

# 國立臺灣大學

## 開放式課程

### 《經濟學原理》

#### 第七講

#### Elasticity and its Application (Ch.5)

授課教師：國立臺灣大學經濟學系 林明仁教授

課程大綱整理：國立臺灣大學 開放式課程



【本著作除另有註明外，採取[創用 CC](#)「姓名標示—非商業性—相同方式分享」[臺灣 3.0 版](#)授權釋出】

※本課程指定教材為 N. Gregory Mankiw: Principles of Economics (2012), 6th edition.

## 彈性 (Elasticity)

- 供需均衡的變化、幅度
- 例子：青少年抽菸
- 定義：
  - a measurement of responsiveness of variable Y to one of its determinants, X.
  - 彈性是用來衡量某一被解釋變數對其解釋變數變動是否敏感的指標
  - 中文裏的「有彈性」：容易受外力影響 圓融；「沒彈性」：不知變通 正直

## 需求彈性

- 價格的需求彈性
- 衡量的單位—percentage

$$\text{需求的價格彈性} = \frac{\text{需求量變化的百分比}}{\text{價格變化的百分比}}$$

- 例子：假設蛋糕價錢從 \$2.00 變成 \$2.20，於是你買的數量從 10 變成 8，我們計算需求彈性如下：

$$\frac{\frac{10-8}{10} \times 100}{\frac{2-2.2}{2} \times 100} = \frac{0.2}{-0.1} = -2$$

$$\frac{\frac{10-8}{8} \times 100\%}{\frac{2-2.2}{2.2} \times 100\%} = \frac{0.25}{-0.090909} = -2.75$$

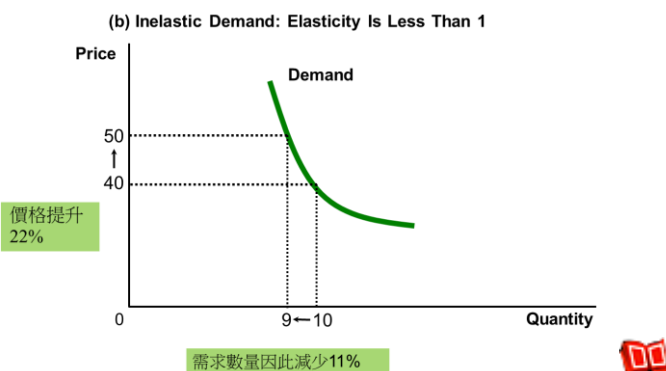
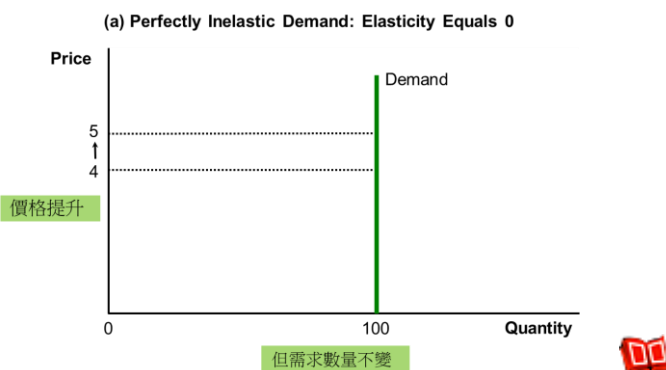
- 參考點不同，彈性不同！
- Notice: 此地彈性為負，但課本只講絕對值。
- Mid-point method

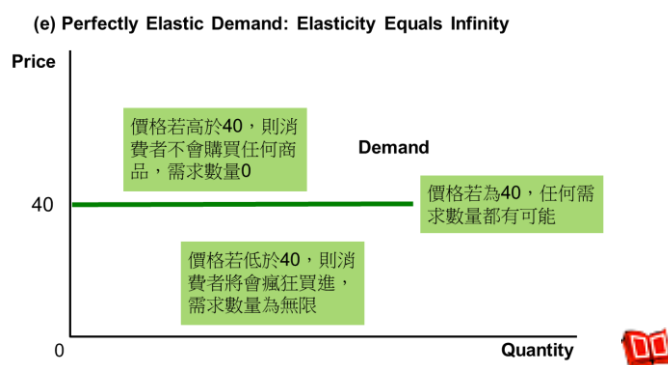
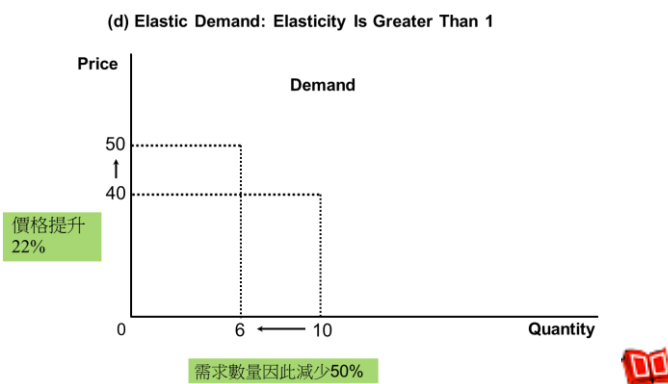
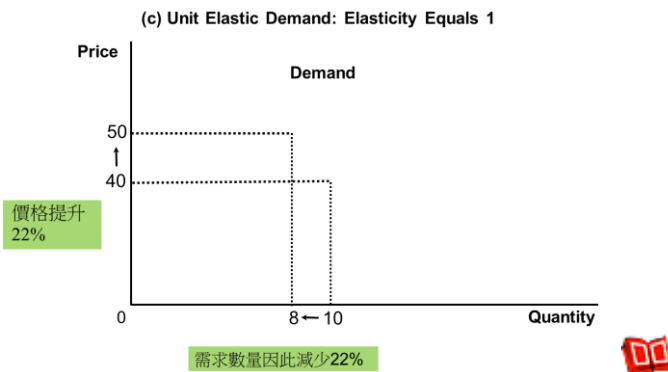
$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$

- Notice :
  - 如果只看斜率：刻度不同，結果會不一樣！
  - 需求曲線上不同兩點間的彈性不一樣！∴ depends on slope and P/Q (在哪一點上)

● 需求曲線

- 無彈性需求
- 有彈性需求
- 完全無彈性
- 完全彈性：ex. 勁草 vs. 牆頭草，誠臣 vs. 漢奸
- 單位彈性





● 決定因素：

□ 替代品的多寡與強弱：

- 替代品多、強 → 彈性大
- Ex: 便利商店裡的飲料

□ 時間長短：

- the longer the time period → The larger the elasticity，事緩則圓
- Ex: gas ↑ 一開始大家沒辦法只好忍耐；時間一久，改搭公車，叫政

府蓋捷運，或換省油車→汽油需求量下降幅度變大

– Ex: 野蠻女友或宅男男友，短期雞肋效果 vs. 長期汰換效果

▫ 市場的定義：

– 定義愈窄，彈性愈大

– Ex: 松阪牛肉 vs. 牛肉，Lexus 460 vs. car → 替代品多寡

– 必需品 vs. 奢侈品

• 必需品佔所得比例小，彈性小，奢侈品則反之。Ex: visiting doctor vs. buying a sailboat

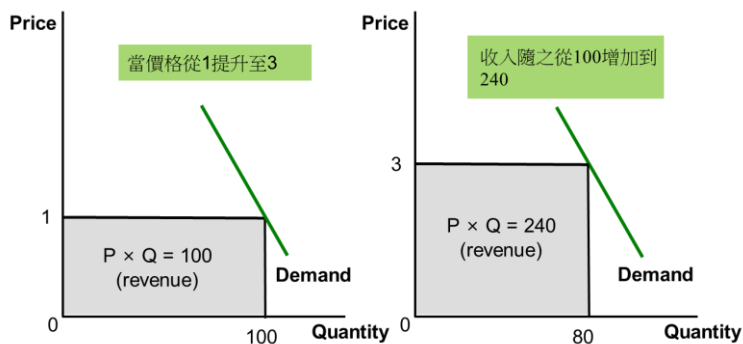
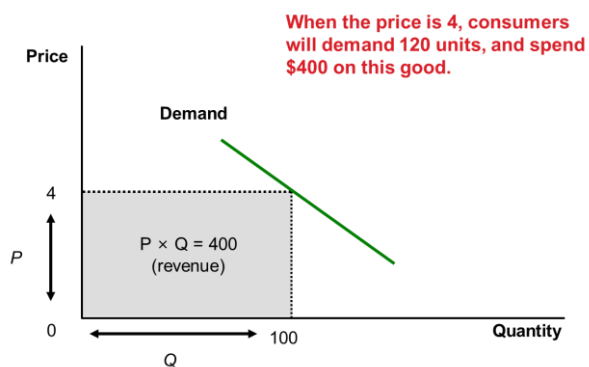
• 支出佔所得的比例越高，彈性越大。Ex: 房價 vs. 菜價

● 總收入 (total revenue)

$$TR = P \times Q$$

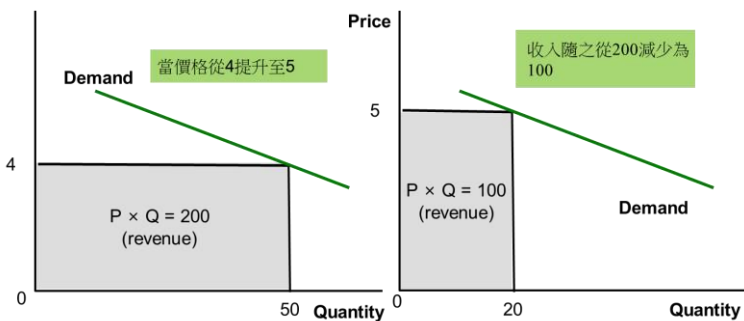
$$= P(Q) Q$$

(知道 Q 代進需求函數，就求得 P 了)



● 直線型需求曲線

- 在較無彈性的需求曲線段上，提高價格會使總收益增加。



Note that with each price increase, the Law of Demand still holds – an increase in price leads to a decrease in the quantity demanded. It is the change in TR that varies!



- 在較有彈性的需求曲線段上，提高價格會使總收益減少。

Price	Quantity	Total Revenue (Price × Quantity)	Percent Change in Price	Percent Change in Quantity	Elasticity	Description
\$7	0	\$0	15	200	13.0	Elastic
6	2	12	18	67	3.7	Elastic
5	4	20	22	40	1.8	Elastic
4	6	24	29	29	1.0	Unit elastic
3	8	24	40	22	0.6	Inelastic
2	10	20	67	18	0.3	Inelastic
1	12	12	200	15	0.1	Inelastic
0	14	0				



● 其他的需求彈性

- 所得的需求彈性

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

– 注意都是用 Percentage

- Types of Goods :
  - 正常財  $\epsilon_1 > 0$
  - 劣等財  $\epsilon_1 < 0$
- $0 < \epsilon_1 < 1$  必需品,  $\epsilon_1 > 1$  奢侈品

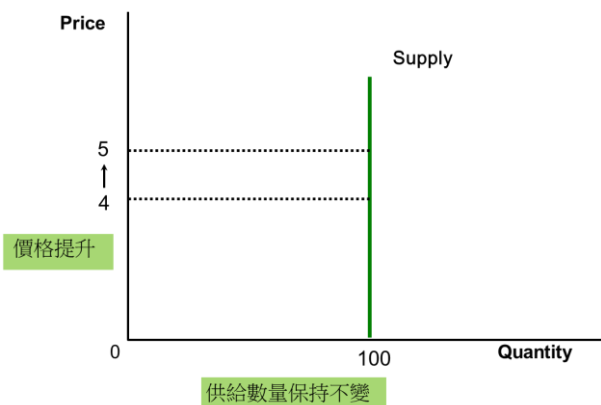
□ 其他物品的價格彈性

$$\text{Cross-price elasticity of demand} = \frac{\% \text{ change in quantity demanded of good 1}}{\% \text{ change in price of good 2}}$$

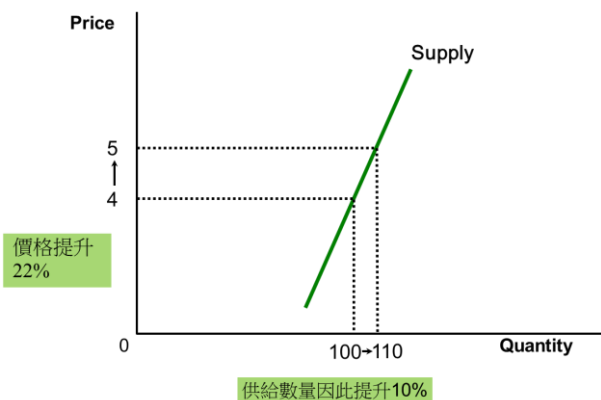
## 供給彈性

- 定義
- 供給曲線

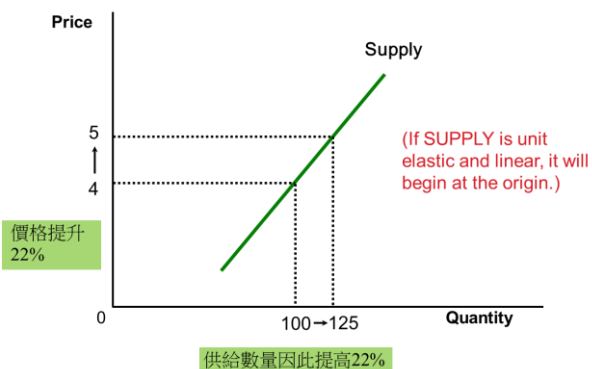
(a) Perfectly Inelastic Supply: Elasticity Equals 0



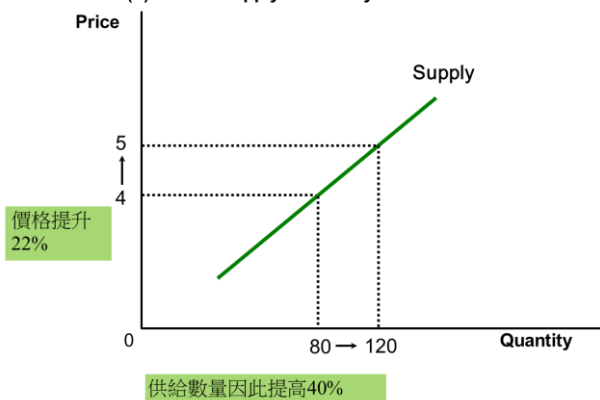
(b) Inelastic Supply: Elasticity Is Less Than 1



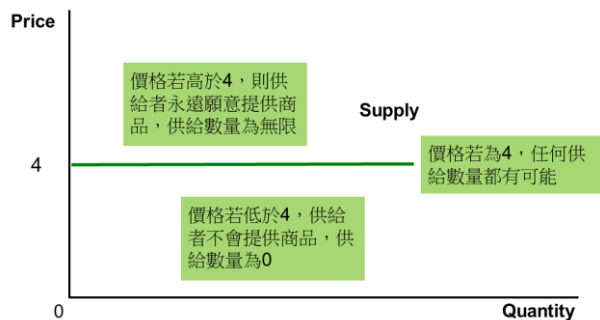
(c) Unit Elastic Supply: Elasticity Equals 1



(d) Elastic Supply: Elasticity Is Greater Than 1



(e) Perfectly Elastic Supply: Elasticity Equals Infinity



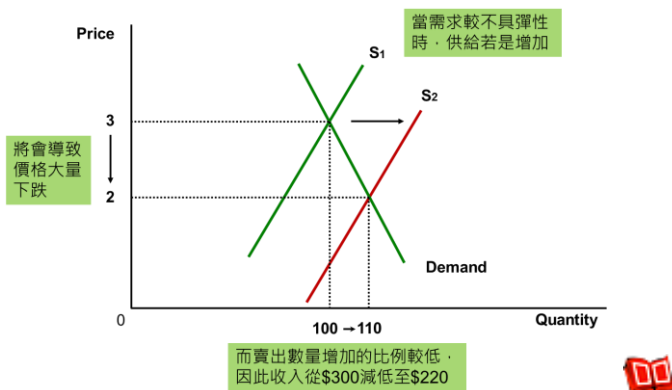
- 決定因素
  - 生產投入是否具備多種用途
  - 時間長短：時間拉長較有彈性
- 計算



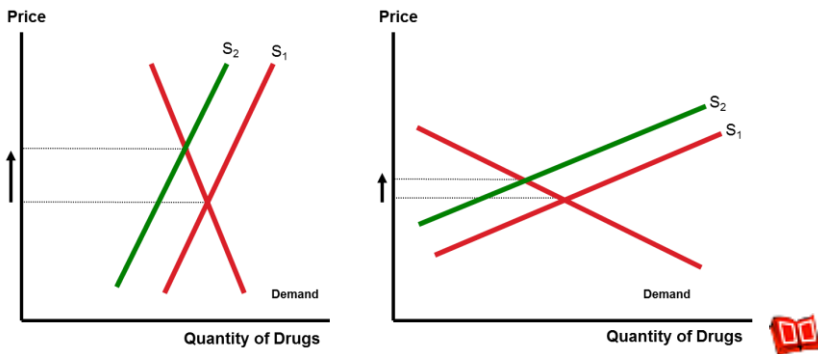
$$\text{Price elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

供給、需求和彈性應用例子

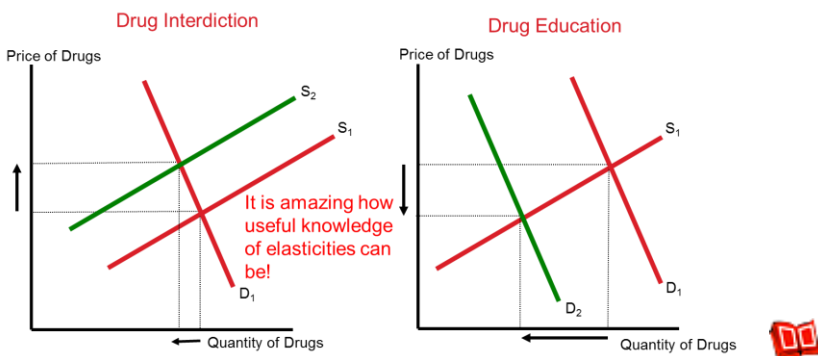
- 穀賤傷農？(課本 p.102)



- 為什麼 OPEC 無法維持高油價？(課本 p.104)



- 毒品查緝會增加或減少與毒品相關犯罪？(課本 p.106)


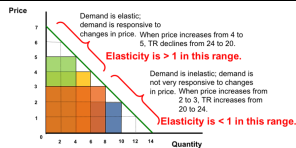

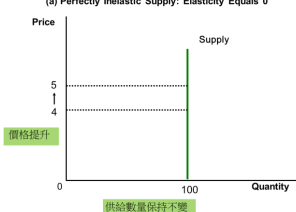
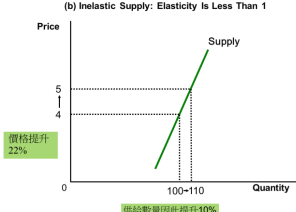
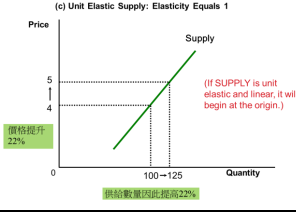

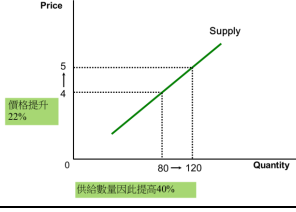
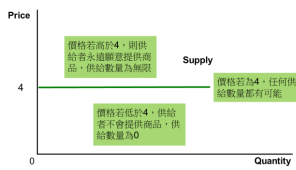
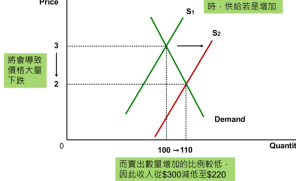



- Ex:卡特的錯誤

- 1974 Oil crisis 為降低石油消耗量：
  - 對大型車 (耗油兇) 課稅但補貼小型車 (公平)
  - 富人對汽油需求彈性小：佔所得比例低
  - 但小車用油量增加
- 整體耗油量大增！

## 版權聲明

頁數	作品	版權標示	作者/來源
3	<p>(a) Perfectly Inelastic Demand: Elasticity Equals 0</p>		引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.93。依據著作權法第 46、52、65 條合理使用。
3	<p>(b) Inelastic Demand: Elasticity Is Less Than 1</p>		
4	<p>(c) Unit Elastic Demand: Elasticity Equals 1</p>		
4	<p>(d) Elastic Demand: Elasticity Is Greater Than 1</p>		
4	<p>(e) Perfectly Elastic Demand: Elasticity Equals Infinity</p>		
5	<p>When the price is 4, consumers will demand 120 units, and spend \$400 on this good.</p>		引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.95。依據著作權法第 46、52、65 條合理使用。
5			製圖：國立臺灣大學 林明仁
6	<p>Note that with each price increase, the Law of Demand still holds – an increase in price leads to a decrease in the quantity demanded. It is the change in TR that varies!</p>		製圖：國立臺灣大學 林明仁

6	<table border="1"> <thead> <tr> <th>Price</th> <th>Quantity</th> <th>Total Revenue (Price × Quantity)</th> <th>Percent Change in Price</th> <th>Percent Change in Quantity</th> <th>Elasticity</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>0</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>2</td> <td>8</td> <td>10</td> <td>200</td> <td>13.0</td> <td>Elastic</td> </tr> <tr> <td>3</td> <td>4</td> <td>12</td> <td>25</td> <td>40</td> <td>1.5</td> <td>Unit elastic</td> </tr> <tr> <td>2</td> <td>6</td> <td>12</td> <td>33</td> <td>50</td> <td>1.0</td> <td>Unit elastic</td> </tr> <tr> <td>1</td> <td>8</td> <td>8</td> <td>50</td> <td>40</td> <td>0.5</td> <td>Inelastic</td> </tr> <tr> <td>0</td> <td>10</td> <td>0</td> <td>100</td> <td>20</td> <td>0.3</td> <td>Inelastic</td> </tr> <tr> <td>0</td> <td>14</td> <td>0</td> <td></td> <td></td> <td></td> <td>Inelastic</td> </tr> </tbody> </table>	Price	Quantity	Total Revenue (Price × Quantity)	Percent Change in Price	Percent Change in Quantity	Elasticity	Description	12	0	0					4	2	8	10	200	13.0	Elastic	3	4	12	25	40	1.5	Unit elastic	2	6	12	33	50	1.0	Unit elastic	1	8	8	50	40	0.5	Inelastic	0	10	0	100	20	0.3	Inelastic	0	14	0				Inelastic		引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.96。依據著作權法第 46、52、65 條合理使用。
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7	<p>(a) Perfectly Inelastic Supply: Elasticity Equals 0</p>  <p>價格提升 供給數量保持不變</p>		引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.100。依據著作權法第 46、52、65 條合理使用。																																																								
7	<p>(b) Inelastic Supply: Elasticity Is Less Than 1</p>  <p>價格提升 22% 供給數量因此提升 10%</p>																																																										
8	<p>(c) Unit Elastic Supply: Elasticity Equals 1</p>  <p>價格提升 25% 供給數量因此提升 25%</p> <p>(If SUPPLY is unit elastic and linear, it will begin at the origin.)</p>																																																										
8	<p>(d) Elastic Supply: Elasticity Is Greater Than 1</p>  <p>價格提升 25% 供給數量因此提高 40%</p>																																																										
8	<p>(e) Perfectly Elastic Supply: Elasticity Equals Infinity</p>  <p>價格若高於4，則供給者永遠願意提供商品，供給數量為無限。 價格若為4，任何供給數量皆可。 價格若低於4，供給者不會提供商品，供給數量為0。</p>																																																										
9	 <p>需求曲線不具彈性時，供給若是增加，則會導致價格大量下跌。 而賣出數量增加的比對數性，因此收入從\$200降至\$220。</p>		引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.102。依據著作權法第 46、52、65 條合理使用。																																																								

<p>9</p>			<p>引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.104。依據著作權法第 46、52、65 條合理使用。</p>
<p>9</p>			<p>引用自 N. Gregory Mankiw “Principles of Economics” 6th edition. P.106。依據著作權法第 46、52、65 條合理使用。</p>