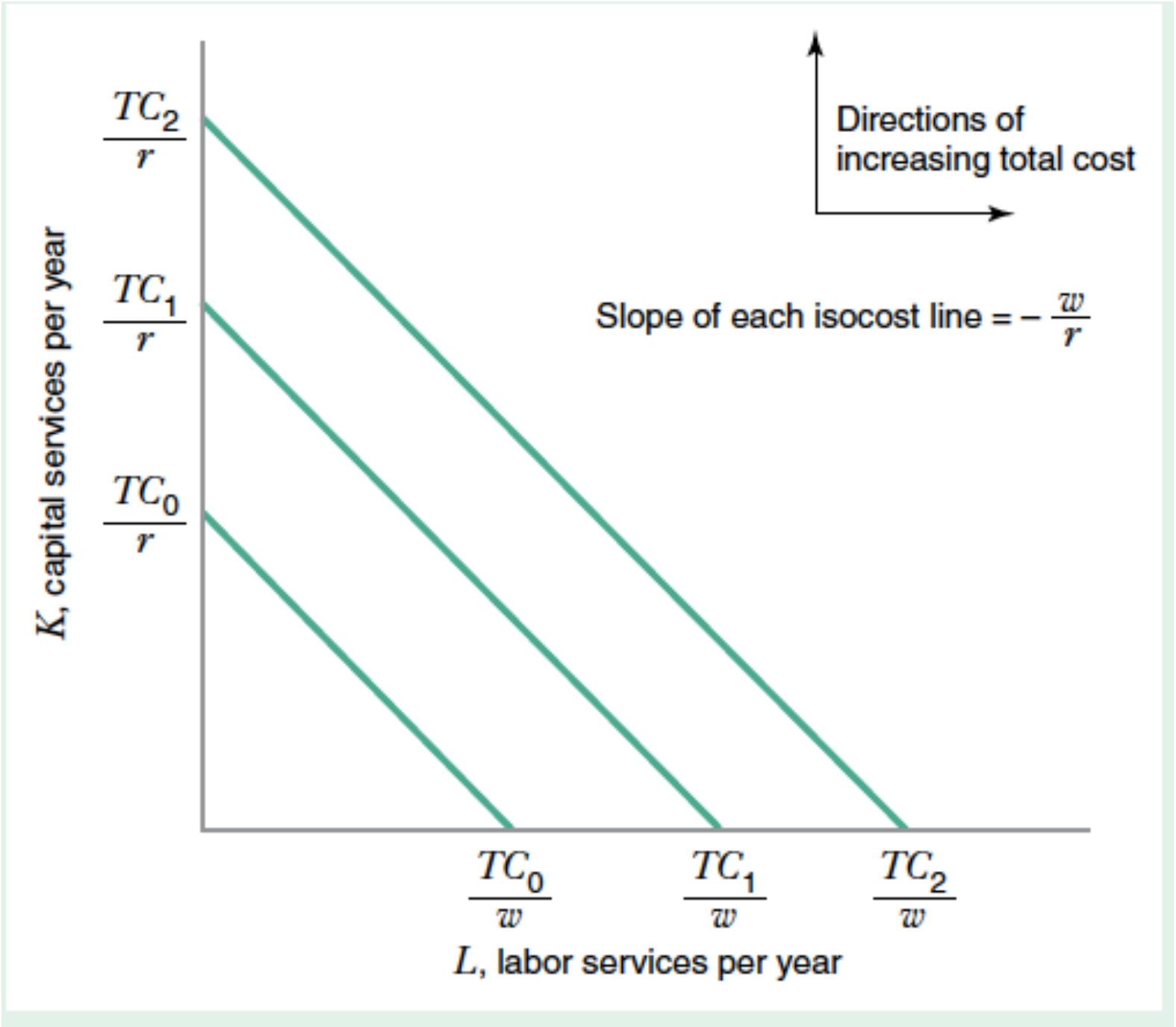
# Isocost Lines

As we move to the northeast in the isocost

map, isocost lines correspond to higher levels of total cost.

All isocost lines have the

same slope.



Consider, for example, a case in which w = SAR10 per labor-hour, r = SAR 20 per machine hour, and TC = SAR 1 million per year.

# What is the isocost line ?

The SAR 1 million isocost line is described by the equation

1,000,000 = 10L + 20K, which can be rewritten as K = 1,000,000/20 – (10/20)L.

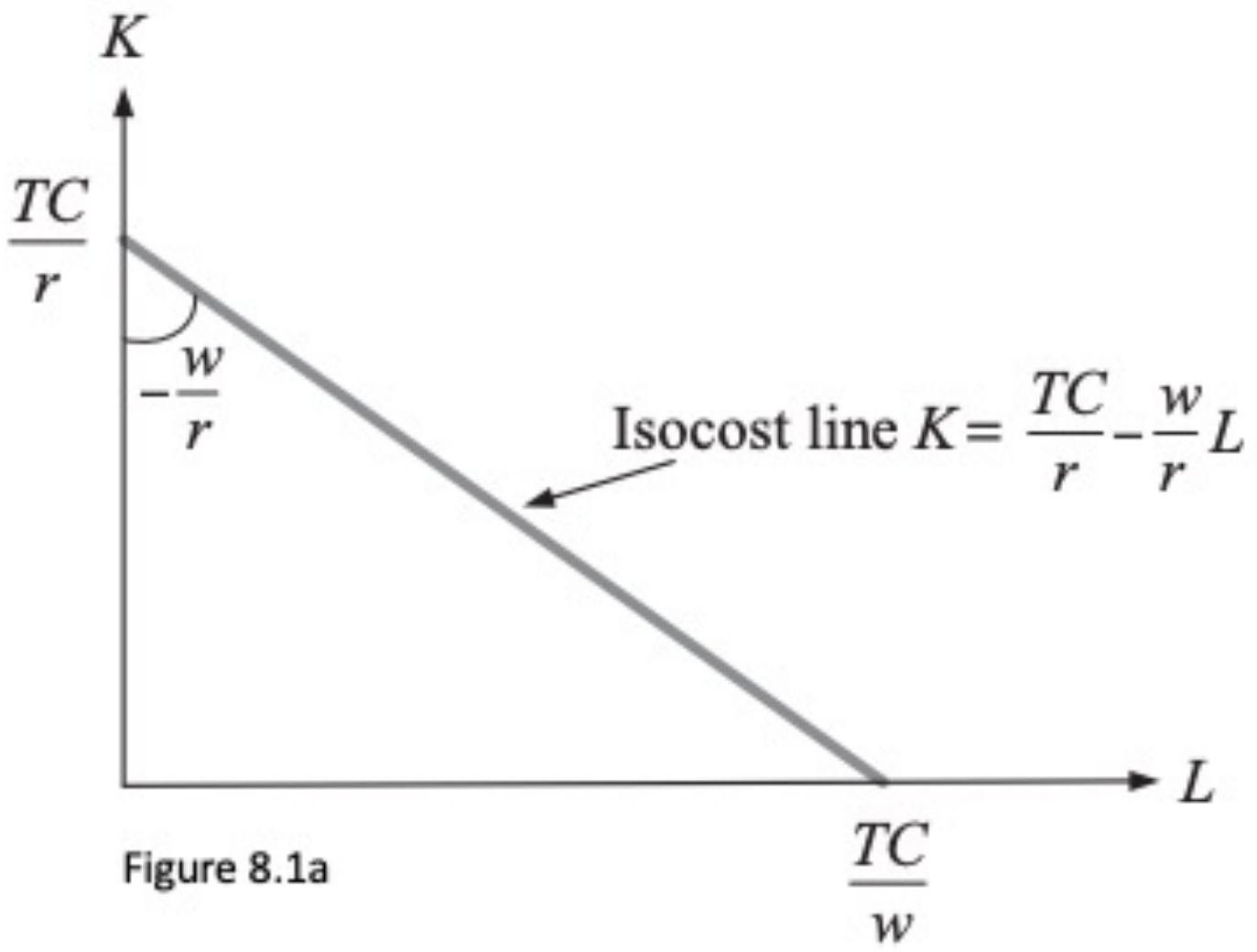



Figure 8.1a

# Wages increase

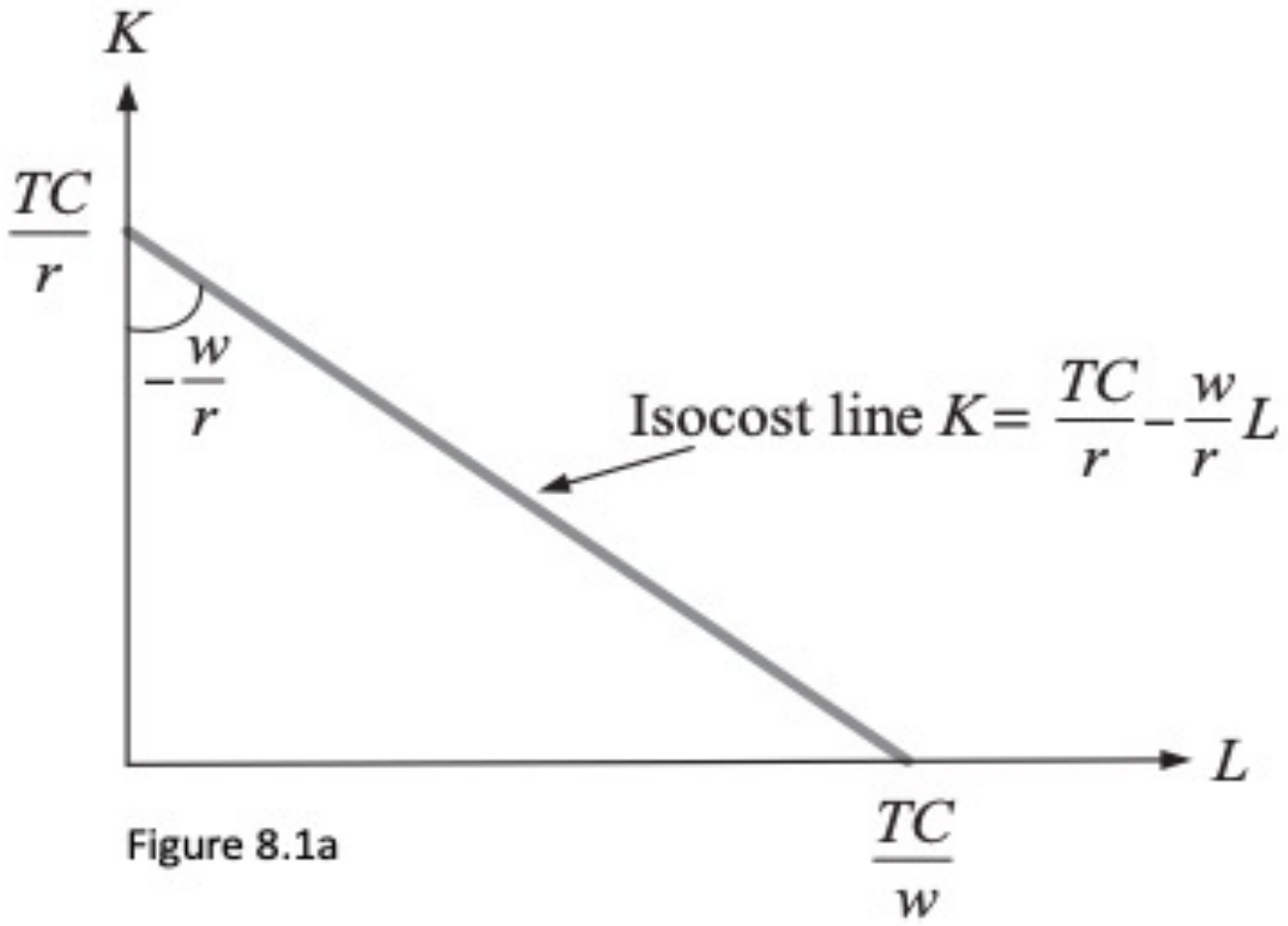
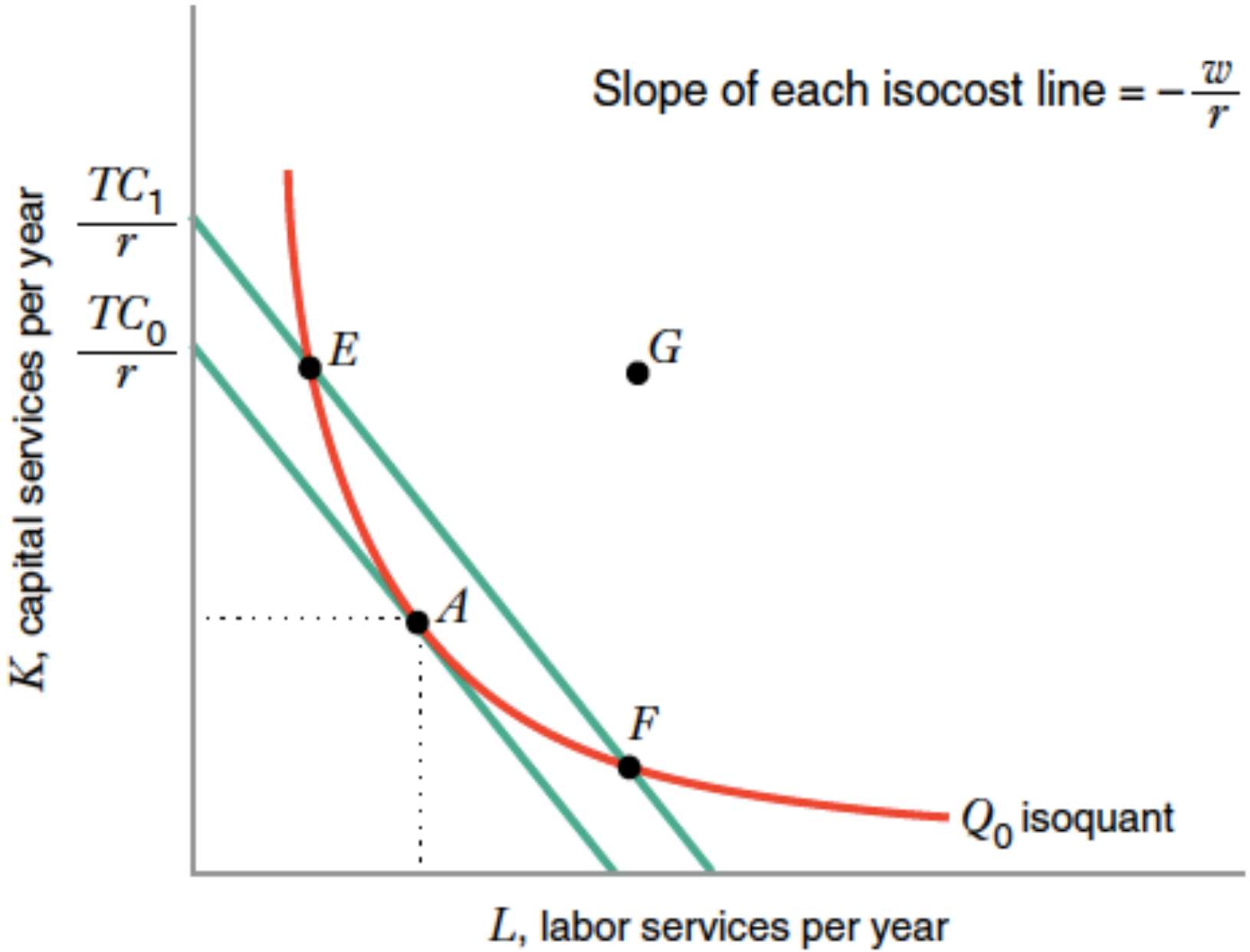



Figure 8.1a

# Interest Rate Increases


Slope of each isocost line = $-\frac{w}{r}$
$\frac{TC_1}{r}$
$\frac{TC_0}{r}$
E
G
A
F
$Q_0$ isoquant
K, capital services per year
L, labor services per year

# Isocount

# The cost-minimizing condition

The slope of isoquant = Slope of isocost line

$$-MRTS_{L,K} = -\frac{w}{r}$$

$$\frac{MP_L}{MP_K} = \frac{w}{r}$$

let's consider a specific example. Suppose that the firm's production function is of the form $Q = 50\sqrt{LK}$ . For this production function, the equations of the marginal products of labor and capital $are\ MP_L = 25\sqrt{\frac{K}{L}}\ and\ MP_K = 25\sqrt{\frac{l}{K}}$.

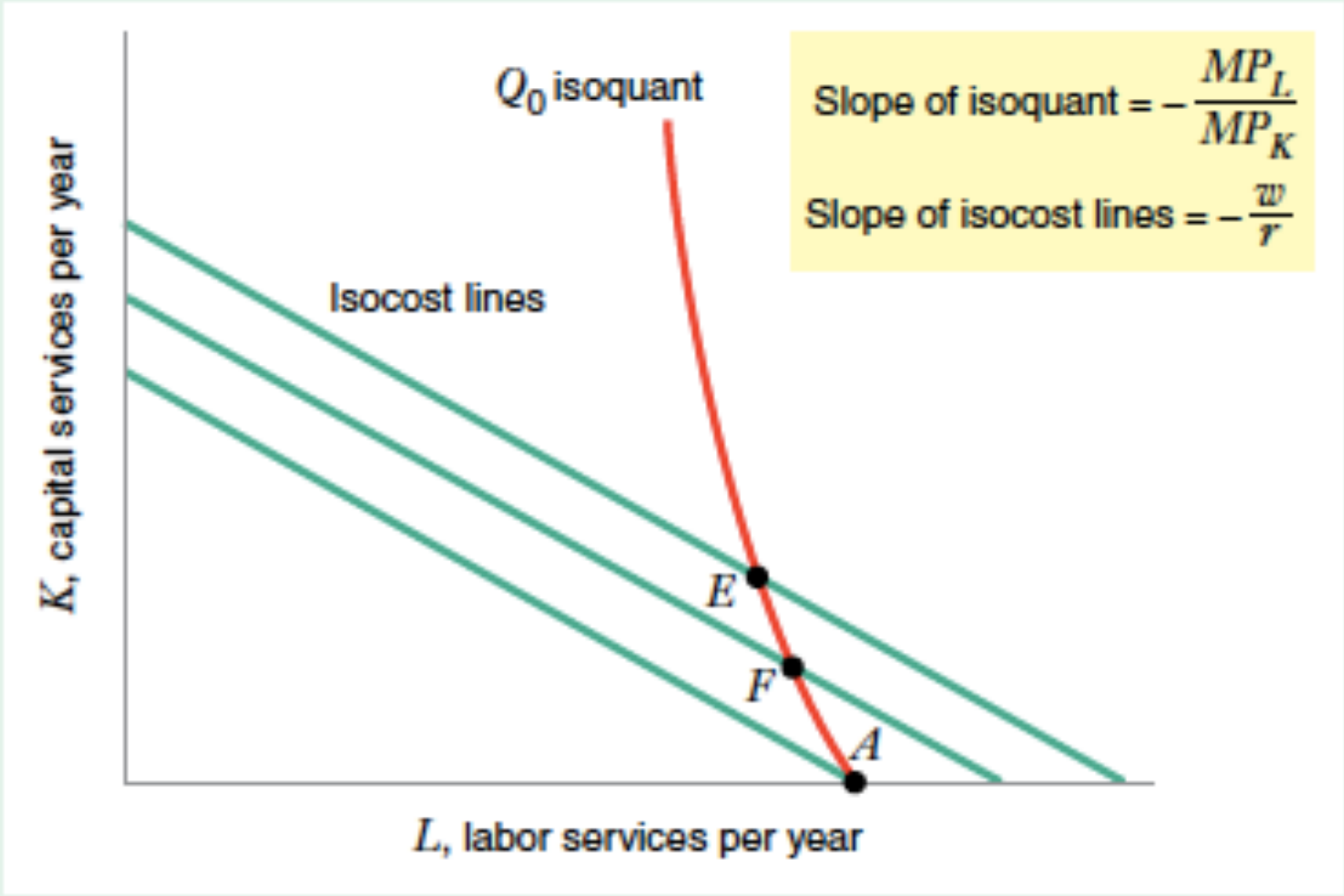
Suppose, too, that the price of labor w is SAR 5 per unit and the price of capital r is SAR 20 per unit.

**What is the cost minimizing input combination if the firm wants to produce 1,000 units per year?**

# A Corner Solution

***We did not have a tangency*** between a budget line and an indifference curve.

The same idea in this chapter, we can also have corner point solutions to the cost-minimization problem.


$Q_0$ isoquant
Slope of isoquant = $-\frac{MP_L}{MP_K}$
Slope of isocost lines = $-\frac{w}{r}$
Isocost lines
E
F
A
K, capital services per year
L, labor services per year

# Learning By doing

Suppose that we have the linear production

function Q = 10L + 2K. For this production function,

$MP_L = 10$ and $MP_K = 2$. Suppose, too, that the price of labor w is SAR 5 per unit and that the price of capital services r is SAR 2 per unit. ***Find the optimal input combination*** given that the firm wishes to produce 200 units of output.

the optimal input combination is a corner point solution at which K = 0. The following argument tells us that we must have a corner point solution. We know that when inputs are perfect substitutes, $MRTS_{L,K} = \frac{MP_L}{MP_K}$ is constant along an isoquant; in this particular example, it is equal to 5. But $\frac{w}{r} = 2.5$, so there is no point that can satisfy $\frac{MP_L}{MP_K} = \frac{w}{r}$. This tells us that we cannot have an interior solution.

# Learning By Doing 2

let’s consider a specific example.

Suppose that the firm’s production function is of the form $Q= 2L+8K$ . Suppose, too, that the price of labor w is SAR 40 per unit and the price of capital r is SAR 10 per unit, q=100

# A Corner Solution

The firm increases its purchases of capital as much as possible, leading to a corner solution where the firm only purchases capital but no labor ($L = 0$).

Inserting L=0 into the output target of the,

100=2L+8K, and solving for k,

K=12.5 units

## Summary

$Q(l,k) = (0,12.5)$

# Learning By Doing

Consider a firm with Cobb-Douglas production function

$$q = L^{1/2} K^{1/2}$$

**Finding input demands, K,L?**

# Comparative Statics with input demands

Increasing in q

Increasing in w

Increasing in r

# Cost-Minimization Problem

The cost-minimization problem (CMP) can be represented as

$$\min_{l,k} TC = wL + rK \quad s.t \qquad Q = f(l,k)$$

**The problem ask the firm:**

Choose the input combination that minimizes your total cost TC, reaching an output level of 100 units.

# Recap
# مراجعة

- The price system: demand and supply, Elasticities.
- Analysis of Consumer Behavior.
- Production and Cost Theory.
- Pricing and market structures: perfect competition, monopoly, monopolistic competition, oligopoly.
- Theory of Distribution.
- Introduction to welfare theory.

# Introduction to welfare theory

Normative Analysis (NA) Analysis that typically focuses on issues of social welfare, examining what will enhance or detract from the common good.

The process of making recommendations about what action should be taken or taking a particular viewpoint on a topic.

# Social Welfare Theory

Normative studies might examine how to achieve a goal that some people consider socially desirable.

**Example:**

1-Policy makers want to make housing more affordable to low-income

families.

2- Government finds it desirable to reduce pollution. Introducing taxes on emissions or strictly limiting the emissions from factories and automobiles

# The Kingdom Of Saudi Arabia

## General Organization for Social Insurance (GOSI)

Programs support workers or their families in cases of disability, retirement, and death.

## Key Programs:

- Widows, Divorced women, People with disabilities, The Elderly, Orphans, Children of unknown parentage
- Unemployed persons, The poor and the needy, AND Those affected by disasters and pandemics


المؤسسة العامة للتقاعد
Public Pension Agency
المؤسسة العامة للتأمينات الاجتماعية
General Organization for Social Insurance

# Example

The Ministry of Human Resources and Social Development said that the decision to raise the minimum wage calculation for Saudis from SAR 3,000 ($800) to SAR 4,000 ($1,066) applies to all existing and new workers in the Saudi labor market (2022)

# Deadweight Loss (DWL)

The term **“deadweight loss”** refers to the economic loss incurred due to inefficient market conditions, i.e., demand and supply are out of equilibrium.

In other words, deadweight loss indicates that the economic **welfare of society is not at its optimum level**.

# Deadweight Loss (DWL)

**A Production externality**

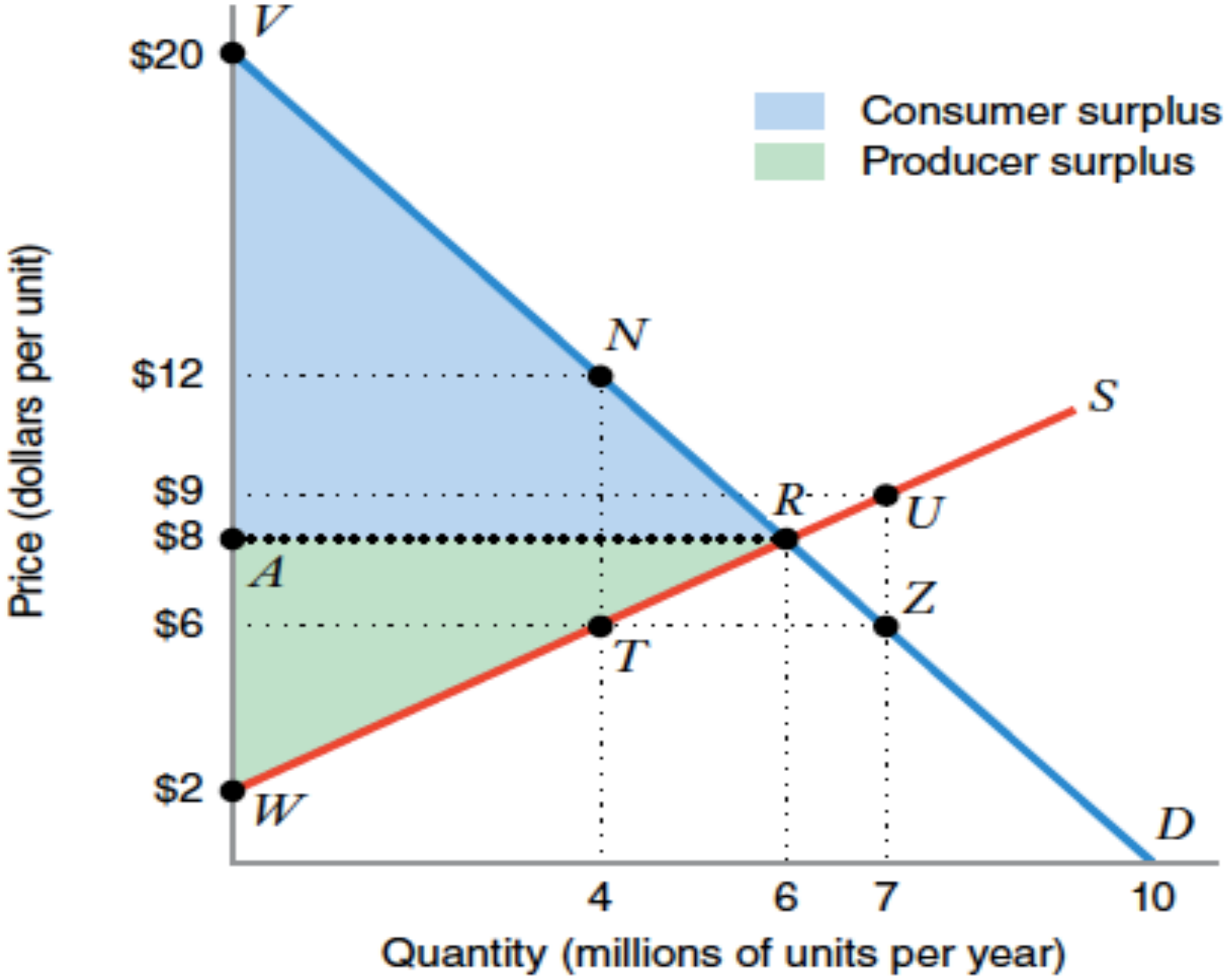
will be present if a producer pollutes the environment.

Pollution creates a social cost that might be ignored by a producer absent government Intervention.

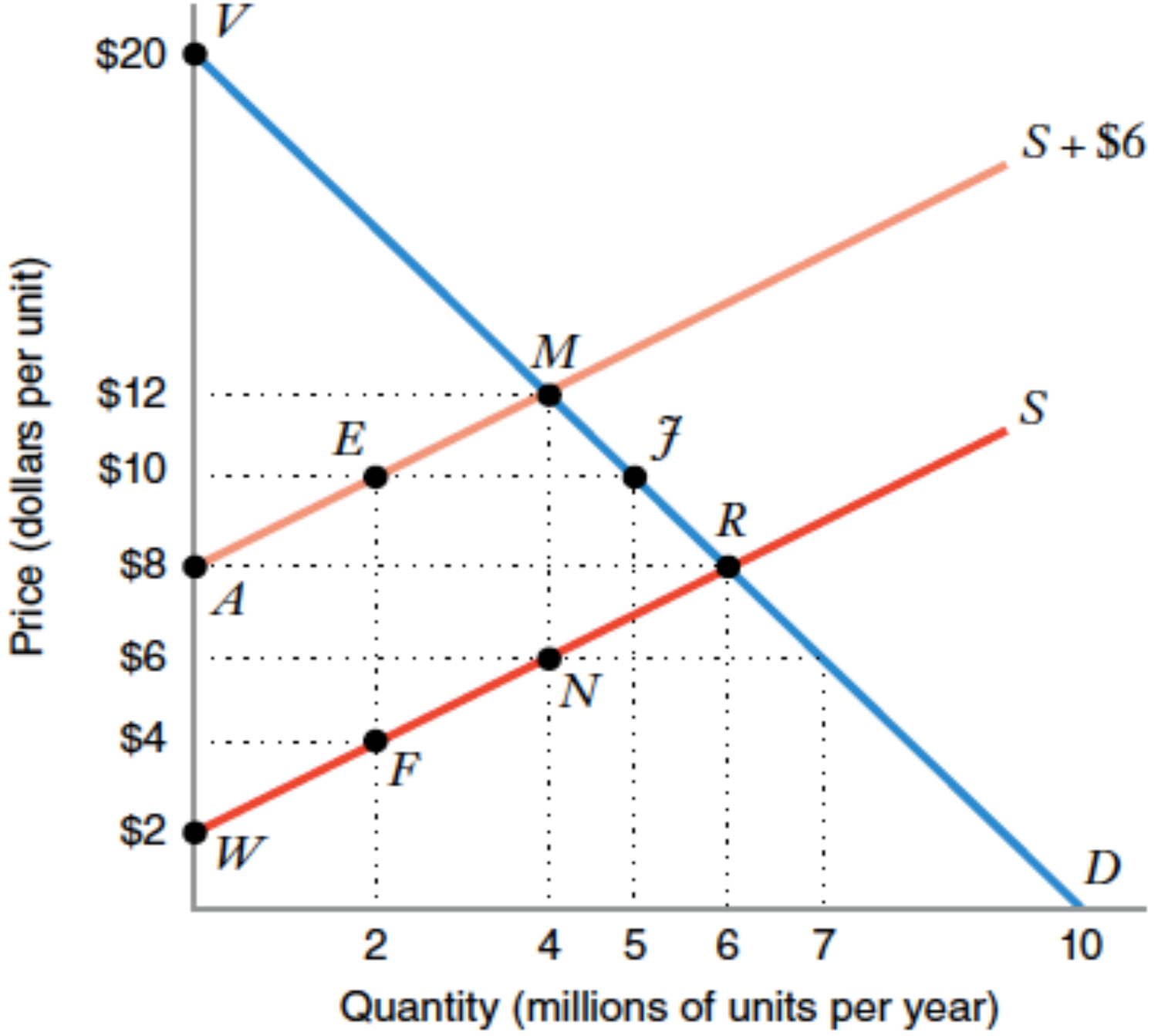
**A consumption externality**

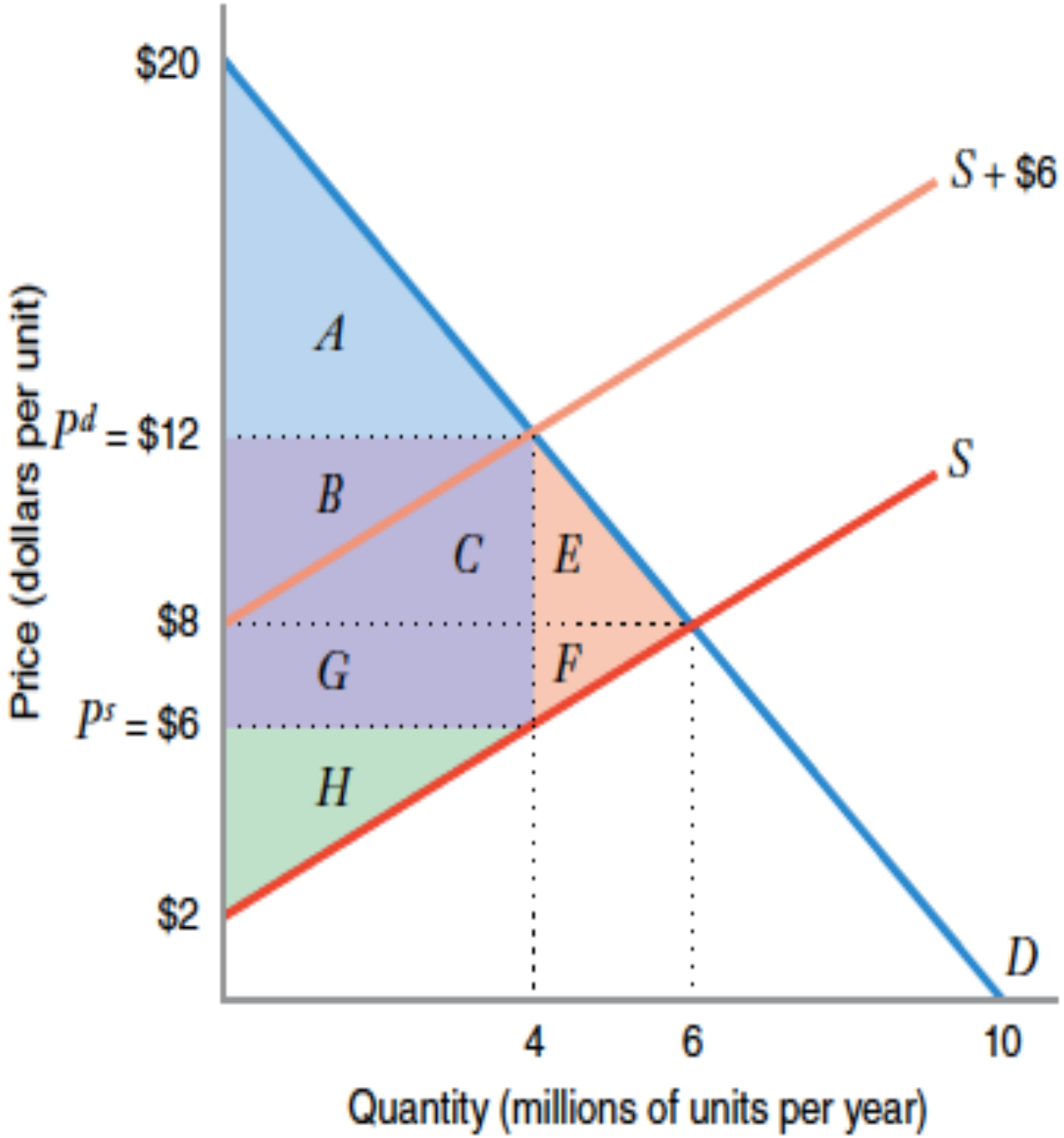
exists when the action of an individual consumer imposes costs on or leads to benefits for, other consumers

***The Role Of Government " Policy Makers"***


Consumer surplus
Producer surplus
Price (dollars per unit)
$20
$12
$9
$8
$6
$2
V
N
S
R
U
A
Z
T
W
D
4
6
7
10
Quantity (millions of units per year)

# Example: Tax


V
$20
S + $6
M
$12
S
E
J
$10
R
$8
A
$6
N
$4
F
$2
W
D
Price (dollars per unit)
2
4
5
6
7
10
Quantity (millions of units per year)




| Area | Size (dollars/year) |
|---|---|
| *A* | $16 million |
| *B* | 8 million |
| *C* | 8 million |
| *E* | 4 million |
| *F* | 2 million |
| *G* | 8 million |
| *H* | 8 million |

| | With No Tax | With Tax | Impact of Tax |
|---|---|---|---|
| Consumer surplus | $A + B + C + E$ ($36 million) | $A$ ($16 million) | $-B - C - E$ (–$20 million) |
| Producer surplus | $F + G + H$ ($18 million) | $H$ ($8 million) | $-F - G$ (–$10 million) |
| Government receipts from tax | zero | $B + C + G$ ($24 million) | $B + C + G$ ($24 million) |
| Net benefits (consumer surplus + producer surplus + government receipts) | $A + B + C + E + F + G + H$ ($54 million) | $A + B + C + G + H$ ($48 million) | $-E - F$ (–$6 million) |
| Deadweight loss | zero | $E + F$ ($6 million) | $E + F$ ($6 million) |

# Summary

| | Consumer Surplus | Producer Surplus | Tax Receipts | Deadweight Loss | Net Economic Benefit |
|---|---|---|---|---|---|
| **With No Tax** | $36 million | $18 million | 0 | 0 | *Potential:* $54 million<br>*Actual:* $54 million |
| **With Tax** | $16 million | $8 million | $24 million | $6 million | *Potential:* $54 million<br>*Actual:* $48 million |

# *LEARNING-BY-DOING EXERCISE*

In this exercise, we determine the equilibrium prices and quantities in Figure 10.3, using algebra. The demand and supply curves in Figure 10.3 are as follows:

$$Q^d = 10 - 0.5P^d$$

$$Q^s = \begin{cases} -2 + P^s, & \text{when } P^s \geq 2 \\ 0, & \text{when } P^s < 2 \end{cases}$$

where $Q^d$ is the quantity demanded when the price consumers pay is $P^d$, and $Q^s$ is the quantity supplied when the price producers receive is $P^s$. The last line of the supply equation indicates that nothing will be supplied if the price producers receive is less than \$2 per unit. Thus, for prices between zero and \$2, the supply curve lies on the vertical axis.

(a) With no tax, what are the equilibrium price and quantity?

(b) Suppose the government imposes an excise tax of $6 per unit. What will the new equilibrium quantity be? What price will buyers pay? What price will sellers receive?

# Example: Subsidy

As in Learning-By-Doing Exercise 10.1, the demand and supply curves are

$$Q^d = 10 - 0.5\,P^d$$

$$Q^s = \begin{cases} -2 + P^s, & \text{when } P^s \geq 2 \\ 0, & \text{when } P^s < 2 \end{cases}$$

where $Q^d$ is the quantity demanded when the price consumers pay is $P^d$, and $Q^s$ is the quantity supplied when the price producers receive is $P^s$.

## Problem

Suppose the government provides a subsidy of \$3 per unit. Find the equilibrium quantity, the price buyers pay, and the price sellers receive.

# اللعبة الاستراتيجية
# Strategic Game

- Introduction to games, ingredients, and representation.
- Nash equilibrium in games with two players.
- Mixed strategy equilibria (msNE) with two players
- Dominance solvable games:
- application of Iterative Deletion of Strictly Dominated Strategies (IDSDS) and Iterative Deletion of Weakly Dominated Strategies (IDWDS).

# Introduction to Game Theory

Game theory:

Can be viewed in terms of its mathematics or as a tool to model the interaction between decision makers.

Chess or Hex, going to movie or opera ..etc much of game theory is concerned with how individual entities (persons, or organizations) choose actions, taking into account how other participants do the same

# Oil Price War

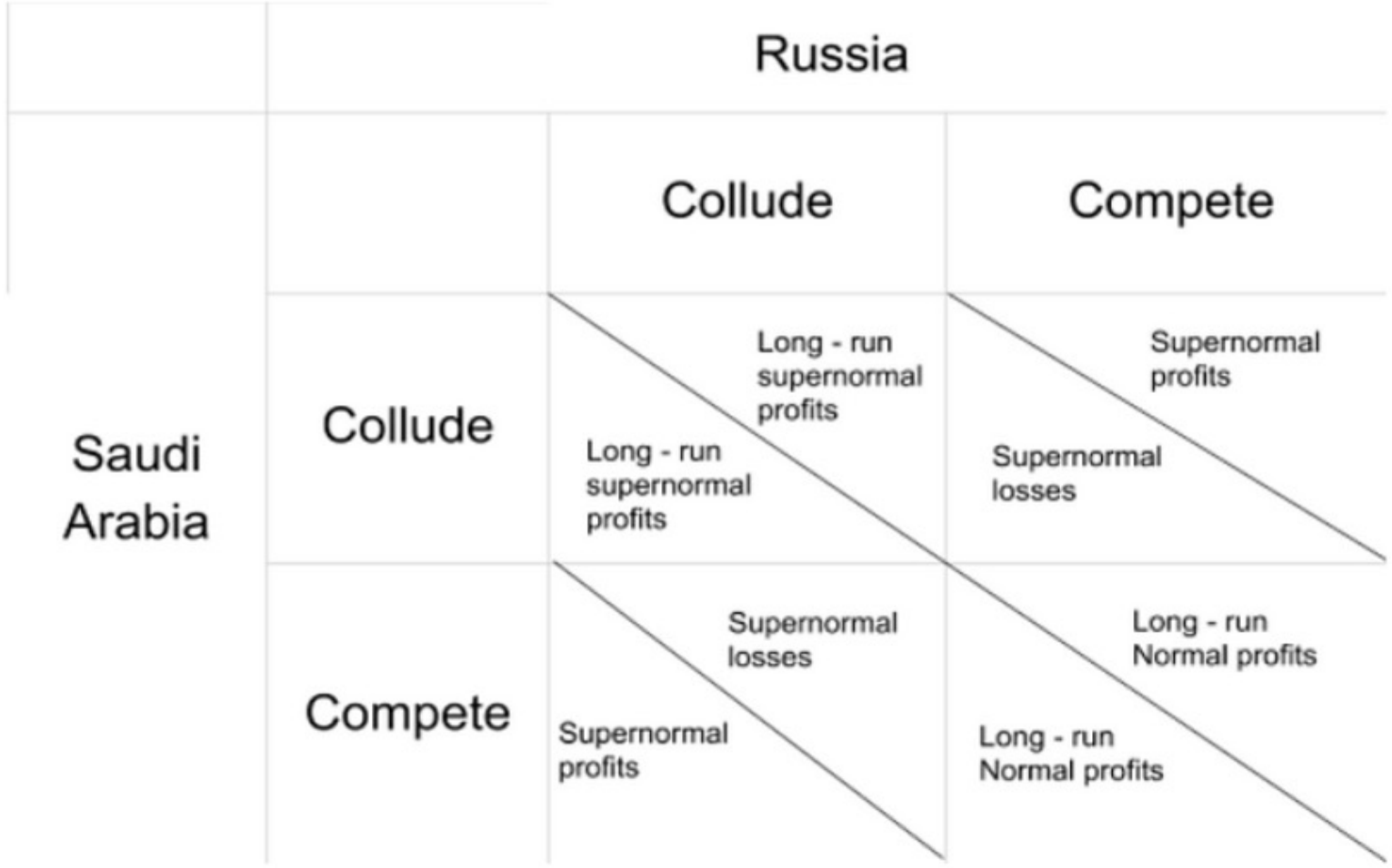
Saudi Arabia

Russia

VS.

***The Chicken Game*** *– Russia And Saudi Arabia's War On Oil Prices*

# The Chicken Game KSA Vs. Russia




Russia
Raise Prices
Lower Prices
Saudi Arabia
Raise Prices
Lower Prices
$200
$200
$300
$50
$50
$300
$100
$100

# The Rule Of Game Theory

**The rules of a game seek to answer the following questions:**

1. Who is playing? set of players (i)
2. What are they playing with? Set of available actions (S)
3. Where does each player get to play? Order, or time structure of the game.
4. How much players can gain (or lose)? Payoffs.

# Nash equilibrium in games with two players

**Prisoners' Dilmma game:**

| | | Frank | |
|---|---|---|---|
| | | Confess | Stay Mum |
| Jesse | Confess | −5, −5 | −3, −10 |
| | Stay Mum | −10, −3 | −2, −2 |

# **First:** Identifying the Row Player's Best Responses

| | | Frank | |
|---|---|---|---|
| | | Confess | Stay Mum |
| Jesse | Confess | −5, −5 | −3, −10 |
| | Stay Mum | −10, −3 | −2, −2 |

| | | Frank | |
|---|---|---|---|
| | | Confess | Stay Mum |
| Jesse | Confess | −5, −5 | −3, −10 |
| | Stay Mum | −10, −3 | −2, −2 |

# Other Games: Game of Chicken

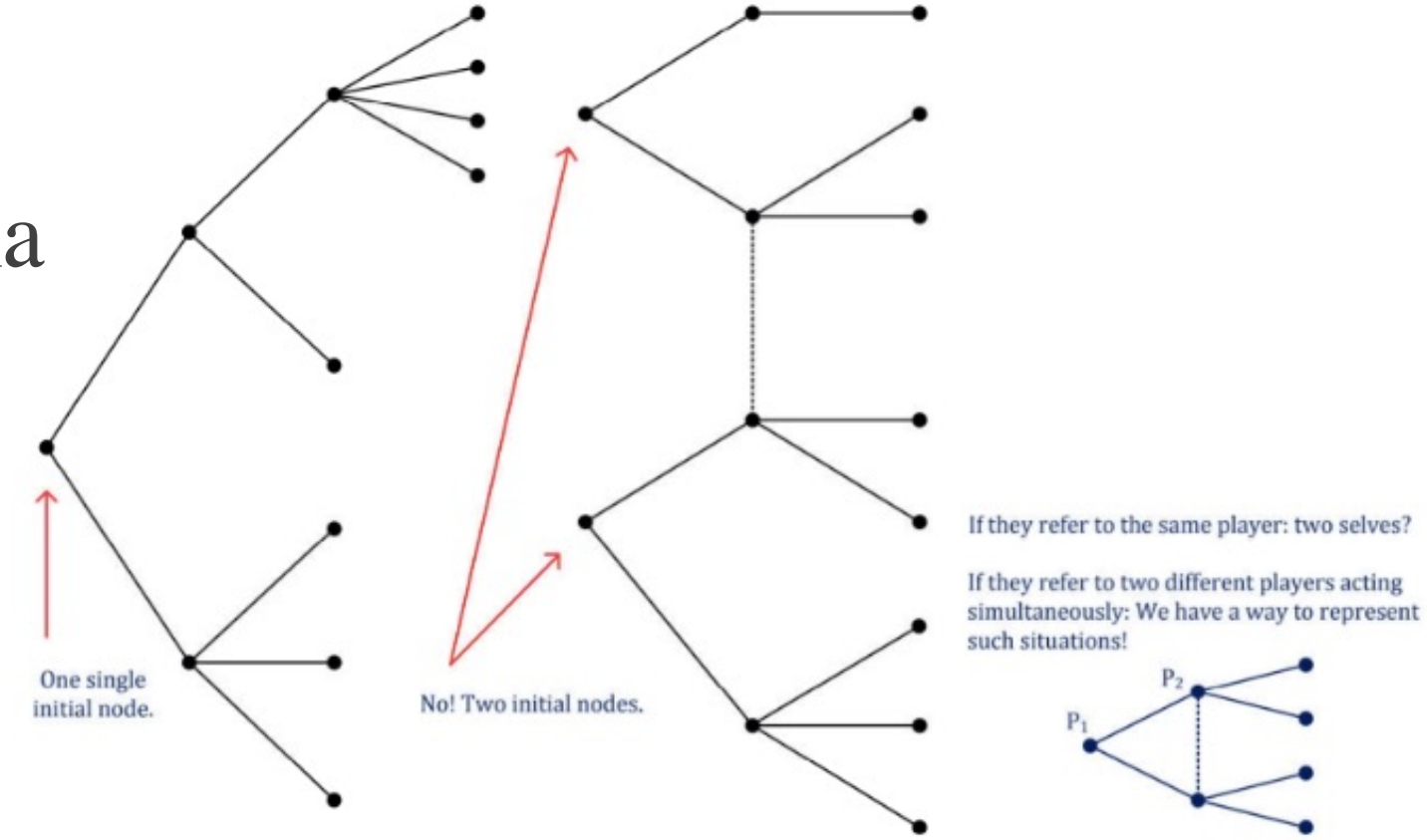
| | | James | |
|---|---|---|---|
| | | Go Straight | Swerve |
| Dean | Go Straight | −10, −10 | 3, 0 |
| | Swerve | 0, 3 | 0, 0 |

# Dating Game: Chevrolet and Cadillac

| | | Chevrolet | |
|---|---|---|---|
| | | Goodyear Tires | Michelin Tires |
| Cadillac | Goodyear Tires | 1, 4 | 0, 0 |
| | Michelin Tires | 2, 2 | 4, 1 |

# Game Tree

- KSA *Vs*. Russia
- Prisoner's Dilemma
- Game Of Chicken
- Dating Game



# Mixed strategy equilibria (msNE) with two players

What if we do not have  PURE NASH EQUILIBRIUM!!!

How do we play the game?

What is the Nash equilibrium in the game?

# Mixed strategy equilibria (msNE) with two players

- We have seen, Pure Nash equilibrium in some games.

- However, the existence of Nash equilibrium would follow if we extend this notion to **mixed strategies.**

- All we need is that each player's mixed strategy to be the best response to the mixed strategies of all other players.

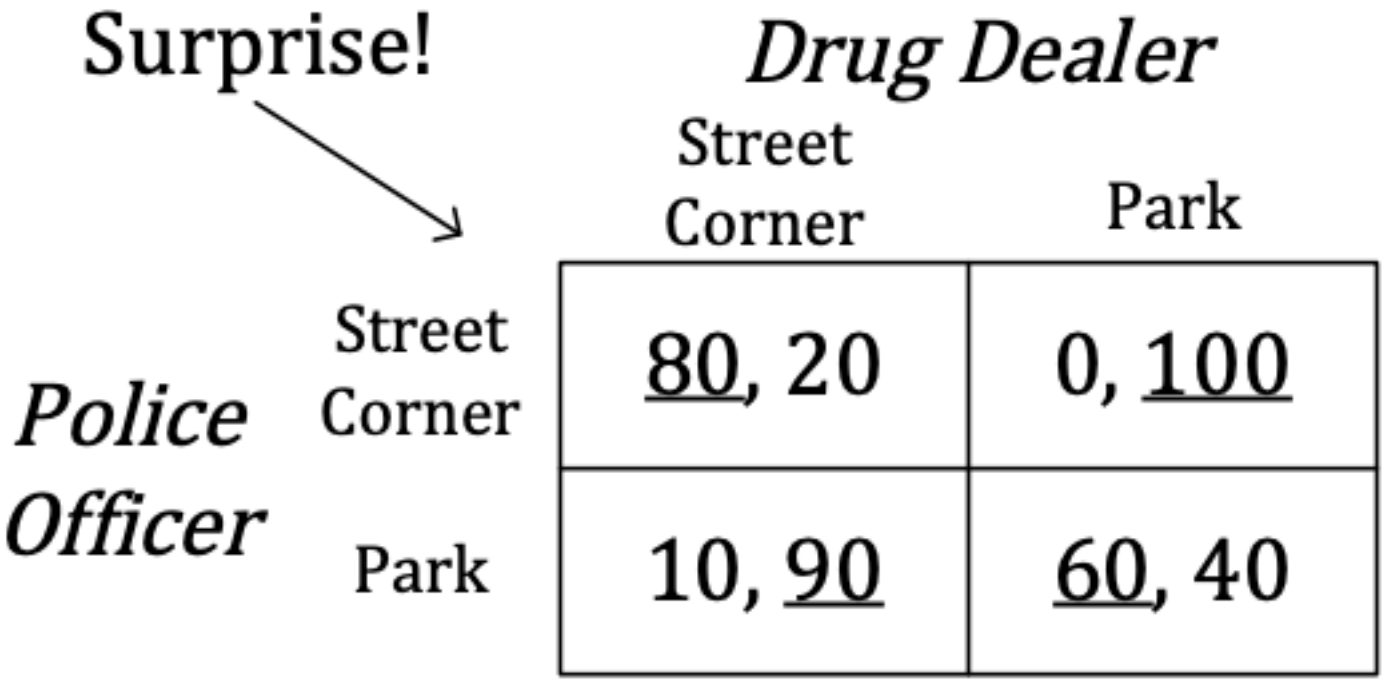
# Example: Mixed Strategy Nash Equilibrium

Example of an anti-coordination game:

| $P_1$ \ $P_2$ | Head | Tail |
|---|---|---|
| Head | $\underline{1}, -1$ | $-1, \underline{1}$ |
| Tail | $-1, \underline{1}$ | $\underline{1}, -1$ |

- We need to allow players to randomize their choices.

# Example 2: Mixed Strategy Nash Equilibrium



# Example 3 : Mixed Strategy Nash Equilibrium

| 1 \ 2 | F | C | B |
|---|---|---|---|
| F | 0, 5 | 2, 3 | 2, 3 |
| C | 2, 3 | 0, 5 | 3, 2 |
| B | 5, 0 | 3, 2 | 2, 3 |

# *How to play the game?*

| | | | *Player 2* | |
|---|---|---|---|---|
| | | | $q$ | $1-q$ |
| | | | Heads | Tails |
| *Player 1* | $p$ | Heads | $1, -1$ | $-1, 1$ |
| | $1-p$ | Tails | $-1, 1$ | $1, -1$ |

# *Learning By Doing 1*

Surprise!

| | | *Drug Dealer* | |
|---|---|---|---|
| | | Street Corner | Park |
| *Police Officer* | Street Corner | <u>80</u>, 20 | 0, <u>100</u> |
| | Park | 10, <u>90</u> | <u>60</u>, 40 |

# *Learning By Doing 2*

| 1 \ 2 | F | C | B |
|---|---|---|---|
| F | 0, 5 | 2, 3 | 2, 3 |
| C | 2, 3 | 0, 5 | 3, 2 |
| B | 5, 0 | 3, 2 | 2, 3 |

# *Learning By Doing 3*

| 1 \ 2 | X | Y | Z |
|---|---|---|---|
| U | 2, 0 | 1, 1 | 4, 2 |
| M | 3, 4 | 1, 2 | 2, 3 |
| D | 1, 3 | 0, 2 | 3, 0 |

# The rock-paper-scissors game

| | | *Player* 2 | | |
|---|---|---|---|---|
| | | Rock | Paper | Scissors |
| *Player* 1 | Rock | 0, 0 | -1, 1 | 1, -1 |
| | Paper | 1, -1 | 0, 0 | -1, 1 |
| | Scissors | -1, 1 | 1, -1 | 0, 0 |

# *learning By Doing 4*

| | | Player 2 | | |
|---|---|---|---|---|
| | | L | C | R |
| Player 1 | U | 2, 0 | 2, 0 | 3, -1 |
| | M | 3, 1 | 0, 0 | 2, -1 |
| | D | 0, 0 | 3, 1 | 2, -1 |

# *Summary*

- Introduction to games
- Nash equilibrium in games with two players.
- Mixed strategy equilibria (msNE) with two players " Pure Nash Equilibrium, Mixed Nash Equilibrium"
- Dominance solvable games:
- Application of Iterative Deletion of Strictly Dominated Strategies (IDSDS) and Iterative Deletion of Weakly Dominated Strategies (IDWDS).