

N. GREGORY MANKIWI

PRINCIPLES OF ECONOMICS
Eight Edition



CHAPTER 12 The Design of the Tax System

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Ten Principles of Taiwanese Economics

- ▶ No, I will NOT teach Mankiw's Chapter 12.
 - ▶ You need not know the US tax system. But,
- ▶ You should understand how normal people in Taiwan (鄉民@PTT) see economic issues
- ▶ So, several professors and I came up with the Ten Principles of Taiwanese Economics
- ▶ See if you can figure out:
 1. Why Taiwanese people believe in them, and
 2. Why they are misleading.

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Ten Principles of Taiwanese Economics

1. Prices should be determined by cost.
 - ▶ 價格只能反映成本。
2. Wages should be determined by effort.
 - ▶ 努力決定薪水。
3. The Taiwanese government is financed by Mars.
 - ▶ 政府花再多錢，總是找得到人買單。
 - ▶ (也就是說，政府的背後金主來自火星。)

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Ten Principles of Taiwanese Economics

4. When market failures occur, blame the government.
 - ▶ 如果市場失靈，一定是政府沒管好。
5. Economists are to be blamed for government failures.
 - ▶ 如果政府失靈，表示經濟學家沒做好。
6. The government should provide generous pensions to all (starting from its own employees)
 - ▶ 每個人都應該有豐厚的月退休俸(從公務員開始)

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Ten Principles of Taiwanese Economics

7. Many industries are too sacred to be commercialized.
 - ▶ 許多產業太神聖，不能商品化。
8. Education is just a signal, not human capital.
 - ▶ 學歷只是認證標籤，考上就該由你玩四年。
9. A weak currency is the driving force of economic growth.
 - ▶ 貨幣貶值可以促進經濟成長。
10. Information should be withheld to prevent panics. (隱匿資訊才能避免不必要的恐慌)

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(價格只能反映成本)

1. Prices should be determined by cost.



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(價格只能反映成本)

1. Prices should be determined by cost.

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(努力決定薪水)

2. Wages should be determined by effort

- College graduates earn 22k?
 - Identical to your peers?
 - Surplus = Low salary!

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(努力決定薪水)

2. Wages should be determined by effort

- But US Companies in Taiwan still can't find enough high-skilled workers!
 - 華視新聞：薪資遠勝22k 台灣技術人才短缺
 - Restatement of Principle #1 for labor markets

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What Went Wrong? (問題出在哪裡呢?)

- Crony Capitalism induces firms to compete through **best princelings**, not **best products**
 - 台灣特有的問題：裙帶資本主義(太子黨)
 - <http://forecasterror.blogspot.tw/2012/08/the-root-of-problems-in-taiwan.html>
- Lack efficiency; no need for capable workers
- 競爭如果比誰最太子黨，企業就會沒效率，而且就不需要真正有能力的員工(只好都領22k?!)
 - Why join this mess (when true princelings try hard to prove themselves) (正港的太子黨都在努力證明自己的實力。為何你想成為(偽)天龍人?)

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3. The Taiwanese government is financed by Mars (政府花再多錢，總是找得到人買單)

彰化縣政府 國民年金服務團隊 廣告

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3. The Taiwanese government is financed by Mars (政府花再多錢，總是找得到人買單)



勞保局 國民年金理財篇 (國台語版)

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What Went Wrong? (問題出在哪裡呢?)



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4. When market failures occur, blame the gov't (如果市場失靈，一定是政府沒管好)

- ▶ 悠遊卡失靈 揪7卡干擾
 - ▶ 《蘋果》實測25款「該管管亂象」蘋果日報 2013/5/7
- ▶ 【生活中心／台北報導】市面流通的票卡百百種，有民衆抱怨搭乘捷運或公車時，部分票卡和悠遊卡放在皮夾裡竟會刷不過，常在上班急著進出時被卡住。《蘋果》以市面常見、總計發行量逾4800萬張的25款卡片進行干擾測試，結果發現有7張感應式卡片會干擾悠遊卡、無法正常運作。
- ▶ 民怨：「業者賣卡，卻不說清楚干擾問題，政府該好好管管亂象。」



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5. Economists are to be blamed for gov't failures (如果政府失靈，表示經濟學家沒做好)

- ▶ (正刺輯)台灣的「廟堂經濟學家」為何遭到南韓譏笑？
 - ▶ 新新聞 2012-8-16 吳啓禎(倫敦大學亞非學院經濟學博士)
- ▶ 出口連續衰退讓今年台灣經濟成長率被下修為保一大戰，台灣經濟被形容成掛急診的病號，政府與部分媒體急忙向國內院士級的經濟學家尋求「靈丹妙藥」。
- ▶ 但是別忘了，素來把持台灣經濟政策的主流論述，將台灣經濟推進加護病房的人，正是同樣這幫「廟堂經濟學家」。這幫「廟堂經濟學家」習於將教科書裡頭的自由貿易與市場效率學說奉為經典圭臬，將主張要小心謹慎、經貿自主、均衡發展的經濟政策批判為「鎖國」而攻擊地體無完膚。

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5. Economists are to be blamed for gov't failures (如果政府失靈，表示經濟學家沒做好)

- ▶ 這幫經濟巫師曾經強力推銷「攔發」(ECFA)，現在則將南韓超越台灣的緣由機制跟 FTA 掛上等號，換湯不換藥，背後還是同樣那帖藥方。...
- ▶ 「上焉者市場與技術兼顧，中焉者以市場換取技術，下焉者以技術換取市場。」在經濟巫師幫的規畫下，台灣淪為下焉者，也難怪南韓如此評論：
- ▶ 「台灣的經濟學家和政府官員只看現在，看不到未來，早已失去新思維的創新動力。」台灣社會如果不認真進行知識辯證而持續向廟堂經濟巫師取經，則苦果自食何時方能休矣？

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What Went Wrong? (問題出在哪裡呢?)

- ▶ 市場失靈與政府失靈 (by 樊家忠, 看雜誌100期 2011/11/10)
- ▶ 身為芝加哥學派泰斗的貝克教授撰文指出，當私人產業無法達到經濟效率時，人們將這種情況稱為「市場失靈」。而當市場失靈時，人們慣性的反應就是「政府」應該扮演糾正市場的角色，好讓經濟行為的效率提高。
- ▶ 貝克指出，這種政府一定可以修正市場沒有效率的假設，實在過於天真。因為我們在做這樣的預設之前，最少應該先認真地探討「政府會不會失靈」的問題。如果政府失靈的情況很嚴重，那我們應該問政府的介入到底會讓問題緩解還是惡化。

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What Went Wrong? (問題出在哪裡呢?)

- ▶ 就台灣的情況來看，這樣的思考尤其重要。因為台灣民衆不僅習慣於接受政府的權威，還習慣於假設政府應該、也能夠解決市場上的各種問題。
- ▶ 一個典型的例子是台灣農產品生產過剩的現象。一旦香蕉、水梨等農產品生產過剩，政府就開始順應民衆的要求，用納稅人的錢予以收購或者補貼。
- ▶ 但是，農產滯銷的問題不但沒有消失，反而愈演愈烈，幾乎年年都出現。
- ▶ 這可能是因為有了政府收購做保險，蕉農或者果農就降低了對種植風險的警戒。

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6. The government should provide generous pensions to all (starting from its own employees)

- 6. 每個人都應該有豐厚的月退俸(從公務員開始)
 - ▶ 全國公務人員協會緊急通報：(5/22/2013)
 - ▶ 昨天國民黨法案闖關失敗，馬大總統召集相關院部會談，已下達本會期通過的指示。
 - ▶ 黨團書記長賴士葆已下令下週一繼續審查公務人員退撫條例，一定要如期通過，不在乎程序正義，看來已是鐵了心。
 - ▶ 我們的所有建議幾乎無一採納，氣憤已不足以說明我們的心情。親愛的朋友們，自我克制已被視為理所當然，他們認為我們不敢上街頭，是這樣子嗎？



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6. The government should provide generous pensions to all (starting from its own employees)

- ▶ 我們就走給他們看，5月25日下午2:30讓我們凱達格蘭大道見，集合地點為景福門門前。
- ▶ 公教一體，禍福與共，感謝教師工會提供這麼適時的運動平台，
- ▶ 今天不走出來，明天會更慘，這次刪妳們的退休金，下次可能減妳的待遇，這次不反抗，下次就請你閉嘴，親愛的夥伴們，出來吧！
- ▶ 為了你自己，也為了下一個世代，讓我們一起走街頭，讓我們一起吶喊，讓我們共同聲討傷害我們傷害制度傷害下個世代的共同敵人！還我們大家一個公道！



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What Went Wrong? (問題出在哪裡呢?)

- ▶ 先前和最近要退休的人其實沒有繳多少退撫金(新制1995年才開始)，但是卻可以享受豐厚的月退俸。
- ▶ 現在30-40歲的公教人員離退休還有20-30年，未來幾十年都要繳退撫金養那些已經退休的前輩。但...
- ▶ 屆時他們要退休的時候，還領得到一樣的退休金嗎？
 - ▶ 如果不行，這其實是個被迫參加的龐氏騙局、老鼠會！
- ▶ 問題是，除非政府的金主真的來自火星，否則現行這種「繳得少、領得多」的退撫制度勢必無法維持！
- ▶ 誰才是真正「傷害我們、傷害制度、傷害下個世代的共同敵人」？

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7. Many industries are too sacred to be commercialized (許多產業太神聖，不能商品化)

- ▶ 肝肝相連到天邊(張桂越)(蘋果日報2008/10/24)
- ▶ 我有兩個弟弟，一個2004年死了，一個2008年換肝成功。一個在台灣，一個在美國。...
 - ▶ 受限法令 有肝無用
- ▶ 三弟陷入肝昏迷時... 我們全家大小包括媳婦們的肝，統統願意割一片給三弟，這是「合法的」，卻統統不合比對標準，不是血型不合，就是這個那個的，
- ▶ 而三弟幾個當兵的兄弟，肝膽相照，個個身強體壯，血型也對，卻不符合中華民國的法律，見死不救。
- ▶ 我只好鬼鬼祟祟的，聯絡到大陸的換肝掮客，...

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7. Many industries are too sacred to be commercialized (許多產業太神聖，不能商品化)

- ▶ 故事還沒說完。上個月，接到西雅圖的電話，說大弟已進入開刀房，六小時後換肝。今天，大弟換肝手術成功，...
- ▶ 對兩個弟弟，一個在台灣，一個在美國，一種肝病兩種命運，我不解神的奧秘，
- ▶ 但我知道我們美國家人沒有送一毛錢紅包，沒有求朋友的特權，沒有找什麼參議員，沒有像熱鍋上螞蟻般東奔西跑，沒有用個人的智慧與財力為大弟求得一塊肝，
- ▶ 卻順順利利地，在短時間內，可以說是悄悄地換肝成功，不可思議的背後，大有學問：

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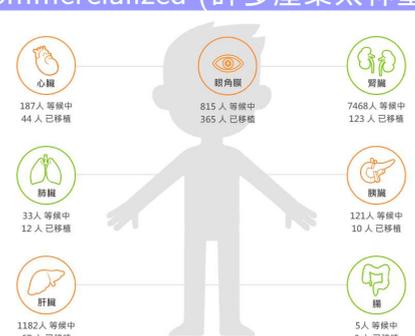
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7. Many industries are too sacred to be commercialized (許多產業太神聖，不能商品化)

1. 美國社會對器官捐贈的教育普及
 - ▶ 供需失衡 自然要搶：台灣的肝病患者排不到、等不到，因為供需失調，幾千個人等一個肝，當然要搶，十八般武藝勢必出籠，送紅包沒用的話，跳進大陸買肝臟的漩渦又是何其自然的事。如果國家有健康的機制，誰願意到大陸冒險？(JW: 其實全世界只有一個地方的器官市場沒有供需失衡，你知道是哪裡嗎？不是中國喔！)
2. 盡速成立臨時小組，解決危險個案。有些病人命在旦夕，立法審案冗長費時，有些病人是不能等的
3. 建議立法委員或相關衛生單位，能夠盡速學習與參考國外換肝機制，借他山之石，改善國人換肝機制

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7. Many industries are too sacred to be commercialized (許多產業太神聖，不能商品化)



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7. Many industries are too sacred to be commercialized (許多產業太神聖，不能商品化)

- ▶ 2009年至2017年國內肝、腎臟活體捐贈移植例數
- ▶ 財團法人器官捐贈移植登錄中心 (2009/1/1~2017/12/31)

年度	2009	2010	2011	2012	2013	2014	2015	2016	2017	總計
肝臟	266	344	401	431	447	485	505	428	406	3713
腎臟	90	97	84	73	128	129	104	112	112	929

- ▶ 公共電視—「獨立特派員」心肝那裡找
- ▶ <https://youtu.be/mkRXHcQMAJo?t=1258>

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Repugnant Markets 你覺得器官可以買賣嗎？

- ▶ Is it acceptable for people to sell their organs?
- ▶ 全世界有一個地方可以合法買賣器官...
- ▶ The Guardian posted a touching album of postings on streets around hospitals offering to...
- ▶ 伊朗!!
- ▶ Kidneys for sale:
 - ▶ Iran's trade in organs <https://www.theguardian.com/society/2015/may>
 - ▶ Kidney trade in Iran
 - ▶ Wikipedia: en.wikipedia.org



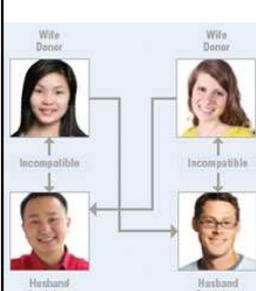
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What went wrong? (問題出在哪裡呢?)

- ▶ Should we ban ALL organ exchanges
 - ▶ (even without monetary transfers)?
 - ▶ 即使不能接受器官買賣，難道沒有金錢交易的「器官交換」也必須禁止嗎？
- ▶ If I want to donate to my wife, but can't
 - ▶ (and you too!) 假如我想捐腎給我的家人、但血型不合，你也想捐腎給家人、血型也不合。
- ▶ Can I donate to your wife so you donate to my wife? (那可以我捐給你家人交換你捐給我家人嗎?)

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What went wrong? (問題出在哪裡呢?)



- ▶ UCLA器官移植中心網站介紹的 Kidney SWAP (配對交換捐贈):
 - ▶ Paired Donor Exchange Transplantation
 - ▶ When a donor and a recipient cannot match (blood type, etc.), they can exchange with another pair with similar problems
 - ▶ 當捐贈者和受贈者血型不合，他們可跟有類似問題的另一對交換
 - ▶ What about 3-way-exchange?
 - ▶ 甚至可進行三方交換?!

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If paired donation is acceptable, what about 如果配對交換捐贈可行，那「連鎖反應」呢？

- ▶ 連鎖捐贈 (Chain Transplantation, Kidney Chain)
- ▶ 某無私捐贈者捐腎，(無法直接捐贈的)受贈者親屬捐腎給第二位病患，第二位受贈者親屬再繼續捐...
- ▶ Altruistic donor gives to a recipient, whose relative donates to a 2nd recipient, whose relative donates...

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60 Lives, 30 Kidneys, All Linked (NY Times)

▶ 2012/2/18 紐約時報: 真正的「肝肝相連到天邊」在加州!

From Start to Finish A donation by a Good Samaritan, Rick Ruzzanti, upper left, set in motion a 60-person chain of transplants that ended with a kidney for Donald C. Terry Jr., bottom right.

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8. Education is just a signal, not human capital (學歷只是認證標籤，考上就該由你玩四年)

3月22日在 Taipei 附近

台大財金放榜了，每個人夢想中的那個夢的殿堂。

王幸云 榜眼
鄭尚分 探花
黃蕭賢 正取
紀昱竹 正取
Ivan Lai (賴三禹) 正取
徐文瑾 正取
曾耀勳 正取
傅聖元 正取

「天道酬勤」，那些個寒窗苦讀的日子，在金榜題名時，一切都值得了。

私立背景的同学，不要再放著空想空了，即便一年夢的殿堂只能有一個或兩個私立的學生有幸擠入，這個夢也值得你去追。

- ▶ Why people complain about too many colleges (but my son has to get in)?
- ▶ 為什麼大家覺得「大學太多了」，但是還要自己小孩拼命擠進去?
- ▶ Why do people apply for their dream school (they can't enter in college)?
- ▶ 為什麼大學時念了私立學校，研究所就要拚「夢的殿堂」、想擠進呆大財金的窄門?
- ▶ Why can you "have fun for 4 years"?
- ▶ 為什麼「由你玩四年」之後，蒼燈青椒大家還是搶著要?

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What went wrong? (問題出在哪裡呢?)

10 mins - Nankang

台大財金是每年大家魂牽夢縈的殿堂，今年又要恭喜萬眾的大家囉!

李星翰 (成大管機肉男，應該是今年經統第一名)

陳炳元 (曾經進入職場後回來，對於自己林延儒 (課本外的常識非常豐富，一張嘴非常開他誰 (一直是台中的帶頭大哥，自津基頭來雅 (走過社工系、經濟系，進入財金所，張育銘 (延續台北大學年年有人進台大財高銘澤 (台大經研不好好念，複製去年張選冠先選 (一度流落匪班，台大經研冠先元，大財金的樣板人物)

甲組有上財管，與我接時間比較長，人都對得上也比較熟。XDD
沒提名到，請私訊給我。XDD
一樣獻上我的祝福，祝願你們頭班2年有滿滿的收穫。

- ▶ 你願意「花四年念全世界最好的大學，但拿不到畢業證書」，還是「拿全世界最好大學的畢業證書，但一輩子不能去念」?
- ▶ 學歷同時有兩個作用：
 1. 累積智識和人力資本
 2. 當認證標籤、炫耀的光環
- ▶ 魚與熊掌可以兼得嗎?

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9. A weak currency is the driving force of economic growth (貨幣貶值可以促進經濟成長)

【黃馨儀、林潔禎/台北報導】
行政院主計總處昨大幅下修今年第1季經濟成長率概估數字至1.54%。工總理事長許勝雄說，雖然美國房地產和汽車工業還OK，但全球經濟與消費力道仍信心不足，歐洲消費市場也還處於停滯狀態；一定會影響到以外銷為導向的台灣且衝擊民間消費力道。

今年第1季經濟成長率較先前預測腰斬，主計總處專門委員梅家瑗 (中) 昨遭媒體包圍。

經濟成長砍半 工商界籲貶值救出口 (蘋果日報2013-5-1)

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What went wrong? (問題出在哪裡呢?)

今年第1季經濟成長率較先前預測腰斬，主計總處專門委員梅家瑗 (中) 昨遭媒體包圍。

經濟成長砍半 工商界籲貶值救出口 (蘋果日報2013-5-1)

- ▶ 台幣貶值有利於出口
- ▶ 但代價是進口品變貴了!
- ▶ 按照購買力平價，新台幣的幣值大概被低估三成!!! (PPP匯率=1:20)
- ▶ 這表示台幣三萬六的64G iPhone XS其實只要兩萬四耶!
- ▶ 為了讓外銷的老闆賺錢，所以全民都要買貴森森的哀鳳，值得嗎?

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10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。



疾管局沒發布首例 網友先「夢到」

東森新聞 (2013/4/25)

- 禽流感指揮中心昨天傍晚宣布，國內出現首例H7N9禽流感病例，但早在上午11點半左右，卻已經有網友PO文說，夢到了台灣有確診的H7N9病例，還會在下午召開記者會，引發網路論戰，不過根據調查這名PO文的網友疑似是醫院的内部員工，搶在疾管局公布前就搶先散布謠言，可能會依據傳染病防治法被處以50萬元以下的罰款。

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10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。

- 疾管局查爆料網友 最重罰50萬
 - 2013-04-26中國時報【邱俐穎／台北報導】
- 台大網路PTT(批踢踢)廿四日搶先爆料國內首例H7N9個案，疾管局副局長周志浩強調，涉嫌散布疫情謠言或不實流行疫情消息，最重可依《傳染病防治法》處罰五十萬元。
- 中央流行疫情指揮中心廿四日傍晚五點半確認國內首例H7N9境外移入病例，但當天上午十一時許，一名被網友點名疑似為台大醫師的網友「Oxytocin(摧慘速)」即在批踢踢爆料，台大醫院已有確診的H7N9病例。

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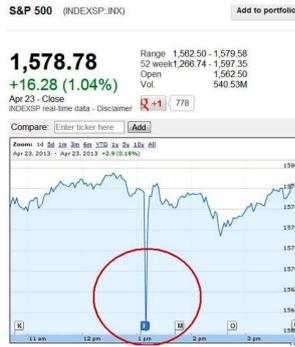
10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。

- 疫情指揮中心當日下午二點舉行例行記者會時，面對各家媒體的求證，公開駁斥這是謠言，請大家別聽信。
- 未料時隔三小時，五點半再度緊急舉行記者會證實病例，引爆網路上「隱匿」疫情的質疑聲浪。
- 周志浩強調，首例病例必須採取最謹慎的做法，一定要經基因定序再三確認，才能公布。廿四日中午基因定序結果尚未出爐，「當時國內的確沒有首例病例」。而指揮中心得知結果的一小時內，立即舉行記者會公布，疫情訊息透明、公開。

2016/2/4 Principles of TW Economics Joseph Tao-yi Wang

10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。

- 隱匿會減緩正確資訊糾錯的速度，也會引發更多恐慌...
- 新頭殼2013.4.24 鄭凱榕編譯
- 美國美聯社的推特(Twitter)帳號23日遭駭客入侵，發送偽新聞：「白宮2度爆炸，歐巴馬總統受傷」，美國股票市場一度狂貶直落，引起大騷動，隨即瞬間反彈。美聯社已經公布被駭，該帳號全面暫停使用。



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10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。

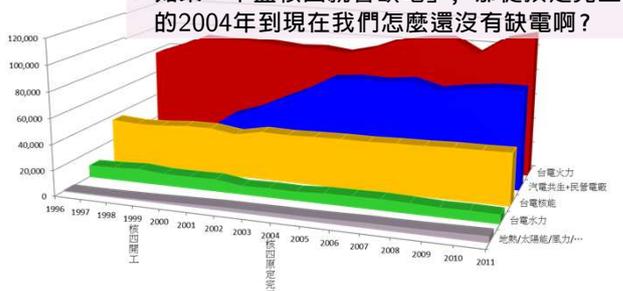


「你說我們核電廠的設計比日本福島電廠好，好在哪裡呢？」「不急不急，改天再告訴你...」

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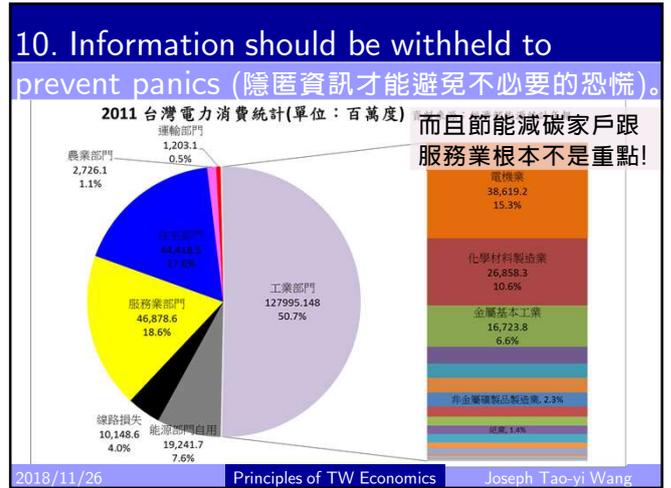
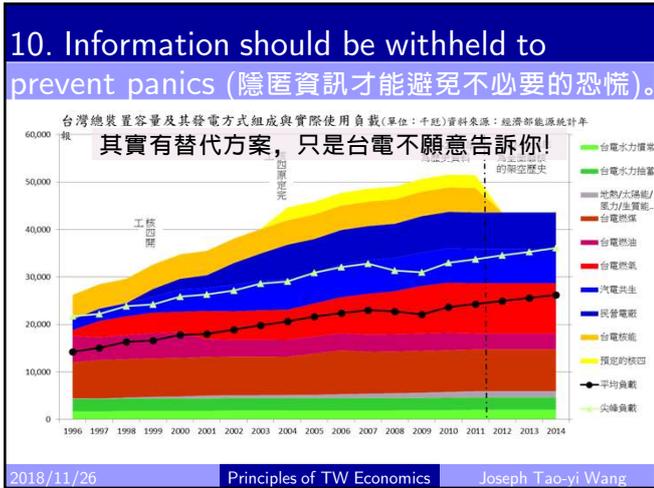
10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。

各種發電方式的(淨)年發電量(單位：百萬度) 資料來源：經濟部能源統計年報



- 如果「不蓋核四就會缺電」，那從預定完工的2004年到現在我們怎麼還沒有缺電啊？

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- ### 10. Information should be withheld to prevent panics (隱匿資訊才能避免不必要的恐慌)。
- ▶ What about reducing air pollution by reducing coal-burning power plants?
 - ▶ Or, those burning oil or gas...
 - ▶ 降低燃煤(或火力)發電，就真的能對抗空汙嗎?
 - ▶ This depends on the causes of air pollution!
 - ▶ How much (%) comes from power plants?
 - ▶ What about forbidding announcing any poll result in the last 10 days before election?
 - ▶ 那「選前十天不能發佈民調」呢?
- 2018/11/26 Principles of TW Economics Joseph Tao-yi Wang

N. GREGORY MANKIWI

PRINCIPLES OF ECONOMICS
Eight Edition

CHAPTER 13 The Costs of Production

Premium PowerPoint Slides by:
V. Andreea CHIRITESCU
Eastern Illinois University

Modified by Joseph Tao-yi Wang

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Active Learning 1 Brainstorming costs

You run Foxconn Electronics Inc.(鴻海富士康).

- List three different costs you have.
- List three different business decisions that are affected by your costs
- How would your answers change if you run 台北農產運銷公司 instead?

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- ### Look for the answers to these questions:
- What is a production function? What is marginal product? How are they related?
 - What are the various costs? How are they related to each other and to output?
 - How are costs different in the short run vs. the long run?
 - What are “economies of scale”?
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Total Revenue, Total Cost, Profit

- We assume that the firm's goal is to maximize profit.

$$\text{Profit} = \text{Total revenue} - \text{Total cost}$$

the amount a firm receives from the sale of its output

TR = P×Q

the market value of the inputs a firm uses in production

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Costs: Explicit vs. Implicit

- 'The cost of something is what you give up to get it.'
- Explicit costs**
 - Require an outlay of money
 - E.g., paying wages to workers.
- Implicit costs**
 - Do not require a cash outlay
 - E.g., the opportunity cost of the owner's time.
- Total cost = Explicit + Implicit costs**

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Explicit vs. Implicit Costs: An Example

You need \$1,000,000 to start your business. The interest rate is 5%.

- Case 1: borrow \$1,000,000
 - explicit cost = \$50,000 interest on loan
- Case 2: use \$400,000 of your savings, borrow the other \$600,000
 - explicit cost = \$30,000 (5%) interest on the loan
 - implicit cost = \$20,000 (5%) **foregone** interest you could have earned on your \$400,000.

In both cases, total (exp + imp) costs are \$50,000

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Economic Profit vs. Accounting Profit

- Accounting profit**
 - =total revenue minus total explicit costs
- Economic profit**
 - =total revenue minus total costs (including explicit and implicit costs)
- Accounting profit ignores implicit costs, so it's higher than economic profit.**

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Active Learning 2

Economic profit vs. accounting profit

The equilibrium rent on office space has just increased by \$5,000/month.

Determine the effects on accounting profit and economic profit if:

- you rent your office space
- you own your office space

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Active Learning 2

Answers

The rent on office space increases \$5,000/month.

- You rent your office space.
 - Explicit costs increase \$5,000/month.
 - Accounting profit & economic profit each fall \$5,000/month.
- You own your office space.
 - Explicit costs do not change, so accounting profit does not change.
 - Implicit costs increase \$5,000/month (opp. cost of using your space instead of renting it) so **economic profit falls by \$5,000/month.**

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Production Function

- Production function
 - Relationship between
 - Quantity of inputs used to make a good
 - And the quantity of output of that good
 - Gets flatter as production rises

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EXAMPLE 1: Farmer Jack

Example 1:

- Farmer Jack grows rice.
- He has 5 acres of land (fixed resource).
- He can hire as many workers as he wants.
 - The quantity of output produced varies with the number of workers hired
 - Unit: picul (石) = a shoulder-load ≈ 60kg

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EXAMPLE 1: Farmer Jack's Production Function

L (no. of workers)	Q (piculs of rice)
0	0
1	1000
2	1800
3	2400
4	2800
5	3000

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Marginal Product

- Marginal product
 - Increase in output that arises from an additional unit of input
 - Other inputs constant
 - Slope of the production function
- Marginal product of labor, MPL
 - $MPL = \Delta Q / \Delta L$
 - If Jack hires one more worker, his output rises by the marginal product of labor.

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EXAMPLE 1: Total & Marginal Product

L (no. of workers)	Q (piculs of rice)	MPL
0	0	
$\Delta L = 1$	1000	$\Delta Q = 1000$ 1000
$\Delta L = 1$	1800	$\Delta Q = 800$ 800
$\Delta L = 1$	2400	$\Delta Q = 600$ 600
$\Delta L = 1$	2800	$\Delta Q = 400$ 400
$\Delta L = 1$	3000	$\Delta Q = 200$ 200

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Diminishing MPL

- Diminishing marginal product
 - Marginal product of an input declines as the quantity of the input increases
 - Production function gets flatter as more inputs are being used:
 - The slope of the production function decreases

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EXAMPLE 1: MPL = Slope of Prod Function

L (no. of workers)	Q (piculs of rice)	MPL
0	0	
1	1000	1000
2	1800	800
3	2400	600
4	2800	400
5	3000	200

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Why MPL Is Important

- ‘Rational people think at the margin’
- When Farmer Jack hires an extra worker
 - His costs rise by the wage he pays the worker
 - His output rises by MPL
 - Comparing them helps Jack decide whether he should hire the worker.

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Why MPL Diminishes

- Farmer Jack’s output rises by a smaller and smaller amount for each additional worker. Why?
 - As Jack adds workers, the average worker has less land to work with and will be less productive.
 - In general, MPL diminishes as L rises whether the fixed input is land or capital (equipment, machines, etc.).

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EXAMPLE 1: Farmer Jack’s Costs

Farmer Jack must pay \$10,000 per month for the land, regardless of how much rice he grows.

The market wage for a farm worker is \$20,000 per month.

- So Farmer Jack’s costs are related to how much rice he produces....

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EXAMPLE 1: Farmer Jack’s Costs

L (no. of workers)	Q (piculs of rice)	Cost of land	Cost of labor	Total cost
0	0	\$10,000	\$0	\$10,000
1	1000	\$10,000	\$20,000	\$30,000
2	1800	\$10,000	\$40,000	\$50,000
3	2400	\$10,000	\$60,000	\$70,000
4	2800	\$10,000	\$80,000	\$90,000
5	3000	\$10,000	\$100,000	\$110,000

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EXAMPLE 1: Farmer Jack’s Total Cost Curve

Q (piculs of rice)	Total Cost
0	\$10,000
1000	\$30,000
1800	\$50,000
2400	\$70,000
2800	\$90,000
3000	\$110,000

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Marginal Cost

- Marginal cost, MC**
 - Increase in total cost arising from an extra unit of production
 - Marginal cost = Change in total cost / Change in quantity

$$MC = \Delta TC / \Delta Q$$

- Increase in total cost
 - From producing an additional unit of output

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EXAMPLE 1: Total and Marginal Cost

	Q (piculs of rice)	Total Cost	Marginal Cost (MC)
	0	\$10,000	
$\Delta Q = 1000$	1000	\$30,000	$\Delta TC = \$20,000$ / \$20.0
$\Delta Q = 800$	1800	\$50,000	$\Delta TC = \$20,000$ / \$25.0
$\Delta Q = 600$	2400	\$70,000	$\Delta TC = \$20,000$ / \$33.3
$\Delta Q = 400$	2800	\$90,000	$\Delta TC = \$20,000$ / \$50.0
$\Delta Q = 200$	3000	\$110,000	$\Delta TC = \$20,000$ / \$100.0

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EXAMPLE 1: The Marginal Cost Curve

Q (piculs of rice)	TC	MC
0	\$10,000	
1000	\$30,000	\$20.0
1800	\$50,000	\$25.0
2400	\$70,000	\$33.3
2800	\$90,000	\$50.0
3000	\$110,000	\$100.0

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Why MC Is Important

- Farmer Jack is rational and wants to maximize his profit**
 - To increase profit, should he produce more or less rice?
 - Farmer Jack needs to “think at the margin”
 - If the cost of additional rice (MC) is less than the revenue he would get from selling it, then Jack’s profits rise if he produces more.

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Fixed and Variable Costs

- Fixed costs, FC**, do not vary with the quantity of output produced
 - For Farmer Jack, FC = \$10,000 for his land
 - Other examples: cost of equipment, loan payments, rent
- Variable costs, VC**, vary with the quantity of output produced
 - For Farmer Jack, VC = wages he pays workers
 - Other example: cost of materials
- Total cost = Fixed cost + Variable cost**

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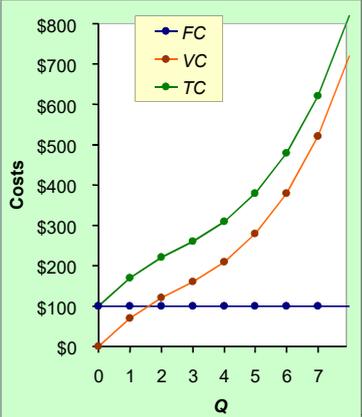
EXAMPLE 2: Production Costs

- Our second example is more general, applies to any type of firm producing any good with any types of inputs.
 - Calculate and graph TC knowing FC and VC
 - Calculate and graph marginal and average costs
 - Understand the relationship between marginal cost and average cost

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EXAMPLE 2: Costs: TC = FC + VC

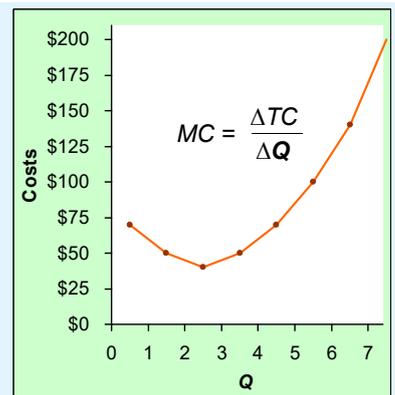
Q	FC	VC	TC
0	\$100	\$0	\$100
1	100	70	170
2	100	120	220
3	100	160	260
4	100	210	310
5	100	280	380
6	100	380	480
7	100	520	620



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EXAMPLE 2: Marginal Cost

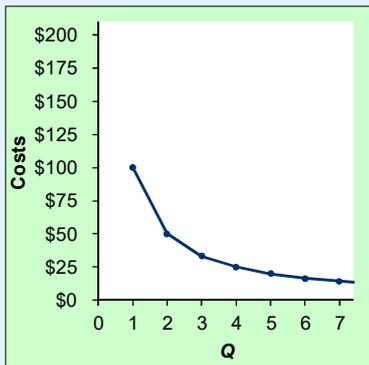
Q	TC	MC
0	\$100	
1	170	\$70
2	220	50
3	260	40
4	310	50
5	380	70
6	480	100
7	620	140



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EXAMPLE 2: Average Fixed Cost, AFC

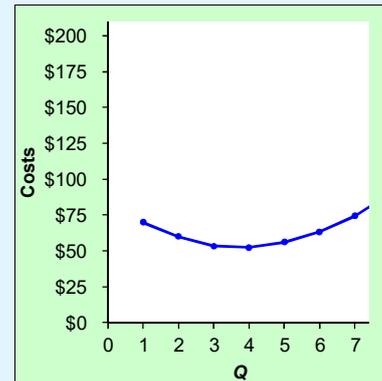
Q	FC	AFC
0	\$100	n/a
1	100	\$100
2	100	50
3	100	33.33
4	100	25
5	100	20
6	100	16.67
7	100	14.29



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EXAMPLE 2: Average Variable Cost, AVC

Q	VC	AVC
0	\$0	n/a
1	70	\$70
2	120	60
3	160	53.33
4	210	52.50
5	280	56.00
6	380	63.33
7	520	74.29



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EXAMPLE 2: Average Total Cost

Q	TC	ATC	AFC	AVC
0	\$100	n/a	n/a	n/a
1	170	\$170	\$100	\$70
2	220	110	50	60
3	260	86.67	33.33	53.33
4	310	77.50	25	52.50
5	380	76	20	56.00
6	480	80	16.67	63.33
7	620	88.57	14.29	74.29

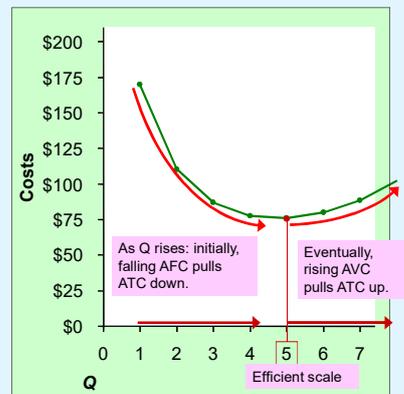
Average total cost (ATC) equals total cost divided by the quantity of output:
 $ATC = TC/Q$

Also,
 $ATC = AFC + AVC$

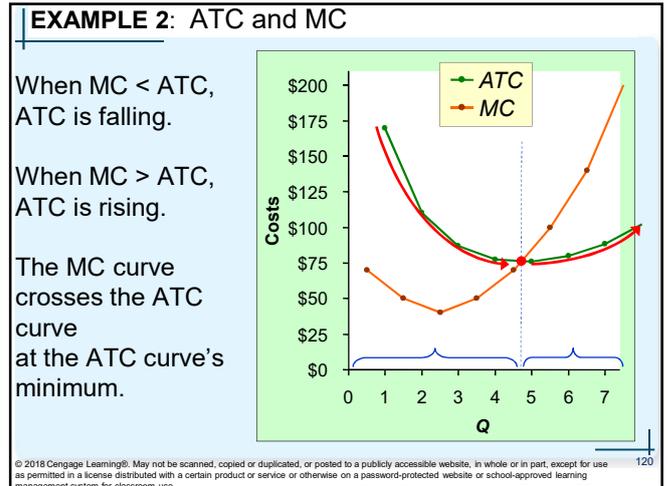
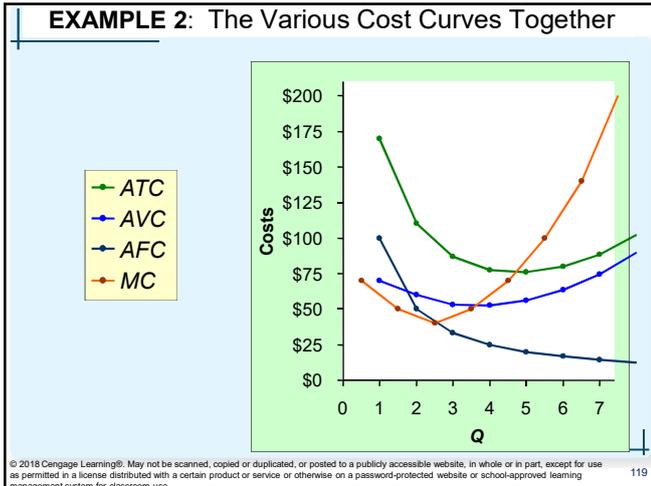
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EXAMPLE 2: Average Total Cost, usually U-shaped

Q	TC	ATC
0	\$100	n/a
1	170	\$170
2	220	110
3	260	86.67
4	310	77.50
5	380	76
6	480	80
7	620	88.57



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Active Learning 3 Calculating costs

Fill in the blank spaces of this table.

Q	VC	TC	AFC	AVC	ATC	MC
0		\$50	n/a	n/a	n/a	\$10
1	10			\$10	\$60.00	
2	30	80				30
3			16.67	20	36.67	
4	100	150	12.50		37.50	
5	150			30		60
6	210	260	8.33	35	43.33	

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Active Learning 3 Answers

First, deduce $FC = \$50$ and use $FC + VC = TC$.

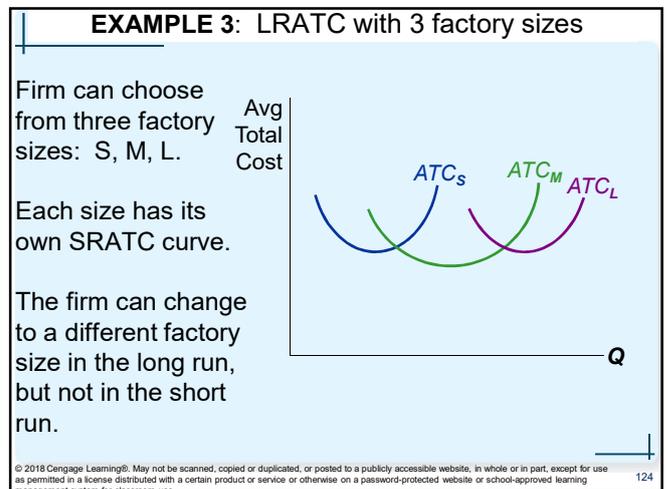
Q	VC	TC	AFC	AVC	ATC	MC
0	\$0	\$50	n/a	n/a	n/a	\$10
1	10	60	\$50.00	\$10	\$60.00	20
2	30	80	25.00	15	40.00	30
3	60	110	16.67	20	36.67	40
4	100	150	12.50	25	37.50	50
5	150	200	10.00	30	40.00	60
6	210	260	8.33	35	43.33	

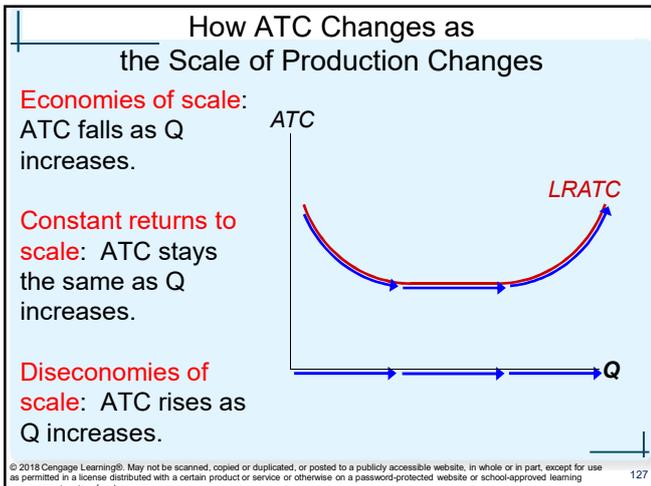
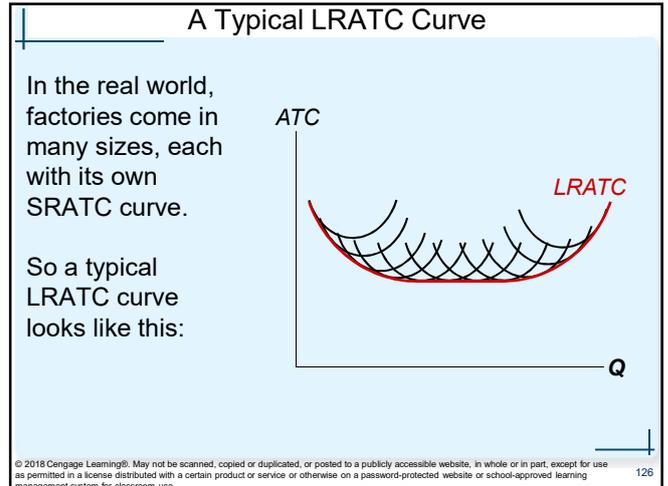
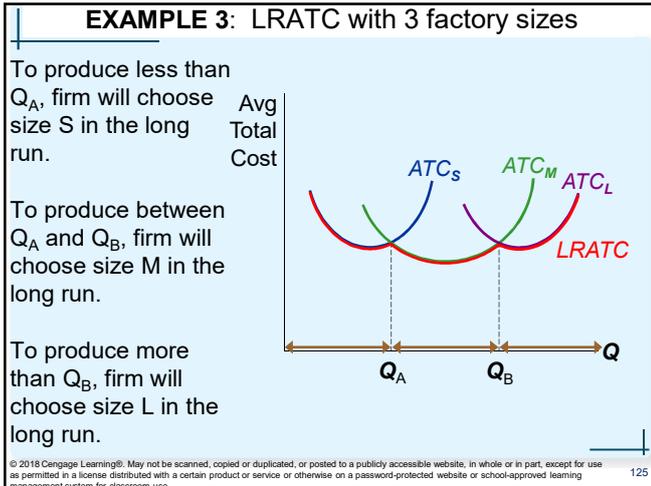
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Costs in the Short Run & Long Run

- Short run:**
 - Some inputs are fixed (e.g., factories, land)
 - The costs of these inputs are FC
- Long run:**
 - All inputs are variable (e.g., firms can build more factories or sell existing ones)
- In the long run**
 - ATC at any Q is cost per unit using the most efficient mix of inputs for that Q (e.g., the factory size with the lowest ATC)

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- ### Costs in Short and Long Run
- **Economies of scale**
 - Long-run average total cost falls as the quantity of output increases
 - Increasing specialization among workers
 - More common when Q is low
 - **Constant returns to scale**
 - Long-run average total cost stays the same as the quantity of output changes
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- ### Costs in Short and Long Run
- **Diseconomies of scale**
 - Long-run average total cost rises as the quantity of output increases
 - Increasing coordination problems in large organizations.
 - E.g., management becomes stretched, can't control costs.
 - More common when Q is high.
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- ### Summary
- The goal of firms is to maximize profit, which equals total revenue minus total cost.
 - When analyzing a firm's behavior, it is important to include all the opportunity costs of production.
 - Explicit: wages a firm pays its workers
 - Implicit: wages the firm owner gives up by working at the firm rather than taking another job
 - Economic profit takes both explicit and implicit costs into account, whereas accounting profit considers only explicit costs.
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Summary

- A firm's costs reflect its production process.
 - Diminishing marginal product: production function gets flatter as Q of an input increases
 - Total-cost curve gets steeper as the quantity produced rises.
- Firm's total costs = fixed costs + variable costs.
 - Fixed costs: do not change when the firm alters the quantity of output produced.
 - Variable costs: change when the firm alters the quantity of output produced.

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Summary

- Average total cost is total cost divided by the quantity of output.
- Marginal cost is the amount by which total cost rises if output increases by 1 unit.
- Graph average total cost and marginal cost.
 - Marginal cost rises with the quantity of output.
 - Average total cost first falls as output increases and then rises as output increases further.
 - The marginal-cost curve always crosses the average total-cost curve at the minimum of average total cost

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Summary

- A firm's costs often depend on the time horizon considered.
 - In particular, many costs are fixed in the short run but variable in the long run.
 - As a result, when the firm changes its level of production, average total cost may rise more in the short run than in the long run.

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Chapter 13: The Cost of Production

- ▶ Opportunity Cost (Explicit / Implicit)
 - ▶ Accounting Profit vs. Economic Profit
- ▶ Marginal Product
 - ▶ $MC, TC = FC + VC, ATC = AFC + AVC$
- ▶ Economies of Scale (for LR)
- ▶ Homework: Mankiw, Ch.13, Problem 2, 4, 5, 7-9

2018/11/26

The Cost of Production

Joseph Tao-yi Wang

Chapter 13: The Cost of Production

- ▶ Challenge Questions (Past Finals)
 - ▶ 2007 - Part 1
 - ▶ 2008 - Essay C
 - ▶ 2012 - Part I
 - ▶ 2013 - Essay B
 - ▶ 2014 - Essay A1-4
 - ▶ 2015 - Essay B1-6
 - ▶ 2017 - Essay D5-D6

2018/11/26

The Cost of Production

Joseph Tao-yi Wang