Structural, Black Box and Ad Hoc Models Used To Determine the Worklife Expectancy Of A Child With Blood Lead Levels

National Association of Forensic Economics Meetings

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Presenter

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My Colleagues

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Presentation Outline

- We present a case study
  - To provide
    - A guide for lawyers and forensic economists on what they should be on the lookout in cases involving “childhood blood lead levels.”
    - A guide to the role of structural, black box, and ad hoc models in FE’s work
- We outline:
  - Our assignment
  - Our approach
  - Our findings
- We draw implications for FE’s
- We suggest a new role for FE’s

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We're Looking for Feedback

- We welcome feedback all aspects our analysis. In particular, we would like to identify:
  - Challenges economic experts face when they accept an assignment regarding the effects of childhood exposure to worklife expectancy and earnings
  - Potential hidden dangers in this type of analysis

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Our Assignment

- A plaintiff's economist claimed that the plaintiff would lose 22 years of worklife because of lead exposure at a young age.
- Our client felt the number was way too big.
- We framed two questions
  1. How does exposure to lead at a young age affect future adults' "earning capacity," "earnings," and "worklife"?
  2. In practice, do defense experts establish in a methodologically sound manner 'lead exposure' as the cause of reduced earnings and earnings capacity?

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Our Proviso

- We agree. “Lead” is bad.
  - It can and does have deleterious effects on childhood development.
  - However, the challenge for experts in a case like our sample one is to be able
    - (i) to sort out the “lead” and “non-lead” causes of “deficits” a child or young adult may have, and
    - (ii) to defend how we arrive at how those deleterious effects might influence the life-time earnings of a plaintiff.

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About the Plaintiff

- Robert Smith is a 21-year-old, right-handed, African American man with a history of elevated blood lead levels
  - His geometric mean blood lead level through age 5 was 11.8 µg/dL
  - He was age 1 in 1998 and age 5 in 2002.
  - 16 years later, Mr. Smith has cognitive & other deficits

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The Experts

Plaintiff's Experts	
Medical Assessment	Dr. Janet Jacobs
Neurological Assessment	Dr. Kevin Knight
Vocational Assessment	Mr. Marcus Martin
Economic Assessment	Dr. Lance Lucas
Defense Experts	
Neurological Assessment	Dr. William Wright
Vocational Assessment	Dr. Aaron Anderson
Economic Assessment	Dr. Baron Baptist

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The Sequence

- **Step 1.**
  - **Start with the medical and neuropsychological assessments.** Do they provide a sound numerical link between lead exposure and indicators such as IQ? Do they provide a sound, numerical link between lead exposure and worklife expectancy?
- **Step 2.**
  - **Move to the vocational assessment.** Does it provide a sound link between indicators such as IQ and the type of job that the plaintiff could expect to get?
- **Step 3**.
  - **Move to the economic analysis.** Does it provide sound estimates of the earnings from the plaintiff's job? Does it include a sound estimate of the worklife expectancy of the plaintiff, based on historical data?

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What We Looked For

- The internal consistency of each report
- The consistency of each report with the findings in the literature
- The consistency among the reports, and the final results must be compatible with the findings in the literature

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Our Lens Was Causation Models

- Econometric studies
  - longitudinal
  - cross-sectional
- Non-econometric studies
  - meta-analysis
  - Markov analysis

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Structural Models

- Structural models lay out the full flow of causation, i.e., all the steps are laid out. Based on our review, we could not find any published studies that determine the effects of blood level exposure on worklife expectancy as used by the plaintiff's economic expert.
- In particular, we are unable to determine:
  - whether those with lead blood levels have worklife expectancies different than those who don't; and
  - whether there are differences in worklife expectancy among those with varying levels of lead in their blood.

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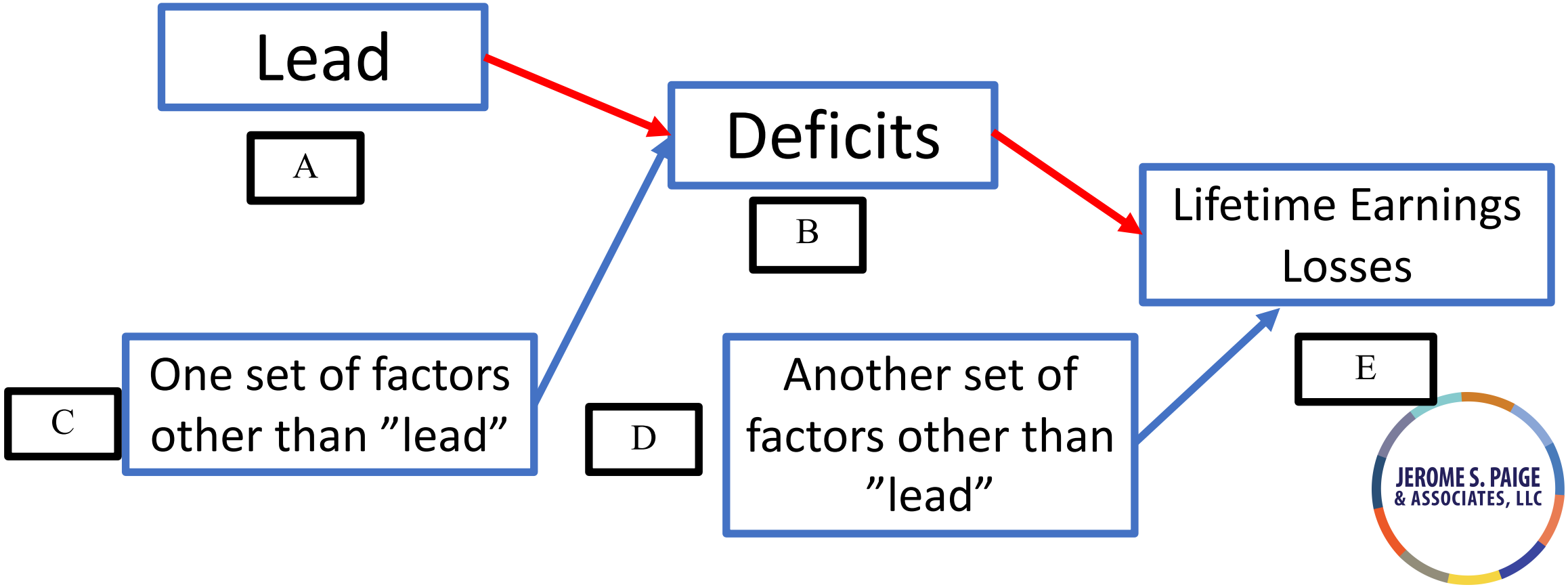
Lead & Earnings (Structural)



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Reduced Form

- “Reduced form” models are like a black box , i.e., they don’t show the flow of causation but just link an initial cause to the final effect.
- While reduced form models are not typically used to determine economic damages, it is the “black box” approach that undergirds the testimony of the plaintiff’s medical, vocational and economic experts in this case.
- Each expert asserts a link, but they never provide convincing evidence as to why their assertions hold.

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Lead & Deficits (Reduced Form/Black Box)

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Ad Hoc

- Not a “model”
- Since we know something about lead, it must be true for Mr. Smith

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Several Methodological Flaws

- Population
- Omission of non-lead factors
- Inappropriate model
- “Cherry-picking”

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It All Boiled Down to the Plaintiff's Medical Expert

Plaintiff's Experts	
Medical Assessment	Dr. Janet Jacobs
Neurological Assessment	No Opinion
Vocational Assessment	Silent
Economic Assessment	Recants
Defense Experts	
Neurological Assessment	No
Vocational Assessment	No
Economic Assessment	No foundation laid

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Our Findings

- Collectively the plaintiff's experts failed to distinguish between a structural and black-box approach.
  - The misspecification of the relationship among factors is the fundamental flaw in the defense's case to establish a link between lead and deficits.
- The plaintiff's neuropsychological, vocational, and economic experts don't establish and link lead and Mr. Smith's "deficits."
- Nothing in the medical defense expert's report supports their conclusions that there is a sound link between the "level of lead exposure" and "deficits."
- Their analyses lack the necessary formal models to link "lead blood levels" to "employment, earnings/earnings capacity and worklife expectancy outcomes."

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Implications for FE's

- Remember
  1. Your role and tread carefully if you advertently take on the task of a causation expert in personal injury and wrongful death cases
  2. Stick with the assumptions you're given and be wary of going beyond them.
  3. Make sure the given assumptions don't undermine the credibility of your analysis.
  4. Be vigilant that the assumptions we make fit our expertise
  5. "To sort and defend"

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New Role for FE's

- Our client was charting new ground in commissioning our report.
  - This is not the type of work adjusters want to pay for
  - Fortunately, the cost was spread over five cases
- Our case study suggests a new role for the FE
  - To tie all the strings of the case together.
  - In PI and WD cases, to position ourselves as the expert that creates the overall storyline

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Our Case Study Adds Value

- A guide for lawyers and forensic economists on what they should be on the lookout for as plaintiff or defense experts in cases involving “childhood blood lead levels.”
- A review of the role structural, black box, and ad hoc models FE’s use

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Wait! Wait! There's More!

- August 28, 2020 Maryland Court of Appeals Decision in Stanley Rochkind v Starlena Stevenson

  https://mdcourts.gov/data/opinions/coa/2020/47a19.pdf

- Suit was first filed in December 2011
  - The key issue is whether the "deficits" of the plaintiff were caused by lead in their blood at an early age.
  - Study relied upon
    - EPA Integrated Science Assessment for Lead (2013) https://perma.cc/K28Z-F58P
  - Possible new hearing on the link between blood lead levels and deficits

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- Specialty Ice Cream

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