

Flipping the EMI Classroom (with Videos and Classroom Experiments)

(用影片與課堂實驗)來顛覆全英教室

Joseph Tao-yi Wang (王道一)

4/29/2022

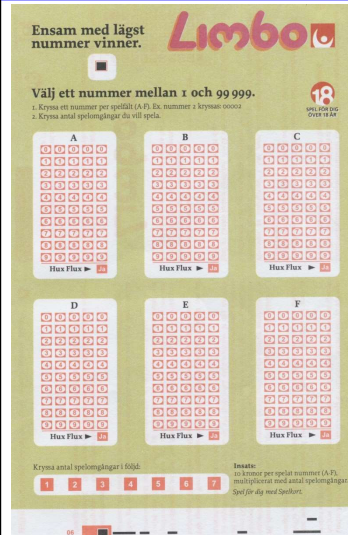
Flipping the EMI Classroom: What is Economics?

顛覆全英教室示範：經濟學是甚麼？

Joseph Tao-yi Wang

台大經濟系 王道一老師

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



- ▶ Swedish Lottery in 2007 (瑞典LUPI 彩券)
- ▶ Lowest Unique Positive Integer (LUPI) Game
 - ▶ 最小唯一者勝的賽局
- ▶ Choose a positive integer from 1 to 100
 - ▶ 請選擇 1 到 100 之間的一個正整數
- ▶ Win if choose the **Lowest** but **Unique** number
 - ▶ 誰選到最小且沒有其他人選的數字就贏了!
- ▶ Prize? (贏家的獎勵?)

2022/4/28

What is Economics?

Joseph Tao-yi Wang

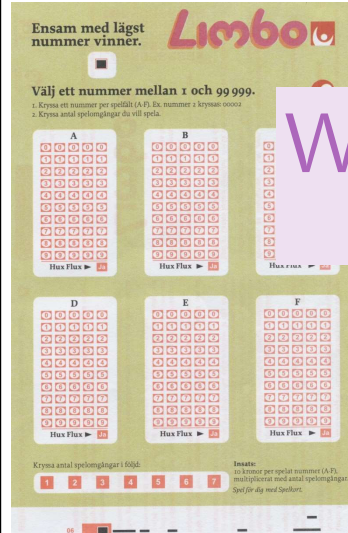
slido



Choose a positive integer from 1 to 100 (請選擇 1 到 100 之間的一個正整數)

① Start presenting to display the poll results on this slide.

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



▶ Swedish Lottery in 2007 (瑞典LUPI 彩券)

Want to Try Again?
(再來一次?)

(LUPI) Game

to 100

▶ 請選擇 1 到 100 之間的一個正整數

▶ Win if choose the **Lowest** but **Unique** number

▶ 誰選到最小且沒有其他人選的數字就贏了!

▶ Prize? (贏家的獎勵?)

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What is Economics?

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Try Again! Choose a positive integer from 1 to 100 (請選擇 1 到 100 之間的一個正整數)

① Start presenting to display the poll results on this slide.

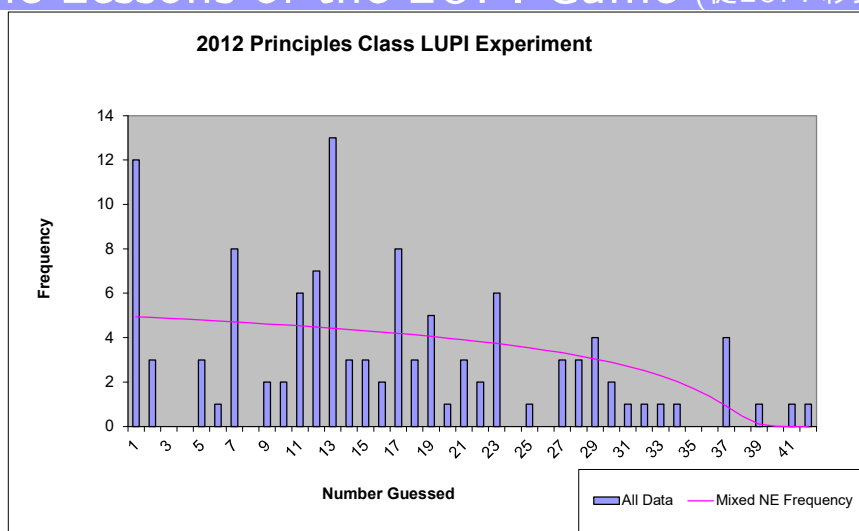
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Last Chance! Choose a positive integer from 1 to 100 (請選擇 1 到 100 之間的一個正整數)

① Start presenting to display the poll results on this slide.

Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)



Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

1. A Set of Rules (= Institution) (一套遊戲規則)
 - ▶ Either explicit or implicit (潛規則) (可以是明文規定或不成文的潛規則)
2. Individuals Optimize (個人決策謀求最佳化)
 - ▶ Because people respond to incentives! (因為人們對誘因有反應!)
3. You Need to React to Others Optimizing (其他人也在最佳化, 所以你要因應)
 - ▶ Even if most users follow the rules, the designer still has to stress-test the system. (即使多數人循規蹈矩, 制度設計者仍須考慮有人惡搞怎麼辦)
4. What should the aggregate data look like? (整體結果長怎樣?)
 - ▶ Come up with a theory (model/graph/story)! (理論的預測為何?)

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What is Economics?

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Solving the LUPI Game Equilibrium (解出 LUPI 的均衡)

- ▶ k wins if nobody "uniquely chose 1 to $(k - 1)$ ", nor chose k
 - ▶ (選 k 贏的條件是沒有人「單獨選 1 到 $(k - 1)$ 」, 而且沒有其他人選 k)
- ▶ Assume Number of Players is Poisson(n)
 - ▶ 假設參與人數為Poisson分佈 (平均 n), 混合策略均衡的條件是:
- ▶ Mixed Strategy Equilibrium requires:
- ▶ $\Pr(\text{win} \mid \text{choose 1}) = \Pr(\text{win} \mid \text{choose 2}) = \dots$

$$e^{-np_1} = (1 - np_1 e^{-np_1}) \cdot e^{-np_2}$$

Nobody chose 1
(沒有其他人選1)

Nobody uniquely chose 1
(沒有人單獨選1)

Nobody chose 2
(沒有其他人選2)

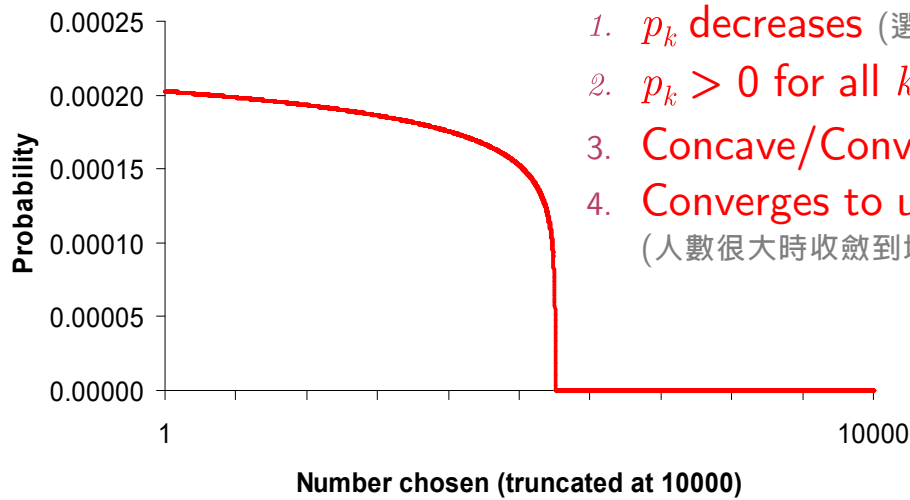
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唯一Poisson
混合策略均衡

Unique Poisson-Nash Equilibrium (Mixed)



1. p_k decreases (選k的機率遞減)
2. $p_k > 0$ for all k (所有數字都選到)
3. Concave/Convex (凸函數/凹函數)
4. Converges to uniform if n large (人數很大時收斂到均勻選擇)

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Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

5. Does empirical data match the theory? (實證資料是否支持你的預測?)
 - ▶ Collect data to see the big picture (蒐集資料來看「整個社會」的結果如何)

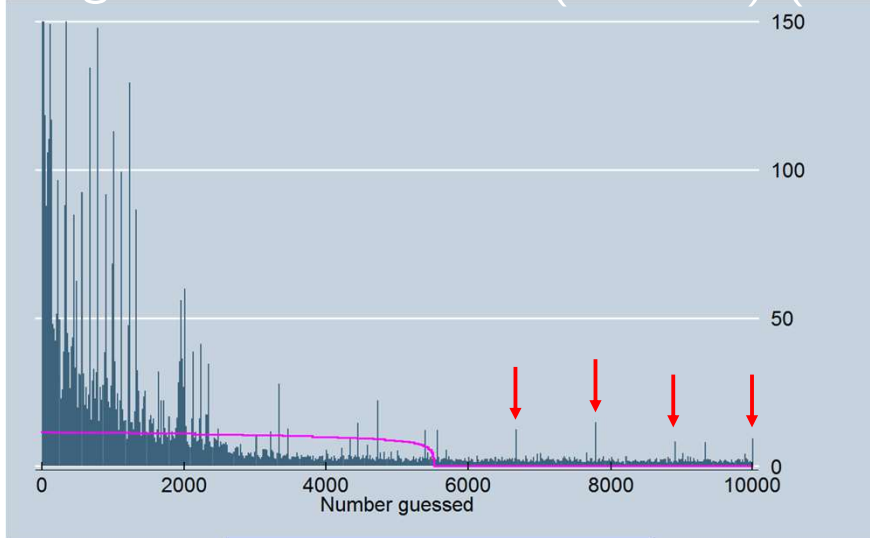
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(每個數字每天選擇的)

Daily Average of Each Number (Week 1) (第1週頻率)



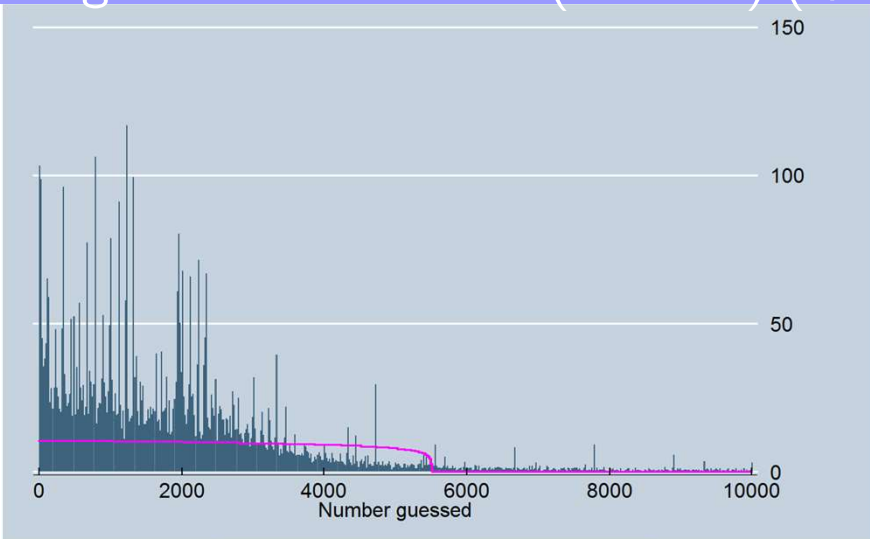
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(每個數字每天選擇的)

Daily Average of Each Number (Week 3) (第3週頻率)



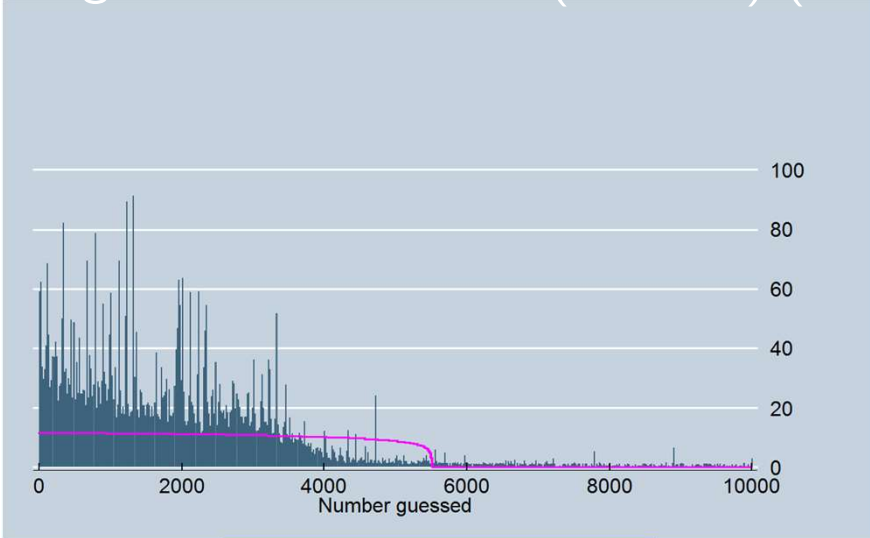
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(每個數字每天選擇的)

Daily Average of Each Number (Week 5) (第5週頻率)



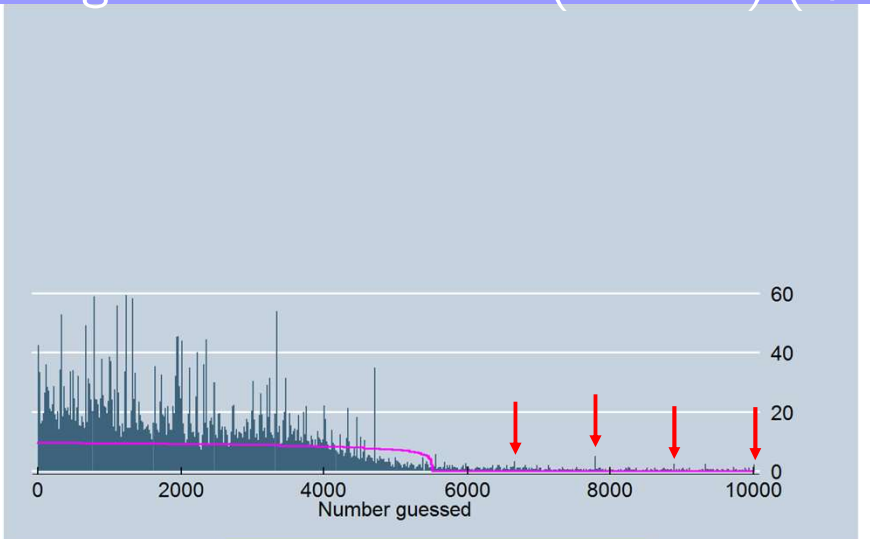
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(每個數字每天選擇的)

Daily Average of Each Number (Week 7) (第7週頻率)



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Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

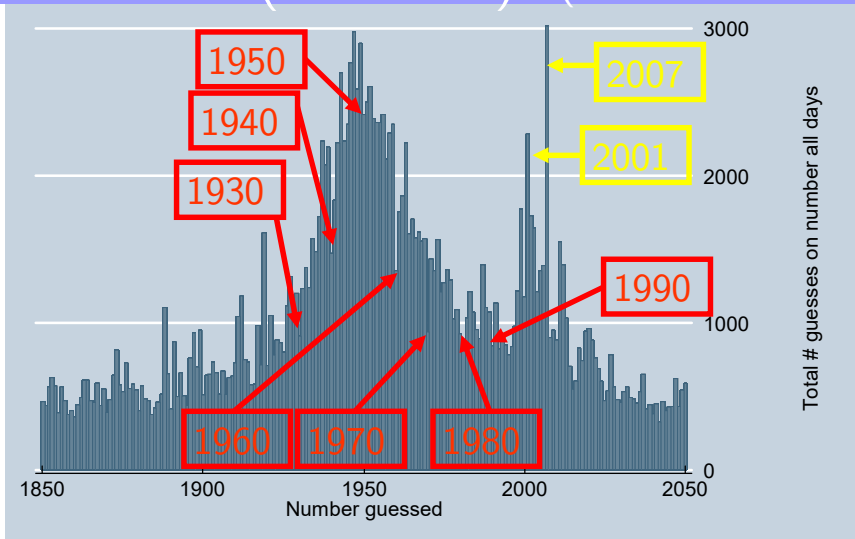
5. Does empirical data match the theory? (實證資料是否支持你的預測?)
 - ▶ Collect data to see the big picture (蒐集資料來看「整個社會」的結果如何)
6. Can individual differences be explained? (資料中個別差異能否解釋?)
 - ▶ Unlike the Bible, economic theory can change (理論有改進空間嗎?)

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What is Economics?

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Choose Birth Year (and 2007)? (出生年度與當年度特別多)



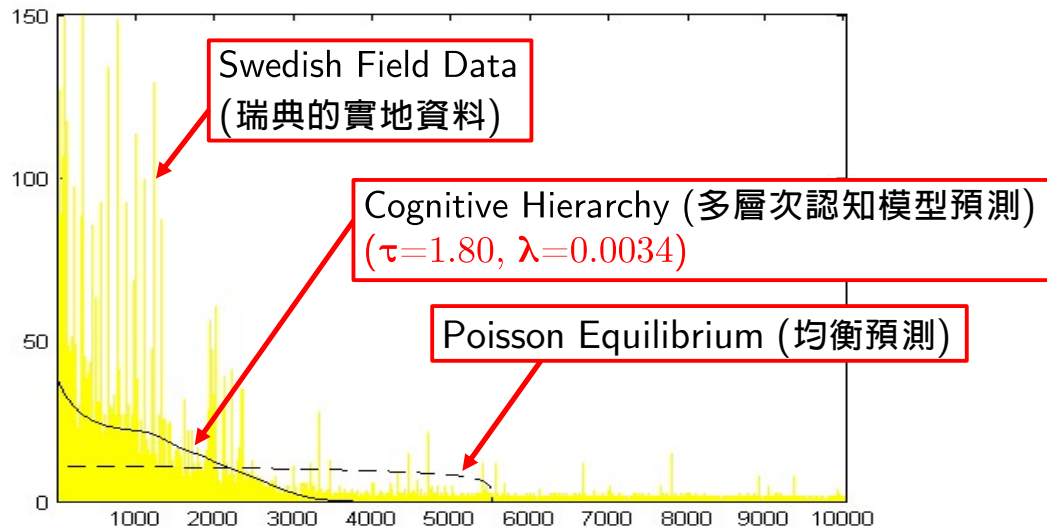
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(剛開始的選擇)

Initial Frequencies in Field (Week 1) (第1週實地資料的頻率)



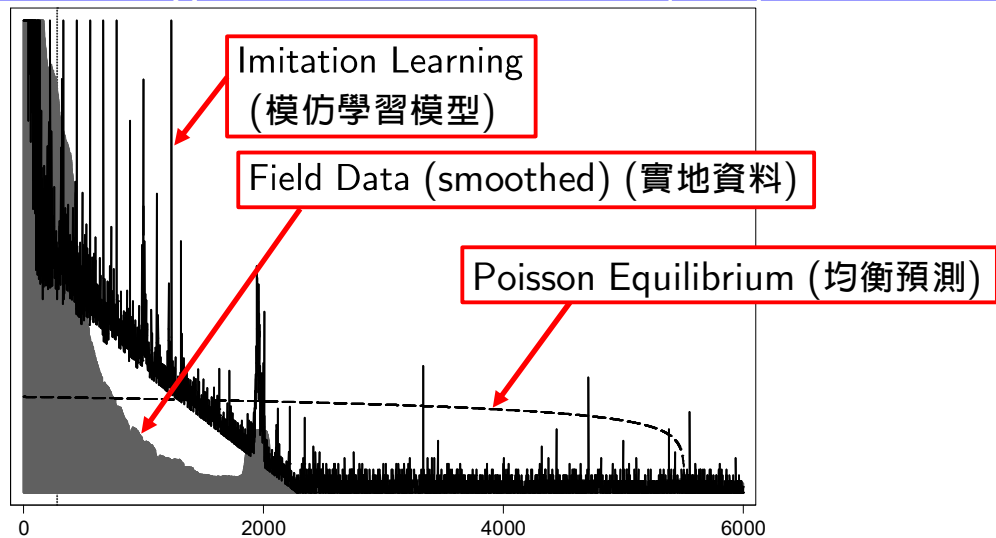
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 2 (第2天資料)



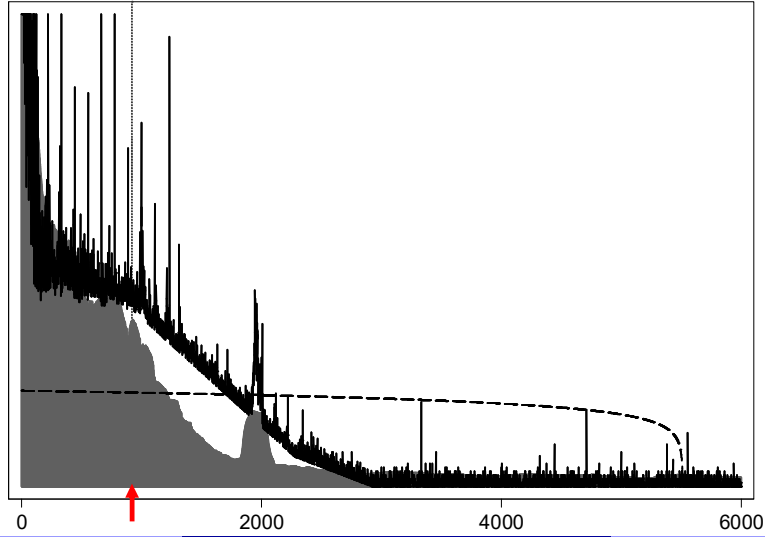
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 3 (第3天資料)



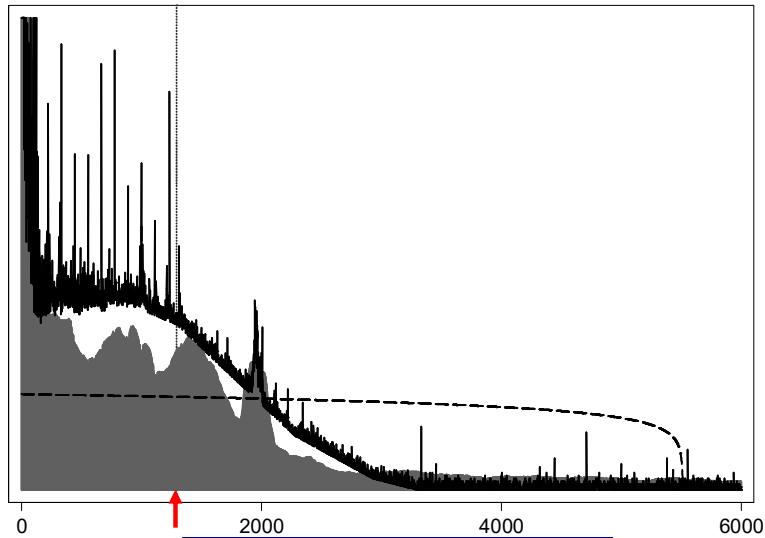
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 4 (第4天資料)



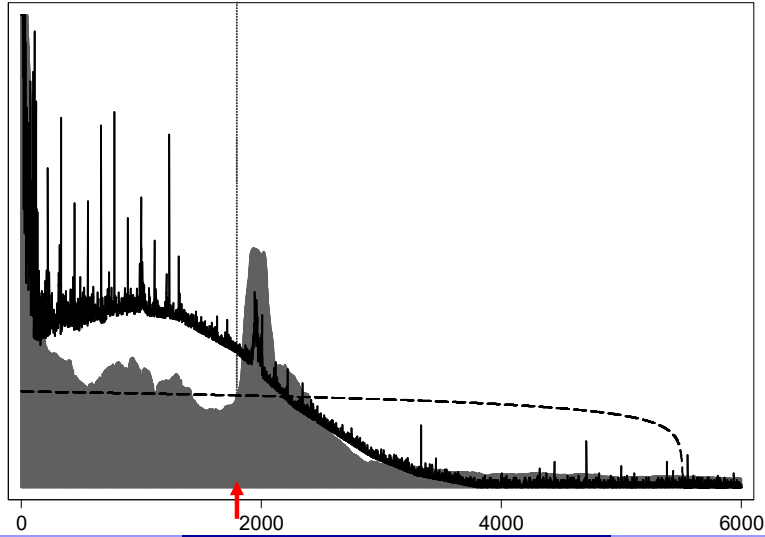
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 5 (第5天資料)



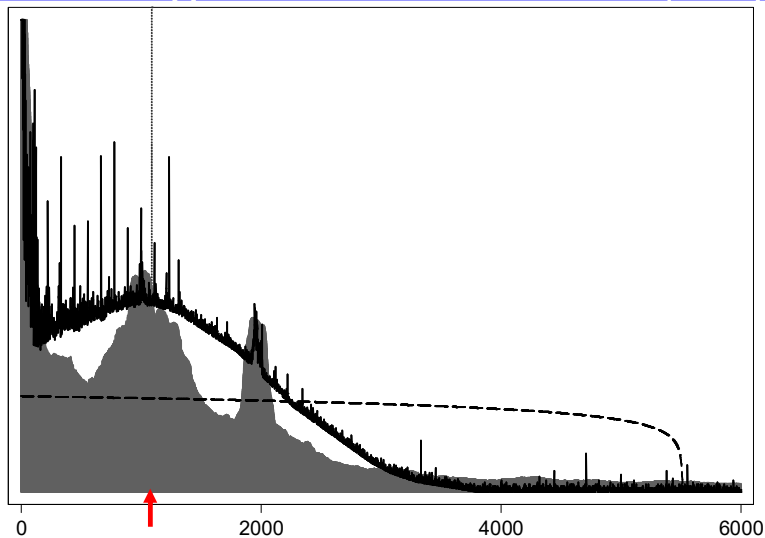
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 6 (第6天資料)



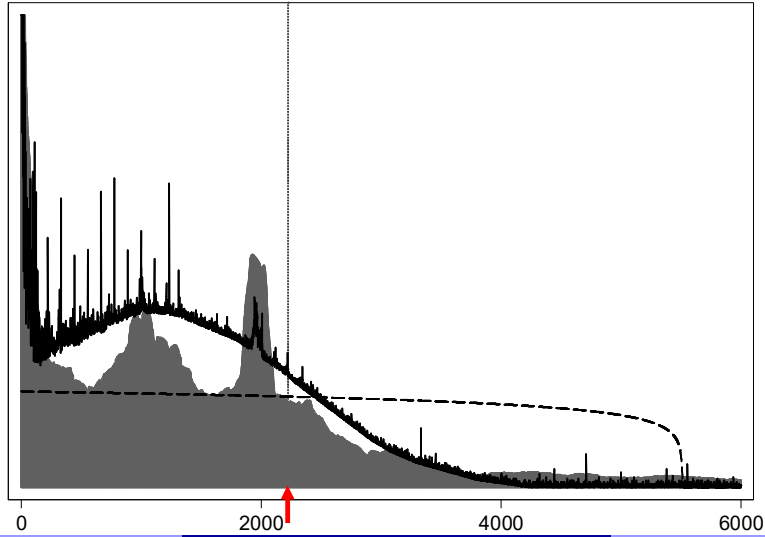
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 7 (第7天資料)



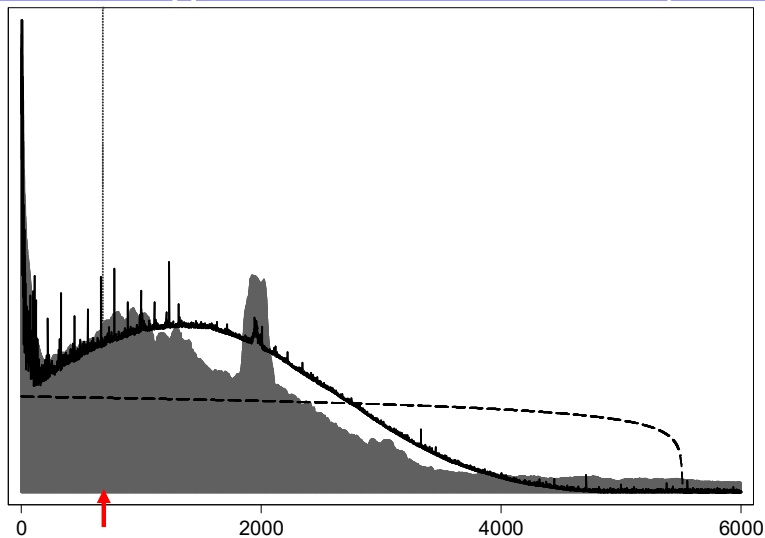
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 14 (第14天資料)



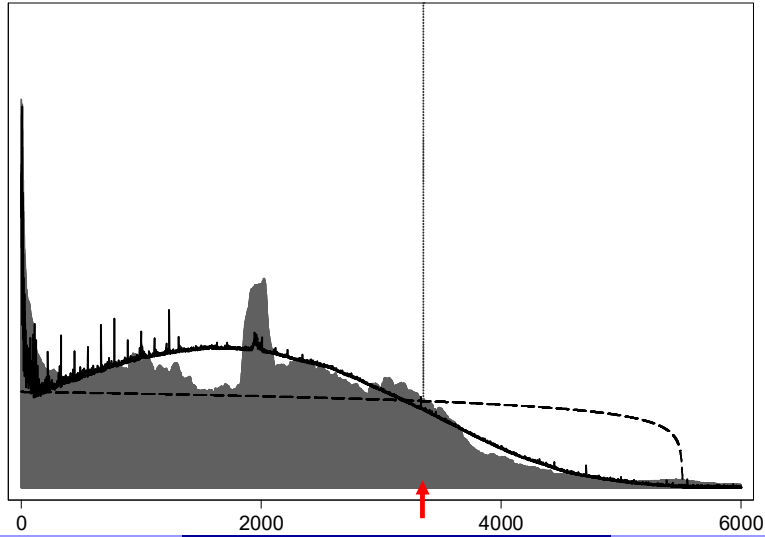
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 21 (第21天資料)



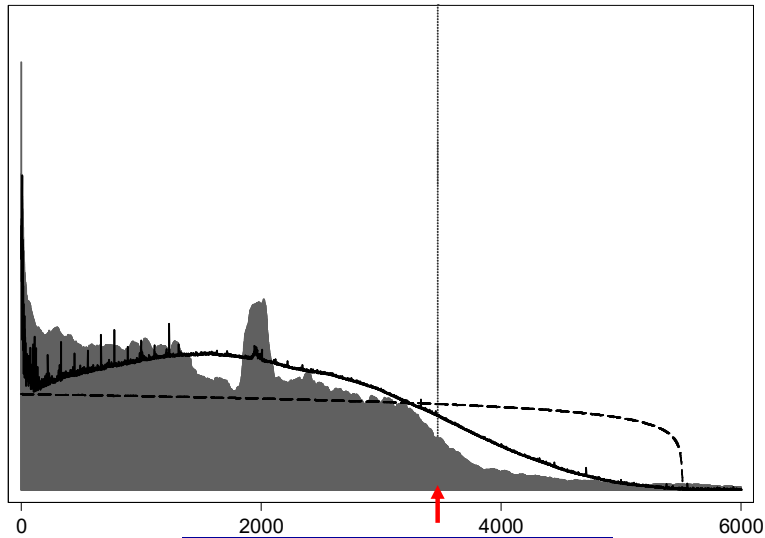
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 28 (第28天資料)



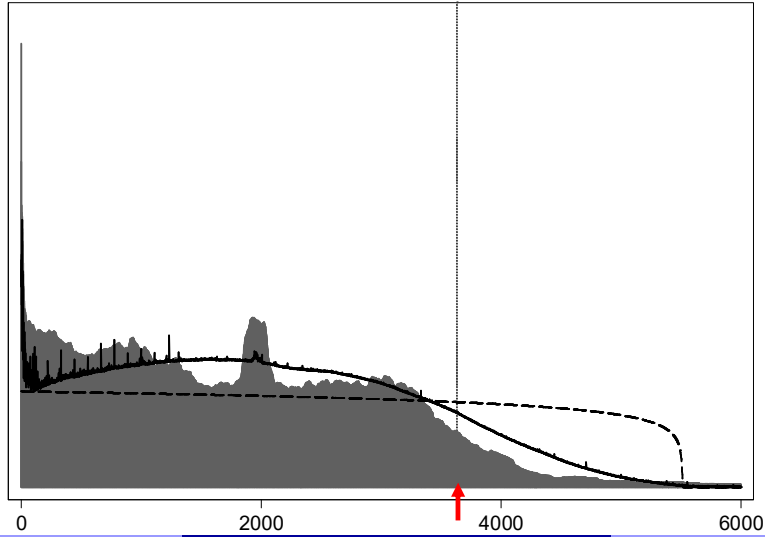
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 35 (第35天資料)



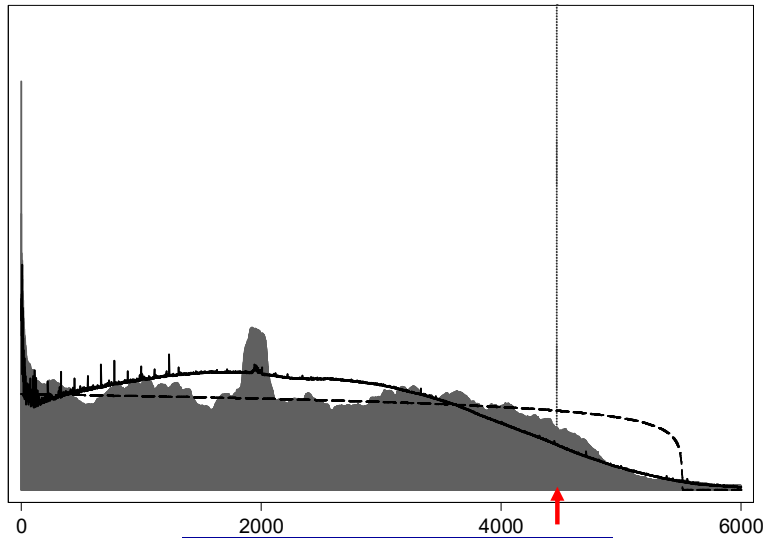
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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 42 (第42天資料)



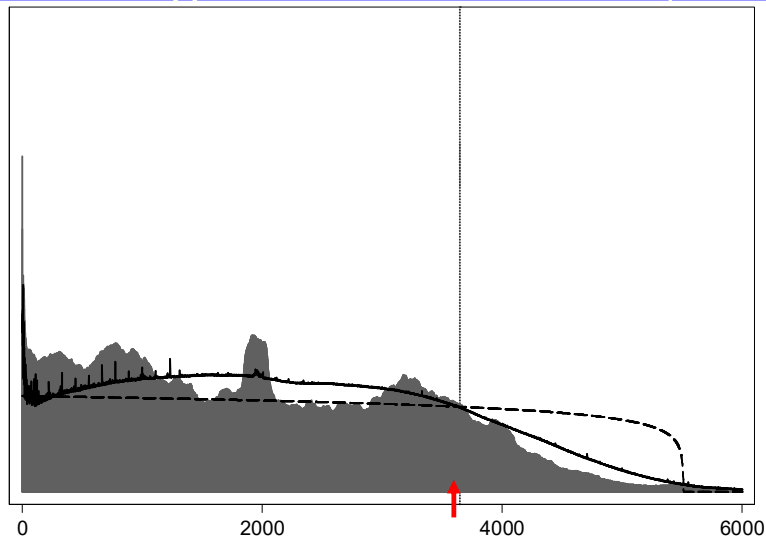
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What is Economics?

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(模仿學習模型 vs. 實地)

Imitation Learning vs. Field Data - Day 49 (第49天資料)



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Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

5. Does empirical data match the theory? (實證資料是否支持你的預測?)
 - ▶ Collect data to see the big picture (蒐集資料來看看「整個社會」的結果如何)
6. Can individual differences be explained? (資料中個別差異能否解釋?)
 - ▶ Unlike the Bible, economic theory can change (理論有改進空間嗎?)
7. How can the institution be improved? (制度有沒有可以改進之處?)
 - ▶ Market Design: The Engineer Question! (市場設計: 工程師問題)
8. Where did this institution come from? (這套制度是哪裡來的?)
 - ▶ Why are we here with the current system? (現況的邏輯是什麼?)
 - ▶ The Historical Question (leading to humanities) (爬梳歷史通向人文)

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What is Economics?

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Conclusion (小結)

- ▶ Traditionally, resources are scarce, so economists focus on **Production and Consumption: Manage Resources Efficiently**
- ▶ 舊經濟時代聚焦在資源有限，經濟學處理生產和消費：解決資源有效運用的問題
- ▶ But in the Meta Economy, resource is no longer the focus!
- ▶ More important are human reactions to information/institutions
- ▶ 但在知識經濟時代，資源不再是重點！更重要的是人們對資訊、對制度的反應
- ▶ So, Economics = **For any Institution, There's a Reaction!**
- ▶ Given a set of rules, how people optimize; whether empirical data confirms theory, and to find institution origins and improvements
- ▶ 因此，現代經濟學研究的是「上有政策，下有對策」：在一套遊戲規則下，人們如何謀求自身最佳；看實證資料如何印證理論，並思考這個制度如何改進、從何而來。

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What is Economics?

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Flipping the EMI Classroom (with Videos and Classroom Experiments)

(用影片與課堂實驗)來顛覆全英教室

Joseph Tao-yi Wang (王道一)

4/29/2022

2022/4/28

Flipping with Videos and Experiments

Joseph Tao-yi Wang

How I Started Flipping at NTU? (前言：我如何開始的?)

- ▶ 2007: Teach **Principles of Microeconomics** at NTU
 - ▶ Design one corresponding classroom experiment per week
 - ▶ (2007年回台大教書，配合大一「經濟學一/經濟學原理與實習上」每週進度設計課堂實驗)
- ▶ 2008: Teach **graduate Microeconomic Theory in English**
 - ▶ "I commit not to understand Chinese both in class and when grading" (2008年研一「個體經濟理論一」用英語授課，當作自己「不懂中文」)
- ▶ 2009: Teach **Principles of Microeconomics in English**
 - ▶ Large Class: 169 (Fall 2013); NTU OCW (2021 in English)
 - ▶ (2009年系上請我「經濟學原理與實習上」也用英語授課，2013年選課人數169人；2021年為台大開放式課程錄製英語授課的「個體經濟學原理與實習」)

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Flipping with Videos and Experiments

Joseph Tao-yi Wang

How I Started Flipping at NTU? (前言：我如何開始的?)

- ▶ 2013: Flip **graduate Microeconomic Theory** with videos
 - ▶ (2013年用事前錄影來顛覆英語授課的研一必修「個體經濟理論一」)
- ▶ 2014: Turn **Experimental Economics** into MOOCs
 - ▶ Coursera (2014); NTU OCW (2015 in English) (2014年為台大 Coursera錄製線上「實驗經濟學I: 行為賽局論」；2015年為台大開放式課程錄製英語授課的版本)
- ▶ 2020: iPad Screen Record **Principles of Microeconomics**
 - ▶ (2020年在英語授課的「個體經濟學原理與實習」因應疫情使用iPad螢幕錄影記錄課程)
- ▶ 2021: Hybrid **Principles of Microeconomics in English**
 - ▶ Online and In-person interaction with Sli.do and MobLab
 - ▶ (2021年「個體經濟學原理與實習」用Sli.do和MobLab進行實體與線上混合英語授課因應疫情起伏)

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Flipping with Videos and Experiments

Joseph Tao-yi Wang

Wait a Minute... (等一下...)

Why Teach in English?

(為什麼要英語授課?)

-EMI Experience at NTU
(呆呆英語授課經驗)

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Flipping with Videos and Experiments

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(英語授課本來應該是要用來裝備學生出國留學/工作)

EMI Helps Prepare Students to Study/Work Abroad

- ▶ Study/Work Abroad After Using English in Class
 - ▶ 學生上課用英語，無縫接軌出國留學工作
- ▶ Universities Provide EMI to Attract Better Students

▶ 大學提供英語學程，吸引更多好學生



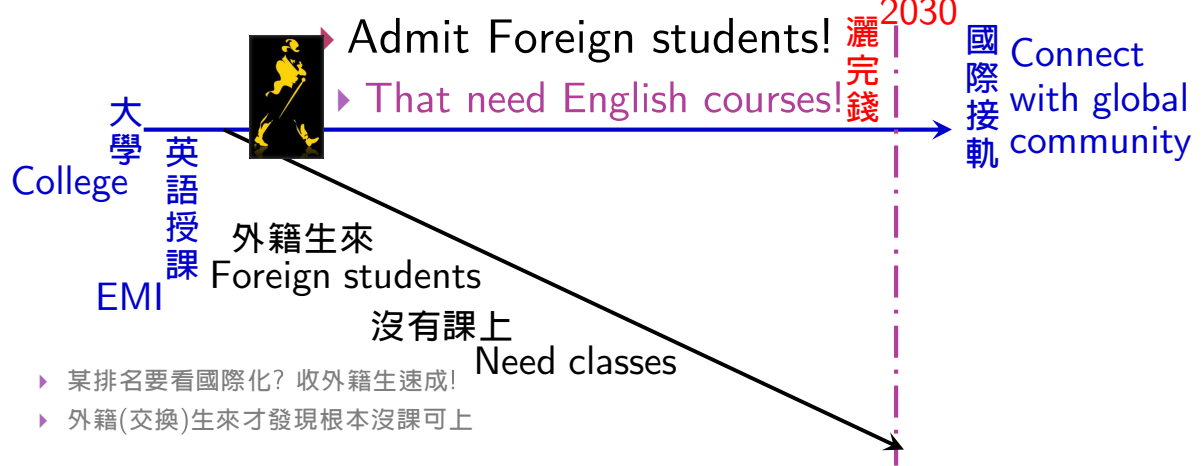
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A Detour... (岔出去...)

▶ Ranking Requires International Faculty/Student Ratio?



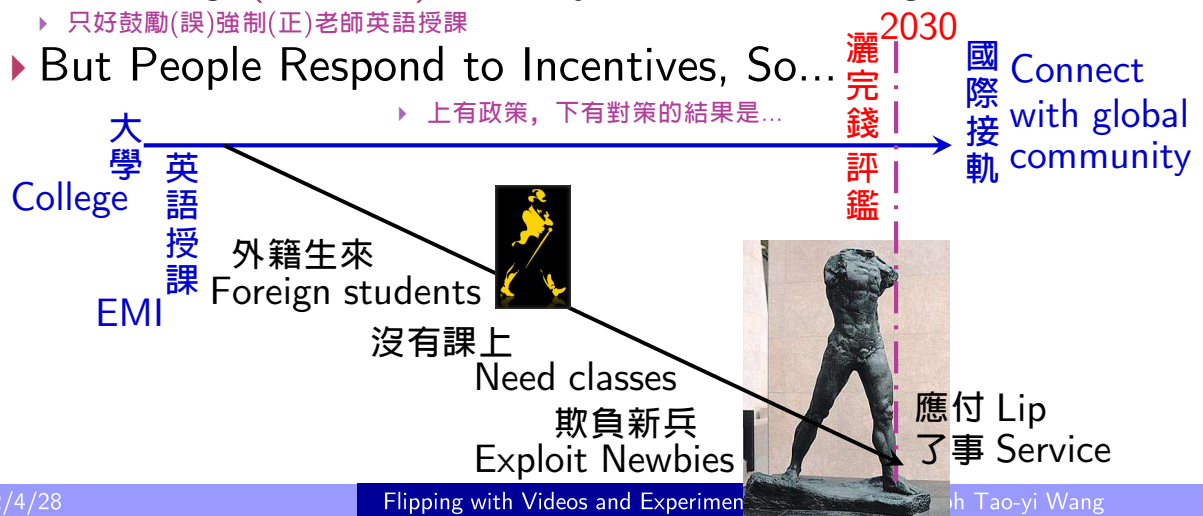
Results of This Detour... (岔出去的結果...)

▶ Encourage (~~Force?!)~~ Faculty to teach in English

▶ 只好鼓勵(誤)強制(正)老師英語授課

▶ But People Respond to Incentives, So...

▶ 上有政策, 下有對策的結果是...



Turning Back... (岔回來...)

▶ Could Hire Foreign Faculty (Who Don't Speak Chinese)

▶ 其實可以聘不懂中文的外籍教師

▶ EMI for Real... (要玩就來玩真的...)



(投資學生=投資未來...)

Investing in the Students = Invest in the Future!

▶ Alumni Reciprocate!

▶ 校友要有感才會回饋/投資自己

▶ Invest in Yourself!



(其實不必等到外師到任，你現在就可以自己「玩真的」!)

You Can Start Even Without Foreign Faculty Here...

But Face Challenges:

- ▶ 但你即將面對挑戰：
- ▶ Go Against the Crowd
 - ▶ 隨波逐流(別人都這樣...)
- ▶ Need Clear Goals
 - ▶ 沒有目標(不知為何而戰...)
- ▶ Need Discipline
 - ▶ 缺乏紀律(我就是做不到!)



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Flipping with Videos and Experiments

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(呆呆全英授課的優點與挑戰)

Teaching in English @ NTU: Pros & Challenges

- ▶ Students **Self-Select** to Your Class (學生自我選擇)
 - ▶ Lazy Taiwanese students won't come (想混的學生不會選全英授課)
 - ▶ Foreign students are forced to come (外籍生會想來選但不一定會留下來)
- ▶ Teaching is **Path Dependent** (英語授課有路徑依賴)
 - ▶ Easier for new faculty or a new course (對新老師或開新課比較容易)
- ▶ **How to Foster Discussion/Interaction?** (但如何鼓勵學生發問/互動?)
 - ▶ Taiwanese students are shy in English (台灣學生不太發言/用英文更不敢)
 - ▶ Rural kids handicapped listening English (鄉下孩子有英聽障礙/上課霧煞煞)

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(如何鼓勵學生發問互動?)

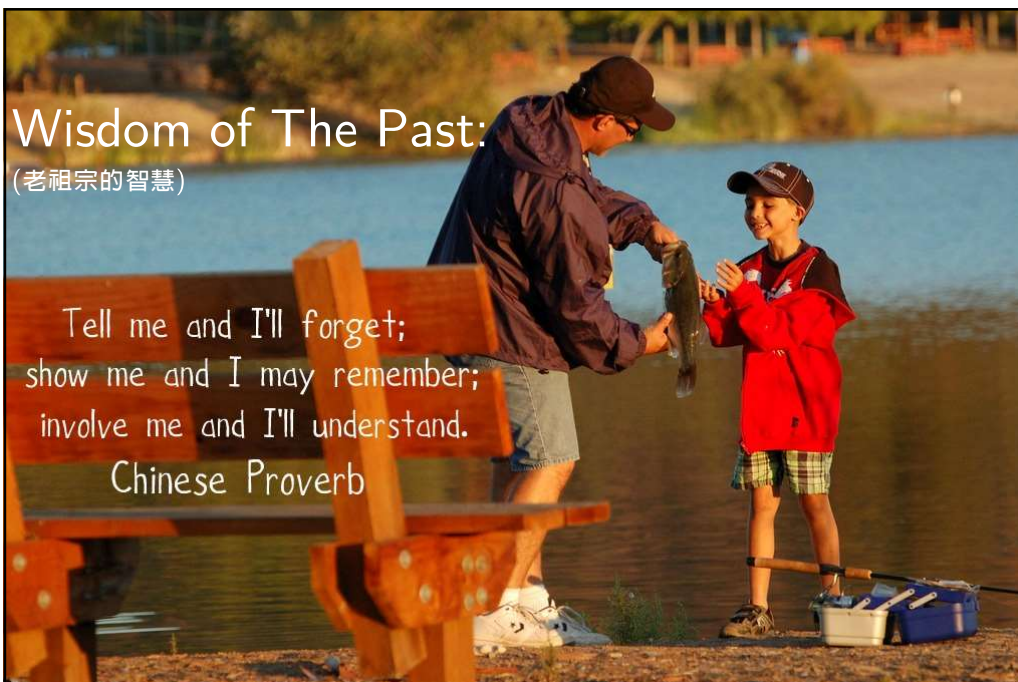
How to Foster Discussion & Interaction?

- ▶ Ask People to Vote (請大家投票，然後點選選擇某個選項的同學起來解釋理由)
 - ▶ Then ask people who voted for X to explain why
- ▶ Which Would You Choose? (如果只能二選一，你寧願選擇哪一個?)
 1. Spend 4 Years Studying at the world's best university, but must keep attendance a secret. (念全世界最好的大學，但是拿不到畢業證書)
 2. Get an Official Degree from the world's best university, but cannot actually study there. (拿全世界最好大學的畢業證書，但不能去念)
- ▶ Clickers are Similar (用表決器也有類似效果，但用英語思考對台灣學生還是很大的挑戰)
 - ▶ Still challenging for Taiwanese students (in English)

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Flipping with Videos and Experiments

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Wisdom of The Past:

(老祖宗的智慧)

Tell me and I'll forget;
show me and I may remember;
involve me and I'll understand.

Chinese Proverb

見之不若
知之，
知之不若
行之，
學至於行之
而止矣。
行之，明也。

(荀子·儒效)

2022/4/28

Flipping with Videos and Experiments

Joseph Tao-yi Wang

(推動經濟學實驗教學的大哉問: 時間哪夠啊?)

Not Enough Lecture Time?

- ▶ I get this question every time: (每次介紹經濟學實驗教學一定被問)
- ▶ **How could I have time for experiments when I can't even finish my lectures?** (講課的時間都不夠了哪有時間做實驗)
- ▶ I used to stress that **Involve me, and I'll understand.**
 - ▶ 荀子說:「行之, 明也」 (比老師說破了嘴還要有用)
- ▶ Now You Can **Flip the Classroom with Videos,**
- ▶ So There is No Excuse! (發現可以用錄影顛覆教室之後, 就不用怕講不完囉!)
- ▶ And it's even more beneficial if it's in English!
(而且不用怕英文聽力不好, 因為可以一聽再聽!)



2022/4/28

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But... (九把刀: 人生就是有這個But...)

- ▶ Instructors Face Their Own Challenges (每個老師面對的挑戰不同)
- ▶ **"You don't know how awful XYU students are."** (你不了解X大學生...)



- ▶ **"NTU students can do this, but not ours!" (Really?!)**

▶ 橘逾淮為枳: 台大學生可以, 不代表我們學生也可以(真的嗎?!)

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But... (九把刀: 人生就是有這個But...)

- ▶ Every Divorce is different, but **Marriage Counseling** is possible since there are: (家家有本難念的經, 為什麼還有人可以幫別人做婚姻協談、諮商輔導? 因為婚姻有:)

1. **General Principles** (共通原則)
2. **Case Studies** (可觀摩案例)
3. **Inspiration** (能觸類旁通)
 - ▶ Can Learn from Analogy

- ▶ What About **Teaching**?

- ▶ 那教學呢?



2022/4/28

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In a Flipped Classroom, You Can... (在顛覆的全英教室裡, 你可以...)

1. Force Students to **Preview** with Videos
 - ▶ (利用錄影來逼學生預習和事後複習、克服語言障礙)
2. Encourage **Questions in Class** (鼓勵學生上課問問題 因事前有做功課)
3. Use **Sli.do** to ask questions/see where they get stuck
 - ▶ **Do Homework (=Quiz) in Groups so they teach each other**
 - ▶ 善用科技問問題(如sli.do)實地觀察學生學習瓶頸, 甚至分組做習題(其實是隨堂小考, 一定要算分!)
4. **Run Experiments** to Foster Discussion (設計課堂實驗來促進課堂討論與互動)
 - ▶ "**Involve Me, and I'll Understand.** (行之, 明也)" (荀子儒效)

2022/4/28

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Q & A

2022/4/28

Flipping with Experiments

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slido



Audience Q&A Session

① Start presenting to display the audience questions on this slide.