

Economics is All About Institutions and Human Behavior

經濟學就是「上有政策下有對策」
For any Institution, There's a Reaction.

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What is Economics?

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What is Science? (何謂科學?)

What about Social Sciences? (那「社會」科學呢?)

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What is Science? (何謂科學?)

- ▶ **Science** from Merriam-Webster: (科學的定義)
 - ▶ "knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through **scientific method**."
 - ▶ (用來描述普遍真理或普遍法則如何運行的系統性知識，特別是用科學方法獲得與檢驗的知識)
- ▶ What is the "**Scientific Method**"?
 - ▶ 何謂「科學方法」?

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Scientific Method – Wikipedia (科學方法)

- ▶ The scientific method seeks to (科學方法希望)
- ▶ **explain** the events of nature in a **reproducible** way,
 - ▶ (用可重複驗證的方式來解釋自然現象，)
- ▶ and to use these reproductions to make useful **predictions**.
 - ▶ (並用此來做有用的預測。)
- ▶ It is done through **observation** of natural phenomena,
 - ▶ (達成方式包含觀察自然發生的現象，以及)
- ▶ and/or through **experimentation** that tries to simulate natural events under controlled conditions.
 - ▶ (用實驗在控制條件下產生自然發生的現象。)

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What about Social Science(s)? (何謂社會科學?)

- ▶ Apply the Scientific Method to Social Events: (用科學方法研究社會現象)
- ▶ Scientific method seeks to explain social events in a reproducible way, and to use these reproductions to make useful predictions. (用可重複驗證的方式來解釋社會現象，並用此來做有用的預測。)
- ▶ It is done through observation of natural social phenomena, (達成方式包含觀察自然發生的社會現象，以及用實驗在控制條件下產生社會現象。)
- ▶ and/or through experimentation that tries to simulate social phenomena under controlled conditions.
- ▶ Control Experiments (控制實驗) vs. Empirical Work (其他實證方法)

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經濟學是甚麼?

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What is Economics? (經濟學是什麼?)

- ▶ **Textbook Definition:** (課本上的定義)
 - ▶ Economics studies how a society manages scarce resources
 - ▶ 經濟學研究一個社會如何管理稀少資源 by Mankiw (2021)
- ▶ **Old Textbook Definition:** (古早課本的定義)
 - ▶ Economics studies how a society uses scarce resources to **produce** valuable goods and services and **allocate** to different people
 - ▶ 經濟學研究一個社會如何善用稀少資源來生產有價值的財貨，分配給不同人 by Samuelson (1948)




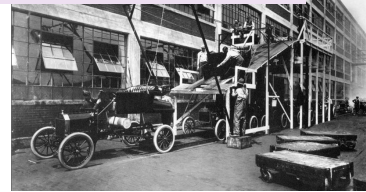

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What is Economics? (經濟學是什麼?)

- ▶ **Traditionally:** Economics is the study of how society produces and distributes goods to satisfy the wants and needs of their members.
- ▶ **For me,** Economics is the study of **institutions and human behavior** (reactions to institutions)
 - ▶ 「**上有政策，下有對策**」

For any Institution, There's a Reaction!

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For any Institution, There's a Reaction!

- ▶ Central Planning in Soviet Union:
 - ▶ "...if the plan merely calls for tonnages of output, (若計劃經濟要求生產一噸鐵釘:「如果上級的計劃只有敘明產出應有的噸數, ...)
 - ▶ there is every incentive to skimp on design or finish or quality, in order to concentrate on sheer weight." (Robert L. Heilbroner (1970): The Economic Problem 那大家自然有誘因要不管設計、外觀或品質方面的考量, 以便專注在噸數上。)
- ▶ Interesting cartoon in Krokodil (Russian satirical magazine) (俄國鱷魚雜誌諷刺漫畫:確實會有一噸鐵釘, 但)
 - ▶ What if one asks for numbers? (若改成要求要1萬根鐵釘...)



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Why Reaction? Because People Respond to Incentives!

- ▶ For any Institution, There's a Reaction!
- ▶ (Classical) Market mechanism is just one example!
 - ▶ 為何「上有政策, 下有對策」?因為人們對誘因有反應! 這表示市場機制只是諸多「制度」之一!
- ▶ Other mechanisms: Auctions, Match-Making (拍賣/配對分發)
- ▶ Other institutions: Governments, Congress, (或制度: 政府/國會)
 - ▶ National Health Insurance, (全民健康保險)
 - ▶ Families, Social Norms (家庭、社會規範)
- ▶ Is Economics Really Everywhere?
 - ▶ (那經濟學豈不是包山包海?)

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From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

梭修賽斯洲形勢圖

Annotations and Disciplines:

- Social Sciences** (Social Sciences)
- Law** (Law)
- Politics** (Politics)
- Psychology** (Psychology)
- Sociology** (Sociology)
- History** (History)
- Culture Studies** (Culture Studies)
- Geography** (Geography)

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From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)

Other Fields (其他領域)

For any Institution, There's a Reaction (上有政策下有對策)

Social Sciences Study Human Society (社會科學研究人類社會)

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From Economics to Social Sciences (從經濟學看社會科學/地圖會說話blog)



The dangers of a one sided story



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What media shows us



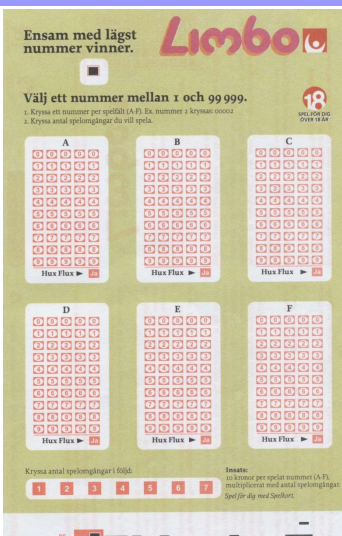
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The actual truth

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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?)

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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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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)
- ▶ (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?)

Want to Try Again?

(再來一次?)

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Try Again! Choose a positive integer from 1 to 100 (再來一次! 請選擇 1 到 100 之間的一個正整數)

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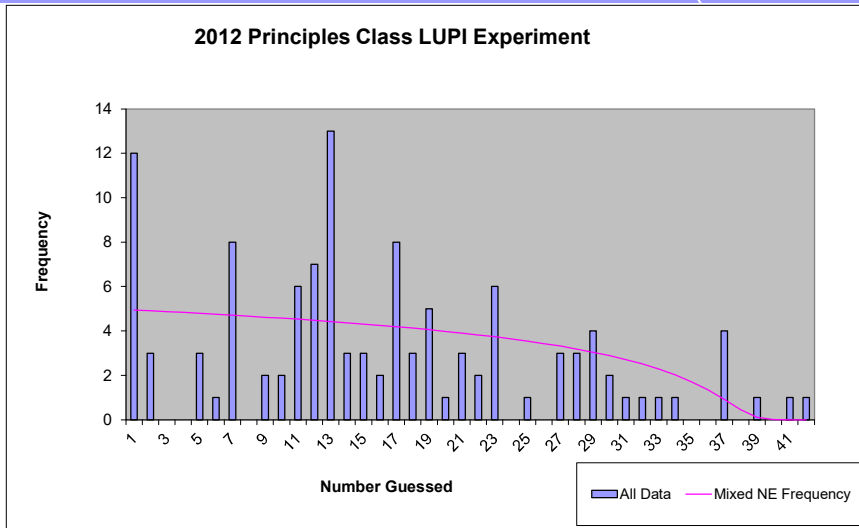


Last Chance! Choose a positive integer from 1 to 100 (最後一次! 請選擇 1 到 100 之間的一個正整數)

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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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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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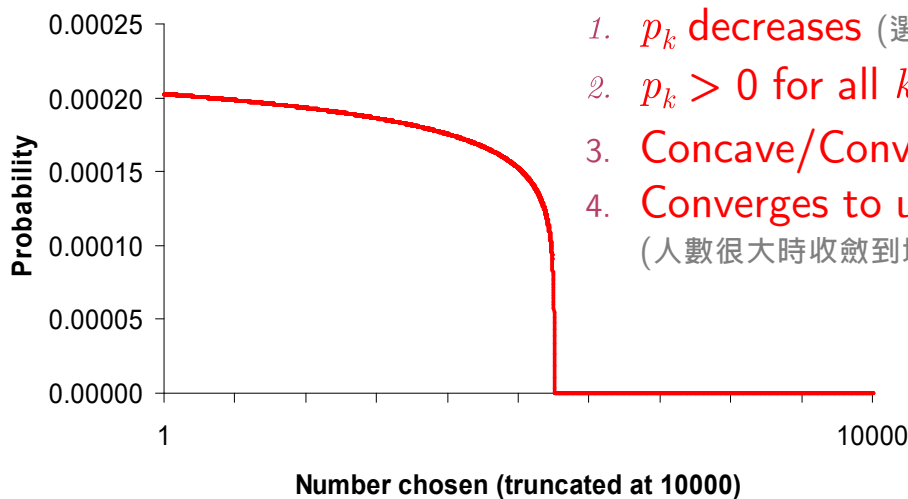
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Unique Poisson-Nash Equilibrium (Mixed)

唯一Poisson
混合策略均衡



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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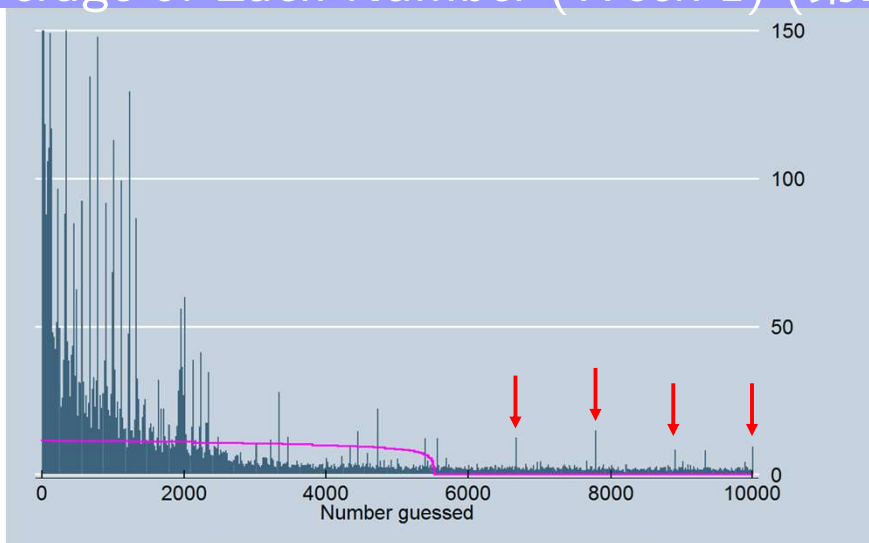
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(每個數字每天選擇的)

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

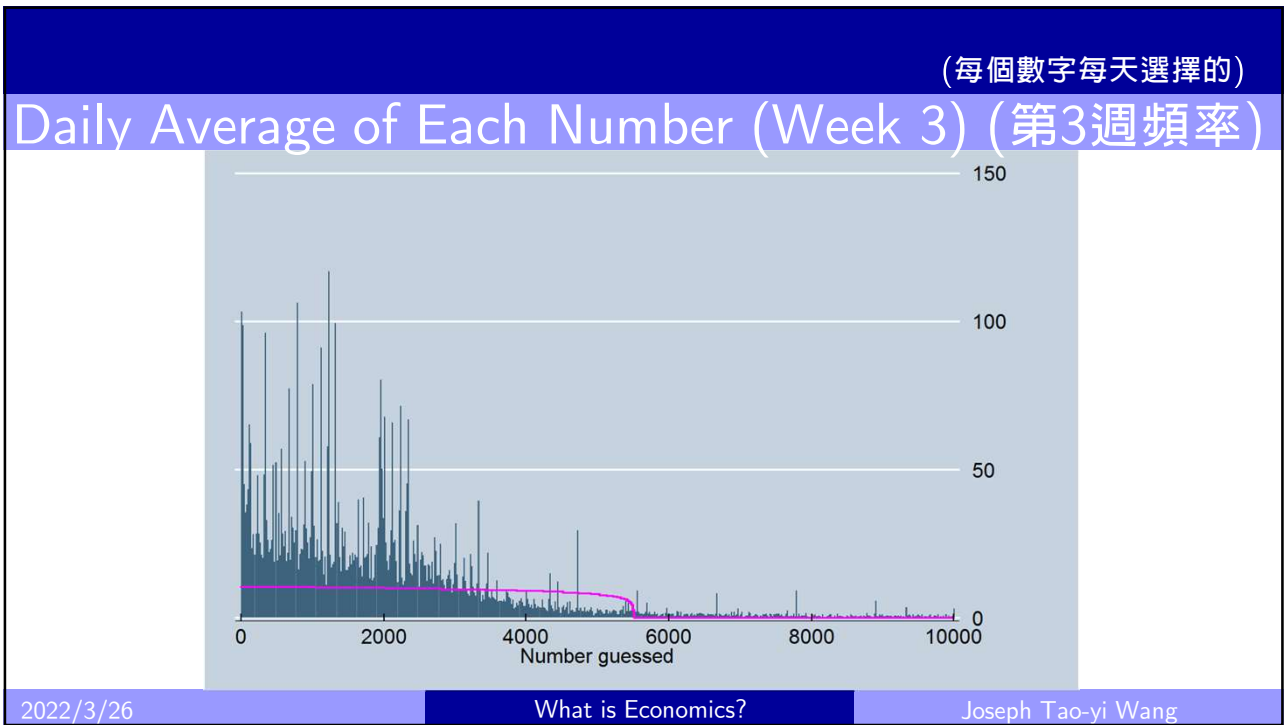


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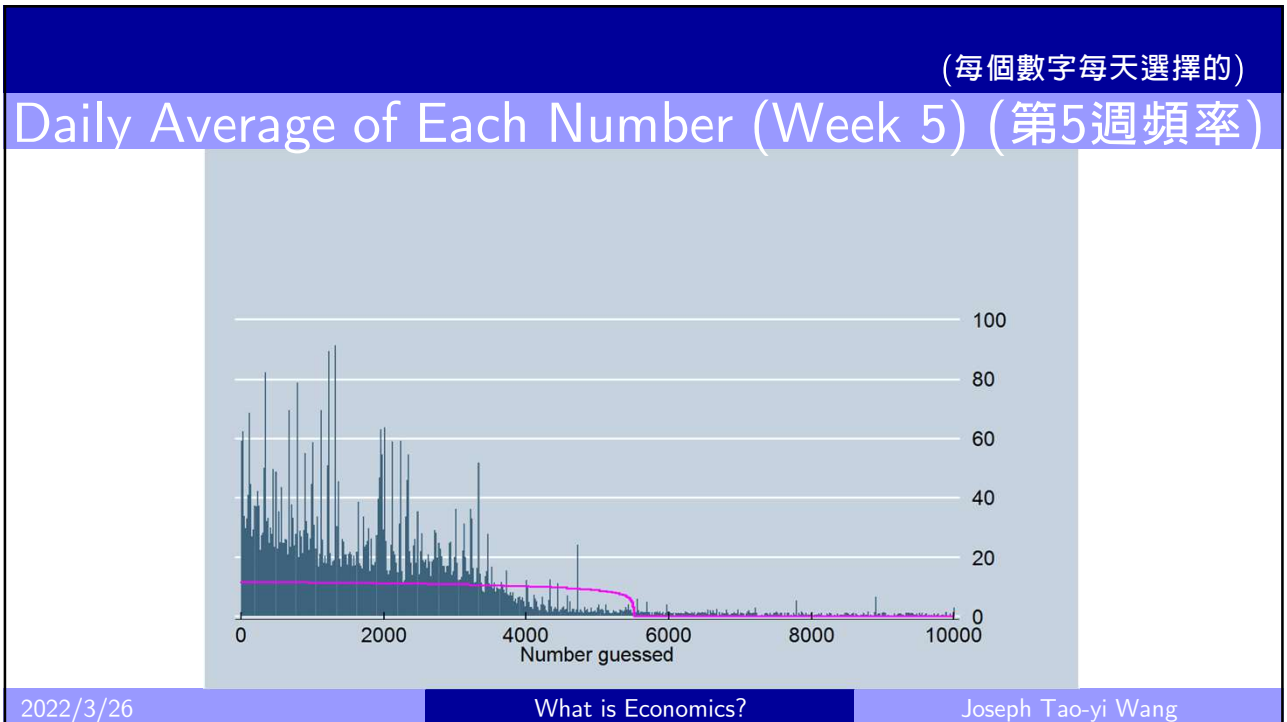
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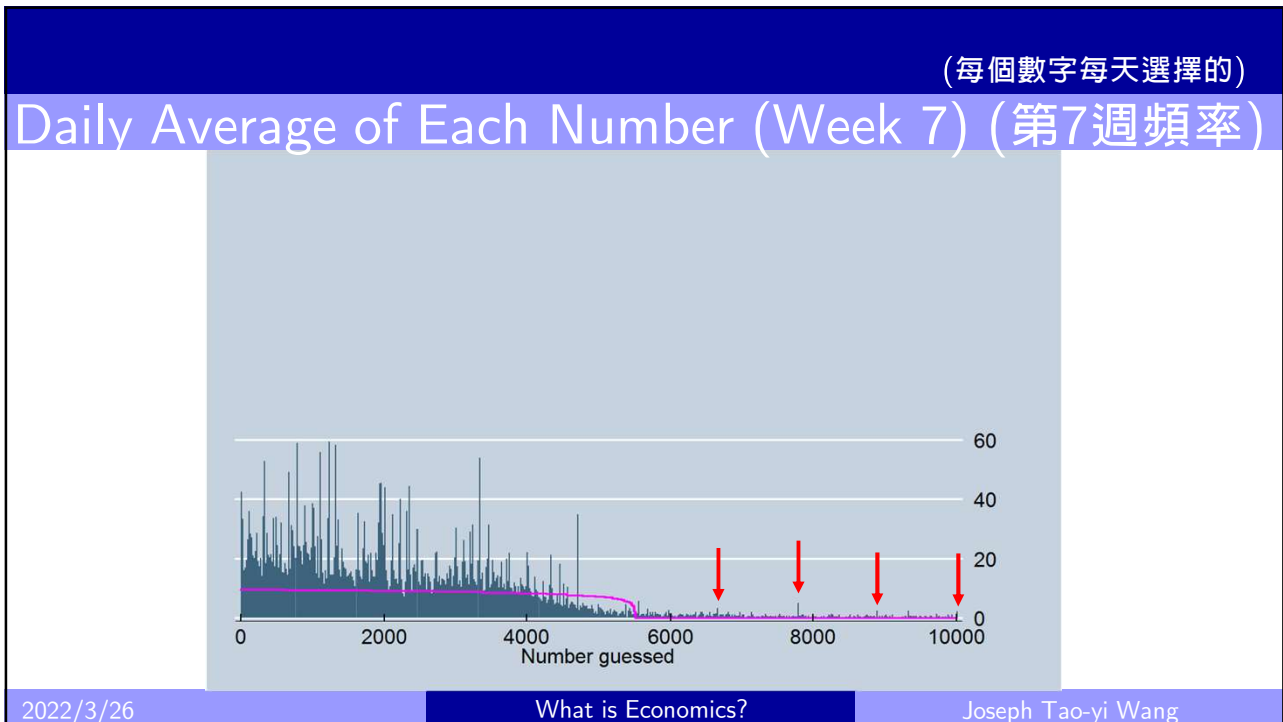
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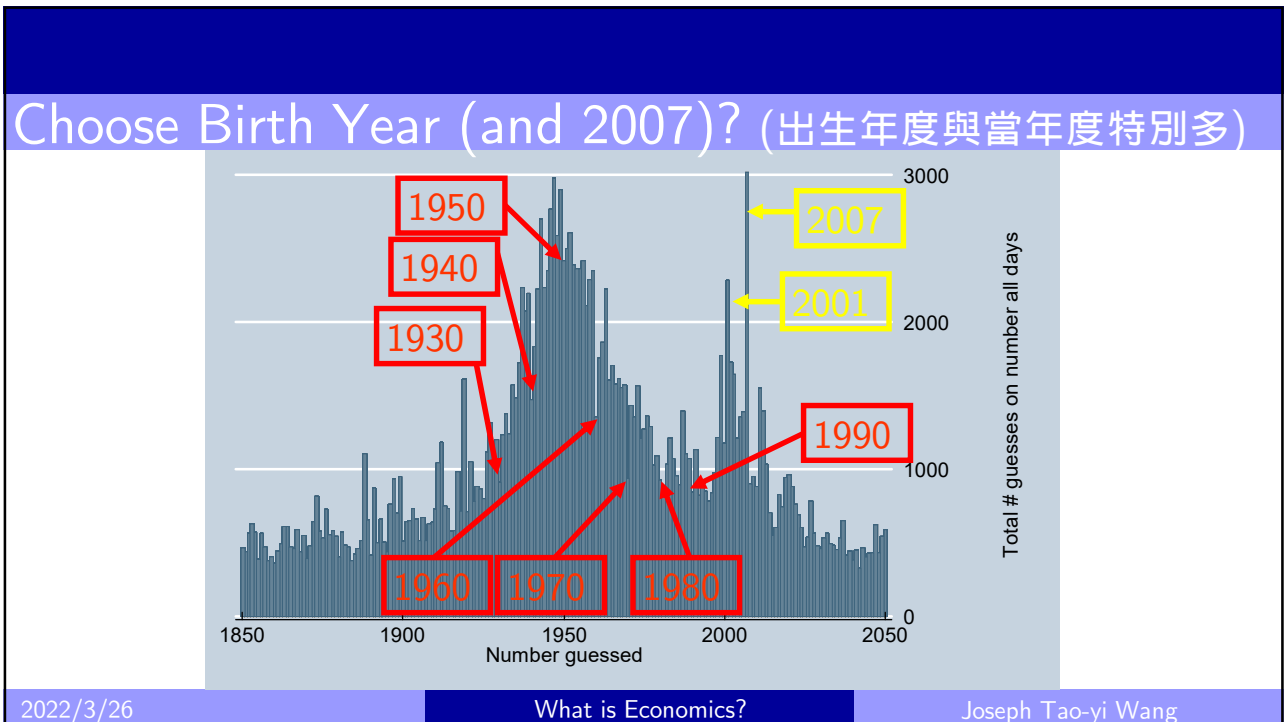
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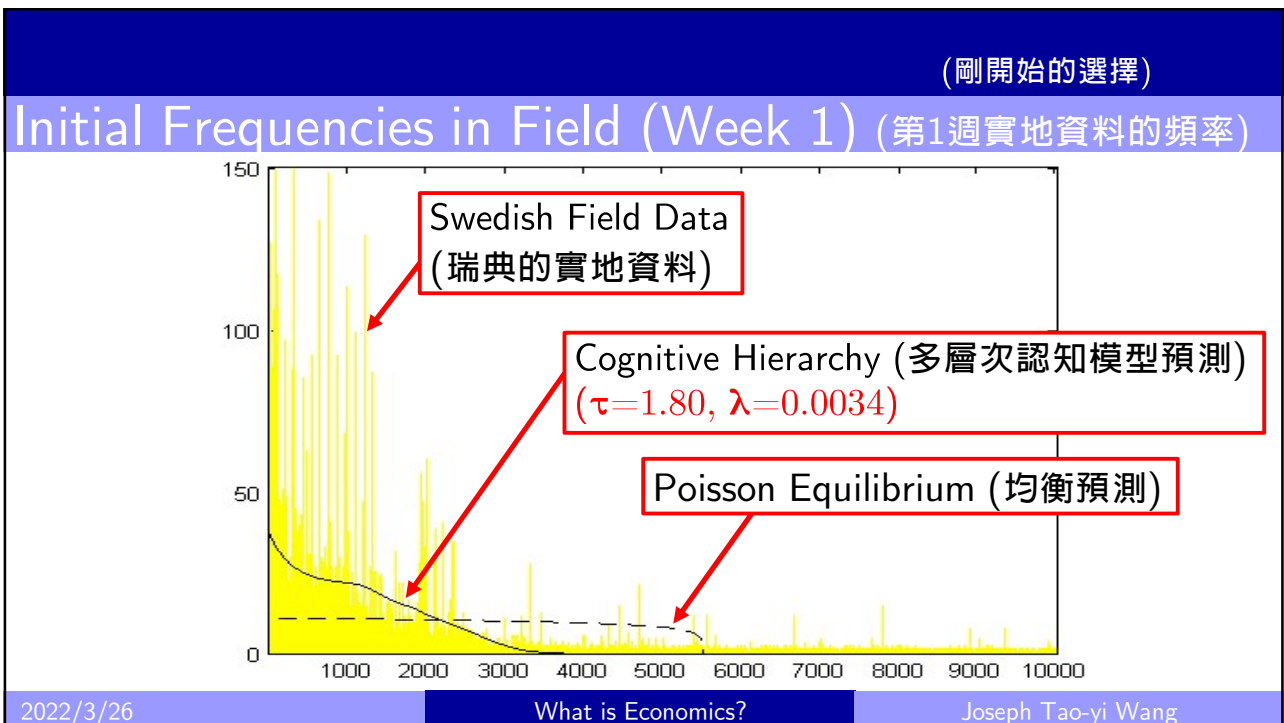
5. Does empirical data match the theory? (實證資料是否支持你的預測?)
 - ▶ Collect data to see the big picture (蒐集資料來看「整個社會」的結果如何)
6. Can individual differences be explained? (資料中個別差異能否解釋?)
 - ▶ Unlike the Bible, economic theory can change (理論有改進空間嗎?)

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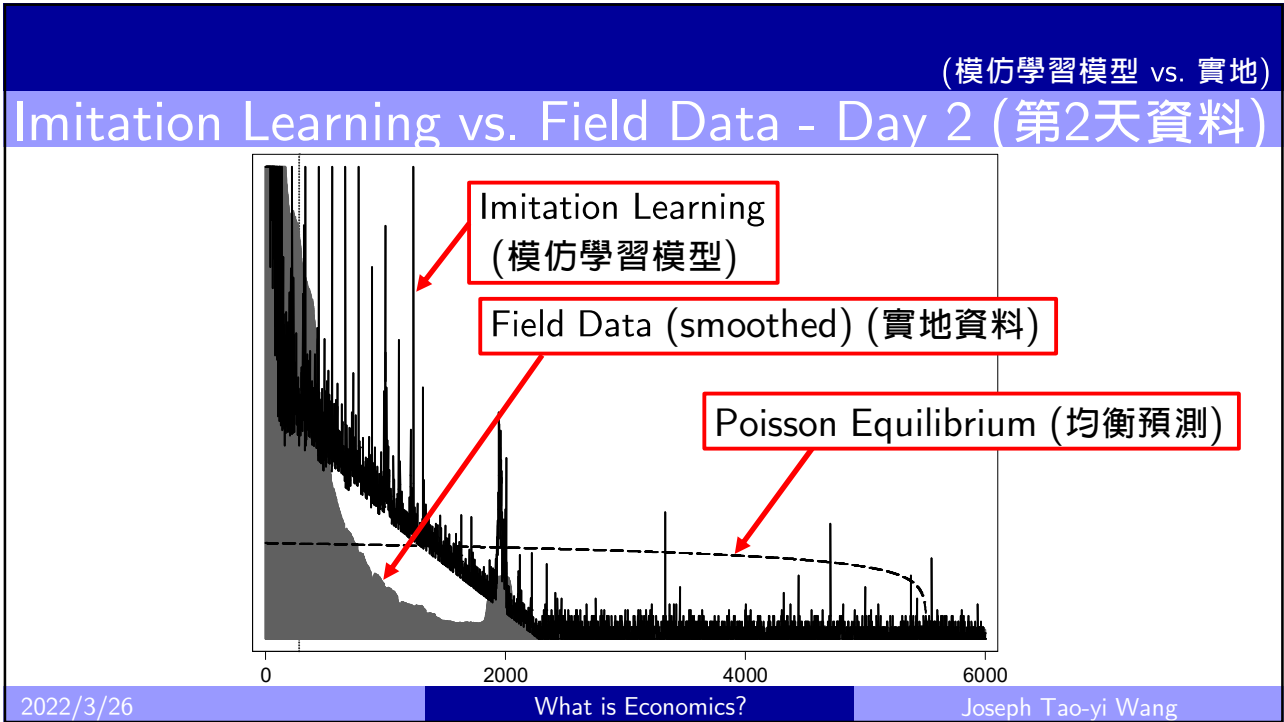
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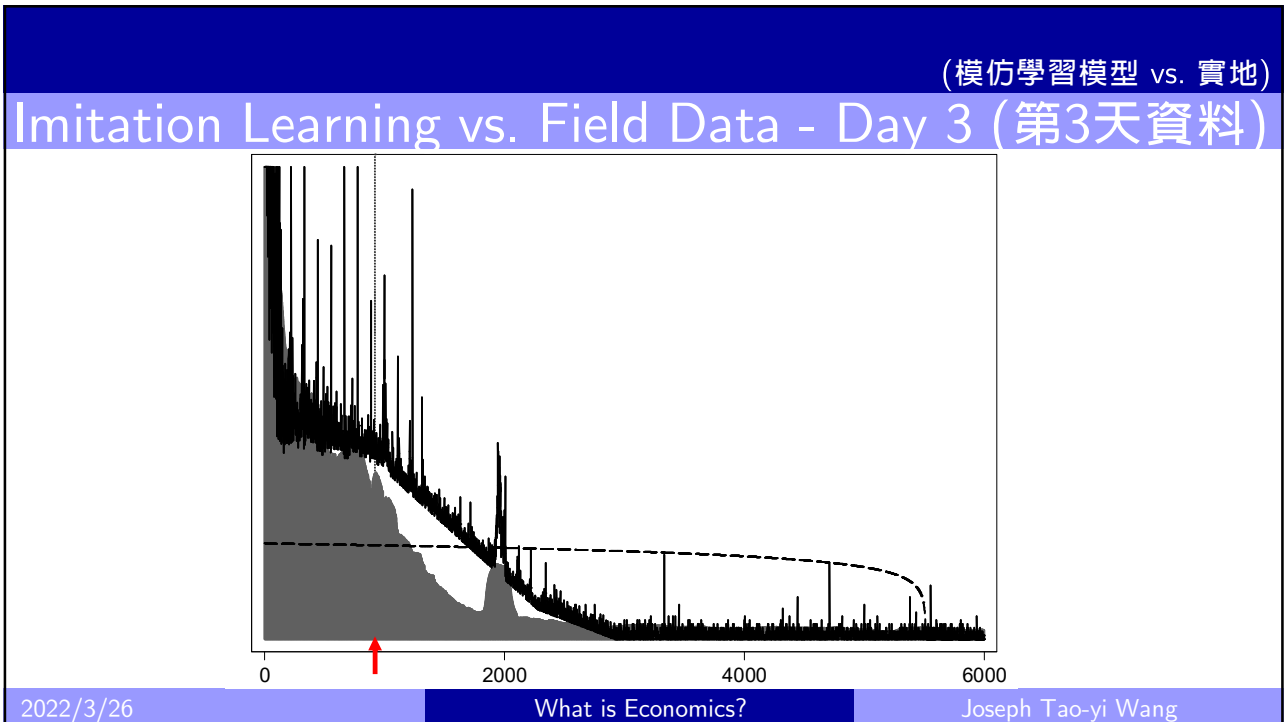
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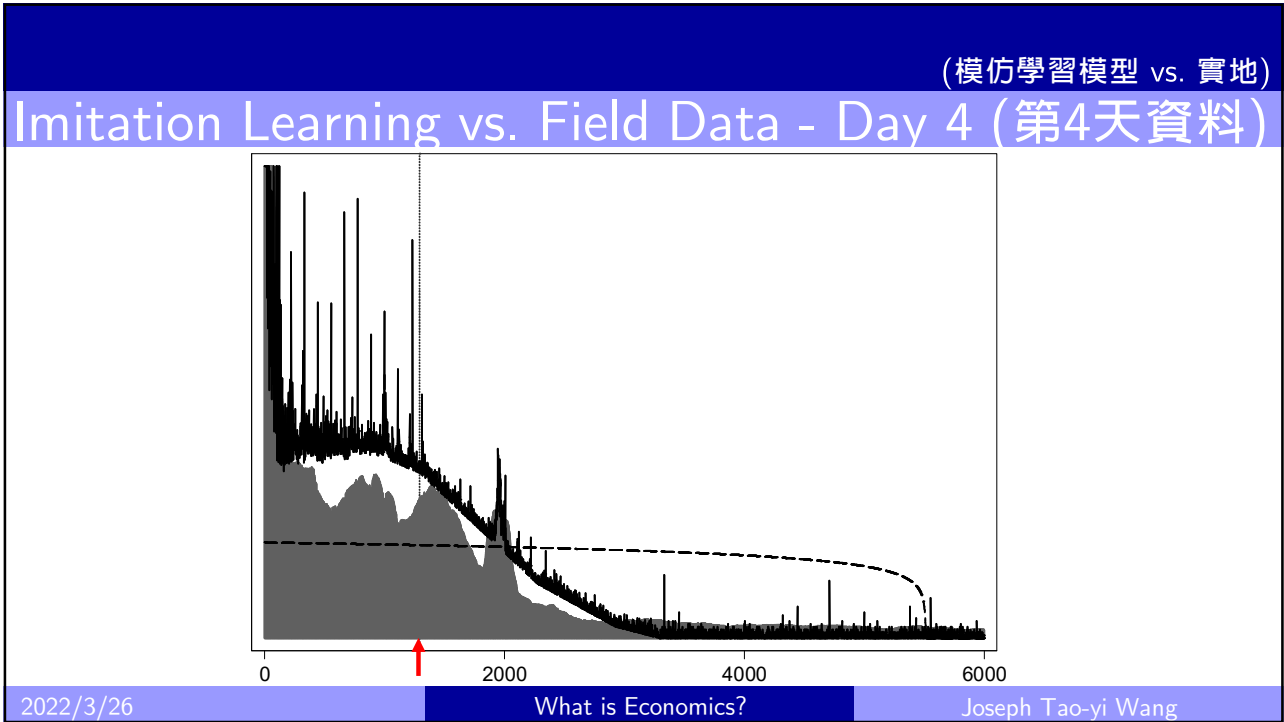
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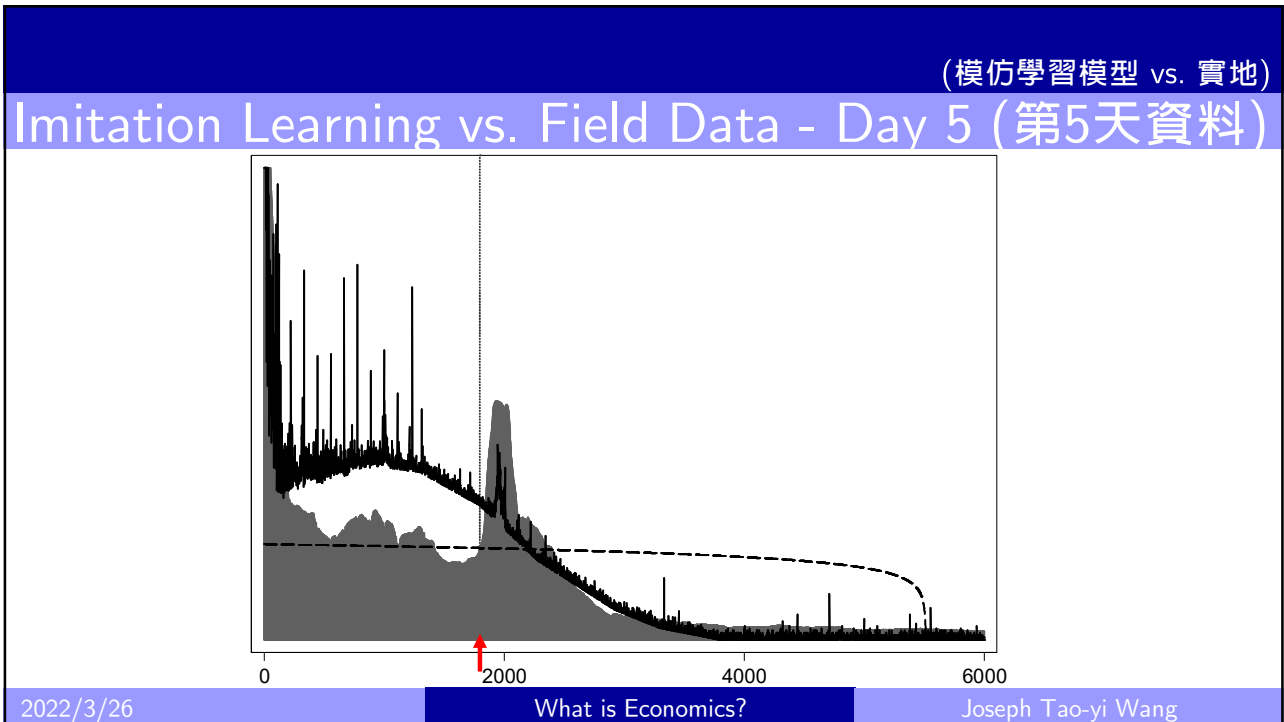
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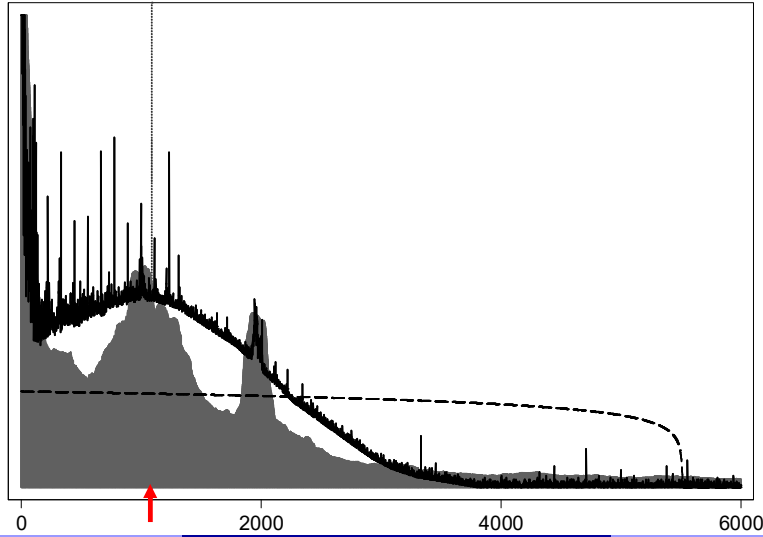
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(模仿學習模型 vs. 實地)

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



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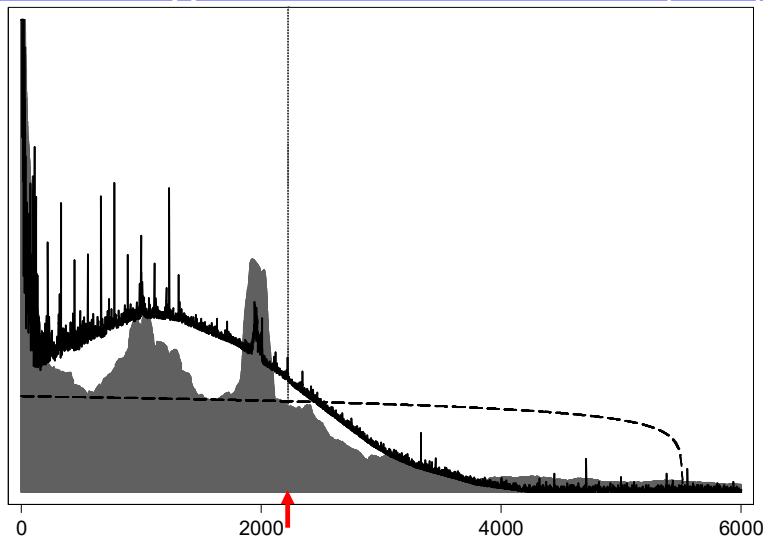
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(模仿學習模型 vs. 實地)

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



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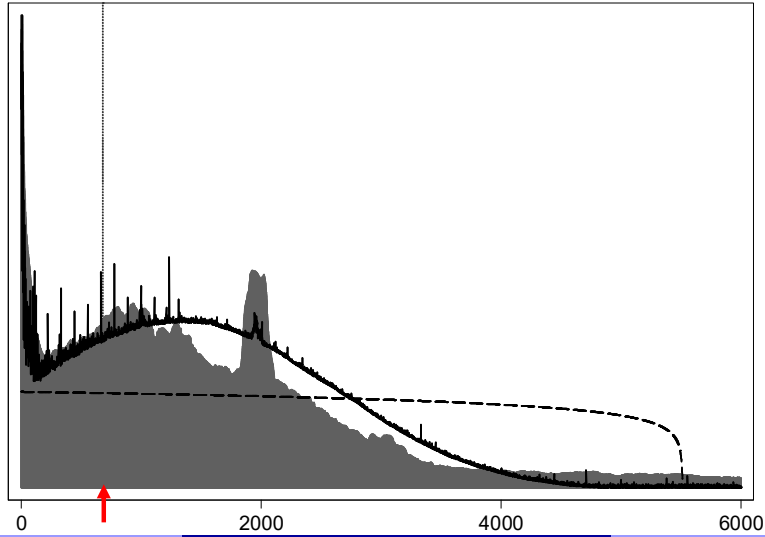
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(模仿學習模型 vs. 實地)

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



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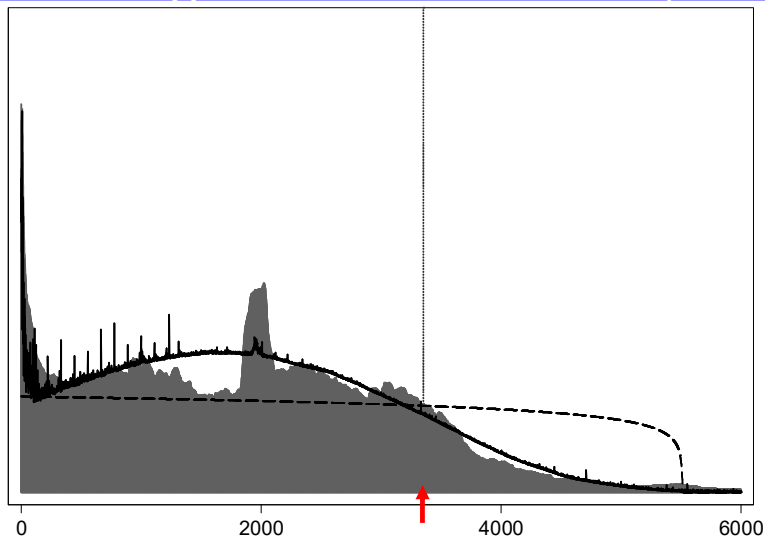
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(模仿學習模型 vs. 實地)

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

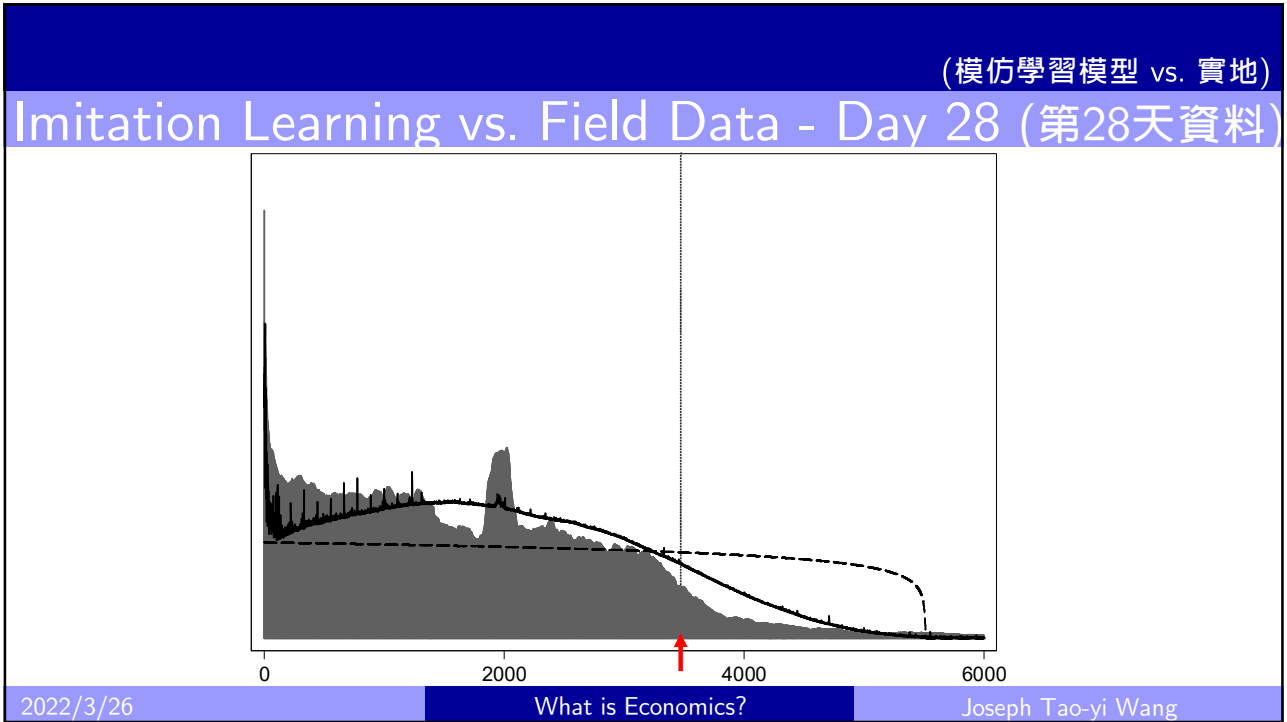


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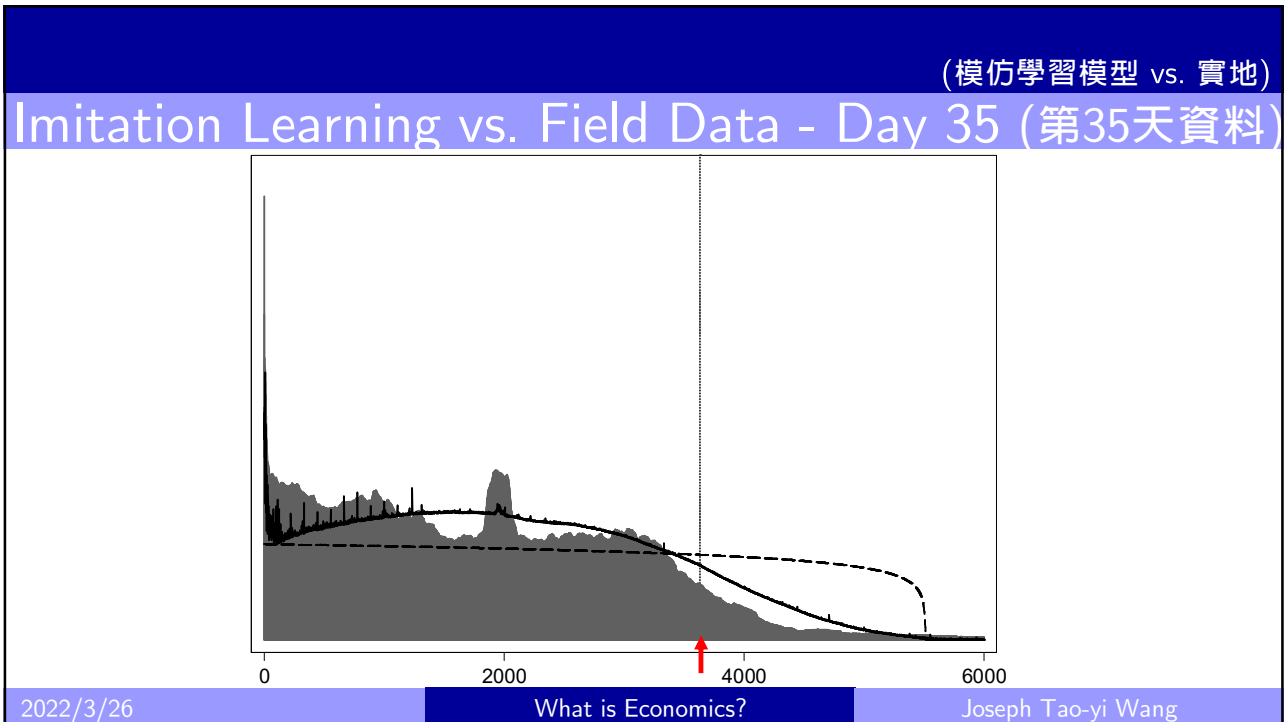
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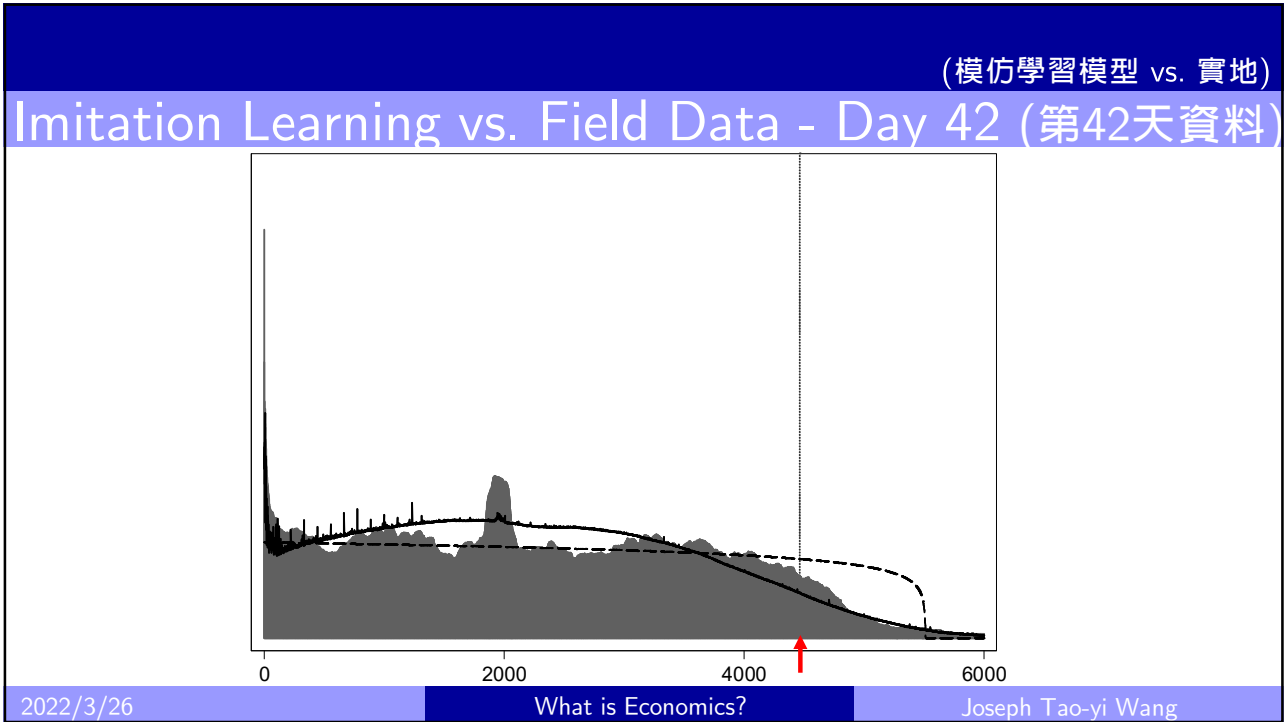
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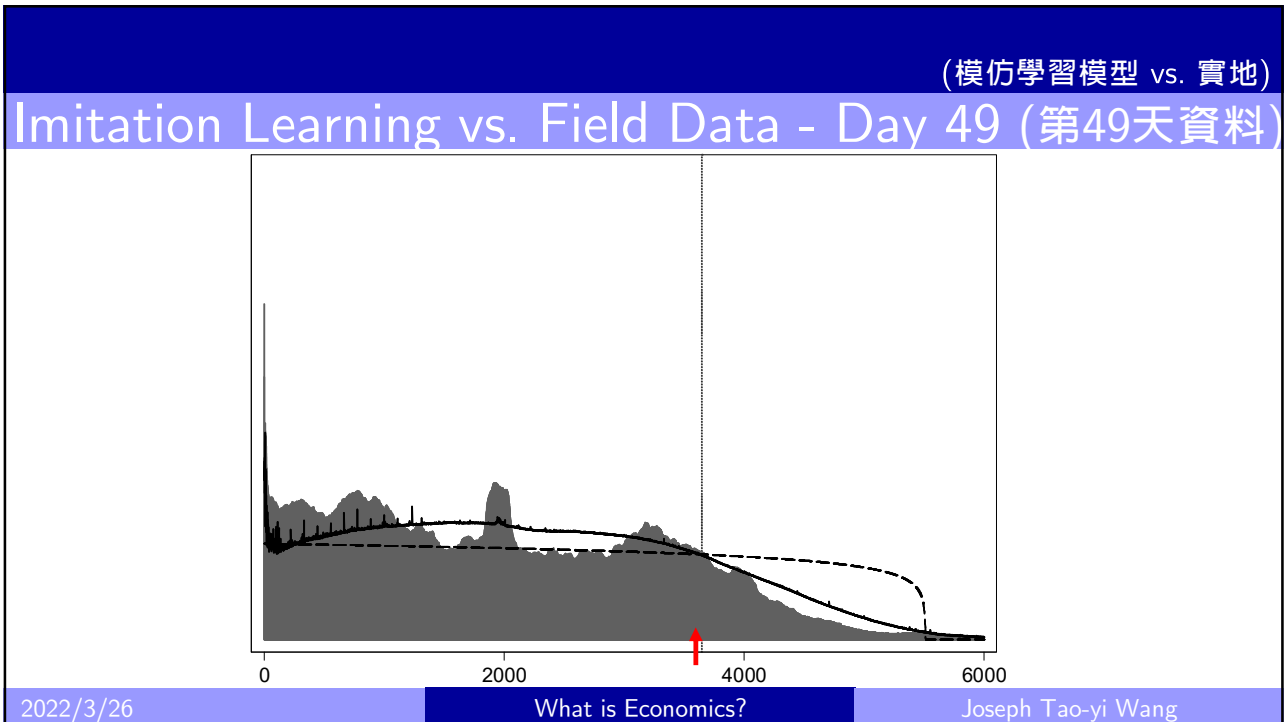
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Economic Lessons of the LUPI Game (從LUPI 彩券看何謂經濟學)

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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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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Institution Design Anticipating Human Reaction

- ▶ 如何考慮「下有對策」來設計制度? 這也是「成功改變的三個必要條件」...
- ▶ To Push for Reform, You Need: (要推動改革, 你需要)
 1. Understand **Logic of Current System** (How it Works)
 - ▶ 瞭解現況的邏輯: 知道為甚麼現在是這樣的光景
 2. **Wisdom from God** (on How to **Fine Tune** the System)
 - ▶ 有從上帝而來的智慧: 知道突破點在哪裡、知道如何微調現有制度讓大家更好
 3. **Convince Key Person** (to Make the Change)
 - ▶ 說服有能力改變的人來改變: 這是比較容易的, 因為前兩者根本是互斥的!
- ▶ Note: 1 & 2 are mutually exclusive!

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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 **Policy**?
 - ▶ 那政策呢?



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What is an Economic Experiment? (甚麼是經濟學實驗?)

- ▶ **An Economic Experiment** constructs a **controlled environment** to observe how **people make economic decisions** under **real incentives**, to answer questions raised by the researcher, testing a hypothesis or which theory matches reality
- ▶ (經濟學實驗是建構一個控制的環境, 在有真實誘因的情況下, 觀察人們如何做決定/經濟決策, 為要回答研究者所提出的問題, 檢驗哪個假說或理論比較符合現實。)
- ▶ **4 Components of Controlled Environments:** (建構控制的環境有四大要素)
 1. **Real Consequences as Incentives** (真實後果或誘因)
 2. **A Treatment/Control Group Design** (對照組的設計)
 3. **Random Assignment** (隨機分組)
 4. **No Deception** (完全不欺騙受試者)

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