Estimating the Lost Earnings of a Child

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Something for Everyone

What This Presentation is About

- **Introduces a method of combining FTEUS & PINC-04 earnings data to estimate all earnings, not just full-time, year-round earnings.**
- **Compares three approaches to estimating the lost earnings of a child:**
  - **Spizman-Kane model.**
  - **Range based on high-school diploma and Bachelor's degree.**
  - **Estimate based on the age-earnings curve for all levels of education.**
- **Compares results based on front-loading of WLE with those based on explicit calculation of probability of labor-force participation.**

Calculation Methodolgy

- **Calculations are based on age-earnings curves represented by a quadratic function of age, starting at youngest age in the published WLE tables and end at age 84.**
- **No adjustment for the risk of unemployment – doesn't affect relative comparisons.**
- **Except for front-loading results, earnings at each age are multiplied by the probability of being an active labor force participant.**
- **Spizman-Kane results are the average of Model I & Model II equations evaluated at the sample means of the independent variables.**

Combining FTEUS & PINC-04 Data to Estimate All Earnings, Not Just FTYR

- **FTEUS sample size >> PINC-04 sample size.**

  (3,395,729 vs 167,216: a 20 to 1 ratio)

- **PINC-04 has data for persons with all earnings; FTEUS only has full-time, year-round earnings.**

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- **PINC-04 has data for persons with all earnings; FTEUS only has full-time, year-round earnings.**

- **Combine FTEUS and PINC-04 by multiplying FTEUS data by the PINC-04 ratio of all persons with earnings to full-time, year-round earnings for each age bracket.**

Why All Persons with Earnings and Not FTYR?

- **Absent a legal decision that specifies a methodology, FTYR arguments based on earnings capacity fall flat.**
- **The best anyone can do is to estimate the expected present value of the lost earnings – all earnings, not just FTYR, are part of the expected value.**
- **The resulting loss estimate should reflect:**
  - **What employers would be willing and able to pay (demand).**
  - **What the child would be willing and able to provide (supply).**
- **If we knew exactly what would have happened but for the child's injury, we would include all earnings, not just FTYR.**

Ratio of FTYR Present Values to All Earnings Present Values

FTYR Divided by All Earnings

Net Discount Rate	All Males			All Females		
	Average of HS & Bachelor's	Average of S-K Model I & II	All Ed Levels	Average of HS & Bachelor's	Average of S-K Model I & II	All Ed Levels
0.25%	1.11111	1.09164	1.13311	1.20634	1.21190	1.23164
0.50%	1.11114	1.08421	1.13345	1.20609	1.21205	1.23260
0.75%	1.11127	1.07731	1.13391	1.20592	1.21230	1.23369
1.00%	1.11151	1.07091	1.13447	1.27893	1.21265	1.23489
1.25%	1.11184	1.06498	1.13515	1.20584	1.21309	1.23622
1.50%	1.11228	1.05952	1.13593	1.20593	1.21361	1.23766
1.75%	1.11280	1.05449	1.13681	1.20610	1.21423	1.23921
2.00%	1.11342	1.04988	1.13779	1.20634	1.21494	1.24087

FTYR only overstatement relative to all earnings is greater for females.

CORRECTED

The Three Approaches

- **Spizman-Kane model.**

Educational Attainment Model for a Minor Child: The Next Generation
John Kane, Lawrence Spizman, and Don Donelson
Journal of Forensic Economics 24(2), 2013, pp. 175-190

- **Range based on high-school diploma and Bachelor's degree.**
- **Estimate based on age-earnings curve for all levels of education.**

CORRECTED

Spizman-Kane Model

- **Ordered probit model that estimates the probability of achieving specific levels of educational attainment.**
- **RHS variables are**:
  - Demographic (Hispanic/Black/Urban/Rural)
  - Mother's years of schooling
  - Father's years of schooling
  - Both biological parents present in household at child's age 12
  - Mother's age at first birth
  - Religion (Baptist/Protestant/Catholic/Jewish/None/Other)
  - Number of siblings
  - Income-to-poverty ratio (excluded in Model II)

Advantages and Disadvantages of Spizman-Kane

- **Advantages**
  - **Results are more specific to the child.**
  - **Considers all levels of educational attainment.**

Advantages and Disadvantages of Spizman-Kane

- **Disadvantages**
  - **Required data may not be available, particularly when on defense.**
  - **Must be prepared to answer questions about the model.**
  - **Cannot use median earnings. (To be explained later.)**
  - **Calculations are complex and may be difficult to explain to a jury.**
    (Probably underestimates the capabilites of juries.)
  - **Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.**

Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.

Educational Attainment Category	S-K	PINC-04	FTEUS	S-C-K WLE
None to 6th Grade	N	N	Y	N
7th to 9th Grade	N	N	Y	N
10th to 12th Grade	N	N	Y	Y
None to 9th Grade	N	N	N	Y
Less than 9th Grade	N	Y	N	N
9th to 12th Grade	N	Y	N	N
Less than High School Diploma	Y	N	N	N
GED	Y*	N	Y	Y
High School	Y*	N	Y	Y
GED & High School Combined	N	Y	N	N
Less than 1-year of college	N*	N	Y	N
1 or more years of college, no degree	N*	N	Y	N
Some college, no degree	N*	Y	N	Y
Associate degree	Y	Y	Y	Y
Bachelor's Degree	Y	Y	Y	Y
Master's Degree	Y	Y	Y	Y
Ph.D. Degree	Y	Y	Y	N
Professional Degree	Y	Y	Y	N
PhD & Professional Degree Combined	N	N	N	Y

*GED & HS include Some College, No Degree for Spizzmzn-Kane model.

Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.

Educational Attainment Category	S-K	PINC-04	FTEUS	S-C-K WLE
None to 6th Grade	N	N	Y	N
7th to 9th Grade	N	N	Y	N
10th to 12th Grade	N	N	Y	Y
None to 9th Grade	N	N	N	Y
Less than 9th Grade	N	Y	N	N
9th to 12th Grade	N	Y	N	N
Less than High School Diploma	Y	N	N	N

PINC-04 & FTEUS data, and WLE data, need to be combined into less than high school.

For PINC-04 & FTEUS, and for each age bracket, sum the products of mean earnings times number of responses and divide by total responses.

For WLE, need to add relevant population counts found in the supplemental data and recalculate the transition probabilities. The recalculated transition probabilities should be used to either calculate the corresponding WLE or the explicit probability of being an active labor force participant.

"SCK_2012_2017_Transit_Probabilities" from supplemental material.

Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.

Educational Attainment Category	S-K	PINC-04	FTEUS	S-C-K WLE
GED	Y*	N	Y	Y
High School	Y*	N	Y	Y
GED & High School Combined	N	Y	N	N
Less than 1-year of college	N*	N	Y	N
1 or more years of college, no degree	N*	N	Y	N
Some college, no degree	N*	Y	N	Y

*GED & HS include Some College, No Degree for Spizzmzn-Kane model.

S-K probabilities, PINC-04 & FTEUS data and WLE data need to be combined into a GED & HS & some college category.

S-K probabilities for GED and HS can just be added.

For PINC-04 & FTEUS, and for each age bracket, sum the products of mean earnings times number of responses and divide by total responses.

For WLE, need to add relevant population counts found in the supplemental data and recalculate the transition probabilities. The recalculated transition probabilities should be used to either calculate the corresponding WLE or the explicit probability of being an active labor force participant.

"SCK_2012_2017_Transit_Probabilities" from supplemental material.

Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.

Educational Attainment Category	S-K	PINC-04	FTEUS	S-C-K WLE
Associate degree	Y	Y	Y	Y
Bachelor's Degree	Y	Y	Y	Y
Master's Degree	Y	Y	Y	Y

Mapping is consistent across data sources. No special handling is required.

Educational Attainment Category	S-K	PINC-04	FTEUS	S-C-K WLE
Ph.D. Degree	Y	Y	Y	N
Professional Degree	Y	Y	Y	N
PhD & Professional Degree Combined	N	N	N	Y

S-K probabilities and PINC-04 & FTEUS data need to be combined into a PhD and professional degree category.

S-K probabilities for PhD and professional degree can just be added.

For PINC-04 & FTEUS, and for each age bracket, sum the products of mean earnings times number of responses and divide by total responses.

Spizman-Kane educational categories do not directly match those of FTEUS or PINC-04 earnings data, or of WLE tables.

Cannot use median earnings with Spizman-Kane: must rely on mean earnings to overcome matching problem.

("sum the products of <u>mean</u> earnings times the number of responses and divide by total responses")

↗

Doesn't work with median.

Advantages and Disadvantages of Presenting Range Based on High School Diploma & Bachelor's Degree

- **Advantages**
  - **Calculations are relatively straightforward and easy to explain.**
  - **Provides a range of loss estimates that the jury can consider.**
  - **High school diploma and Bachelor's degree map directly to WLE.**
  - **Can use mean and median earnings.**

Advantages and Disadvantages of Presenting Range Based on High School Diploma & Bachelor's Degree

- **Disadvantages**
  - **Does not consider all levels of educational attainment.**
  - **Does not consider any available information concerning the child.**

Is the available information sufficient to use Spizman-Kane?

High School Diploma & Bachelor's Degree Range
Does Not Consider All Levels of Educational Attainment

- **Spizman-Kane Probabilities**

	Less Than High School	Greater Than Bachelor's Degree
Males	5.34%	3.80%
Females	4.60%	5.71%

- **Full-Time, Year-Round, Employed Population**

	Less Than High School	Greater Than Bachelor's Degree
Males	7.86%	13.57%
Females	4.13%	17.47%

High School Diploma & Bachelor's Degree Range
Does Not Consider All Levels of Educational Attainment

- **Spizman-Kane Probabilities**

	Less Than High School	Greater Than Bachelor's Degree
Males	5.34%	3.80%
Females	4.60%	5.71%

Possible overstatement of present value of earnings for males.

Possible understatement of present value of earnings for females.

- **Full-Time, Year-Round, Employed Population**

	Less Than High School	Greater Than Bachelor's Degree
Males	7.86%	13.57%
Females	4.13%	17.47%

Probable understatement of present value of earnings for both males and females.

High School Diploma & Bachelor's Degree Range
Does Not Consider All Levels of Educational Attainment

	All Males with Earnings		All Females with Earnings	
Net Discount Rate	Average of HS & Bachelor's Divided by Avg S-K Models	Average of HS & Bachelor's Divided by All Ed Levels	Average of HS & Bachelor's Divided by Avg S-K Models	Average of HS & Bachelor's Divided by All Ed Levels
0.25%	1.06867	0.90419	1.05789	0.96528
0.50%	1.06954	0.90463	1.05942	0.96385
0.75%	1.07038	0.90509	1.06095	0.96247
1.00%	1.07121	0.90559	1.06250	0.96114
1.25%	1.07201	0.90611	1.06404	0.95986
1.50%	1.07279	0.90666	1.06560	0.95863
1.75%	1.07355	0.90722	1.06716	0.95744
2.00%	1.07429	0.90782	1.06873	0.95631

Very little variation as NDR increases.

Possible understatement did not occur

6 to 8 percent greater than S-K for males.

5 to 7 percent greater than S-K for females.

9 to 10 percent smaller than All Ed for males.

3 to 5 percent smaller than All Ed for females.

High School Diploma & Bachelor's Degree Range
Does Not Consider All Levels of Educational Attainment

Net Discount Rate	All Males with FTYR Earnings: Average of HS & Bachelor's Divided by Avg S-K Models	All Males with FTYR Earnings: Average of HS & Bachelor's Divided by All Ed Levels	All Females with FTYR Earnings: Average of HS & Bachelor's Divided by Avg S-K Models	All Females with FTYR Earnings: Average of HS & Bachelor's Divided by All Ed Levels
0.25%	1.05817	0.88663	1.05304	0.94545
0.50%	1.05888	0.88681	1.05420	0.94311
0.75%	1.05957	0.88702	1.05537	0.94080
1.00%	1.06022	0.88726	1.05653	0.93852
1.25%	1.06085	0.88751	1.05769	0.93627
1.50%	1.06144	0.88778	1.05885	0.93406
1.75%	1.06200	0.88807	1.06001	0.93186
2.00%	1.06254	0.88837	1.06117	0.92970

Very little variation as NDR increases.

Possible understatement did not occur

5 to 8 percent greater than S-K for males.

5 to 6 percent greater than S-K for females.

About 11 percent smaller than All Ed for males.

5 to 7 percent smaller than All Ed for females.

Advantages and Disadvantages of Presenting Results Based on Persons with All Levels of Education

- **Advantages**
  - **Calculations are relatively straightforward and easy to explain.**
  - **Considers all levels of educational attainment.**
  - **All education category maps directly to WLE.**
  - **Can use mean and median earnings.**

Advantages and Disadvantages of Presenting Results Based on Persons with All Levels of Education

- **Disadvantages**

  Is the available information sufficient to use Spizman-Kane?

  – **Does not consider any available information concerning the child.**

  – **Only provides a single point estimate of the earnings loss, unless calculations extend past front-loaded WLE.**

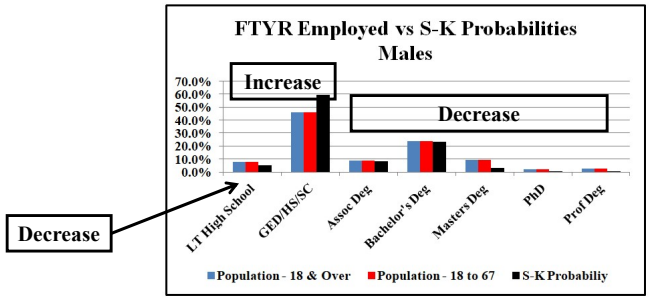
  What information is available that will allow a jury to pick from a range that they couldn't use to modify a point estimate?

  Extending losses beyond front-loaded WLE just provides jury with an even greater overstatement of the loss.

  – **Assumes current distribution by educational attainment is representative of the future.**

Basing Estimates on All Levels of Education

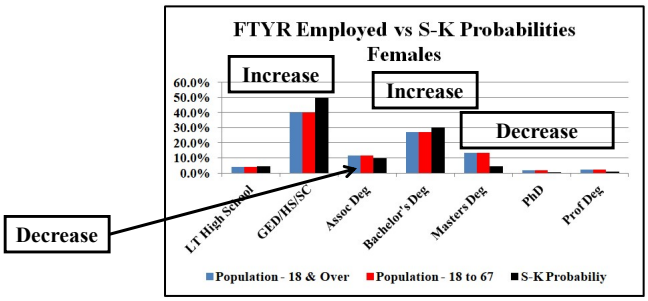
Assumes current distribution by educational attainment is representative of the future.



Most significant difference is in GED/HS/SC & Masters

Results Based on All Levels of Education

Assumes current distribution by educational attainment is representative of the future.



Most significant difference is in GED/HS/SC & Bachelor's & Masters

Difference Between All Levels of Education & Spizman-Kane

Net Discount Rate	All Ed Levels Divided by Avg S-K Models — All Persons w/ Earnings: Males	All Ed Levels Divided by Avg S-K Models — All Persons w/ Earnings: Females	All Ed Levels Divided by Avg S-K Models — FTYR Earnings: Males	All Ed Levels Divided by Avg S-K Models — FTYR Earnings: Females
0.25%	1.18192	1.09594	1.19348	1.11379
0.50%	1.18230	1.09916	1.19403	1.11779
0.75%	1.18262	1.10233	1.19452	1.12177
1.00%	1.18288	1.10546	1.19494	1.12574
1.25%	1.18309	1.10854	1.19531	1.12968
1.50%	1.18324	1.11159	1.19561	1.13361
1.75%	1.18333	1.11459	1.19586	1.13752
2.00%	1.18338	1.11756	1.19605	1.14141

Front Loading of WLE versus Explicit Calculation of Probability of Labor Force Participation

Front Loading Present Value Divided by Present Value Based on Probability of LF Activity - Males

Net Discount Rate	All Males with Earnings: Average of S-K Model I & II	Average of HS & Bachelor's	High School Diploma
0.25%	1.0279	1.0531	1.0318
0.50%	1.0351	1.0575	1.0408
0.75%	1.0421	1.0616	1.0494
1.00%	1.0487	1.0656	1.0576
1.25%	1.0550	1.0693	1.0655
1.50%	1.0610	1.0728	1.0731
1.75%	1.0668	1.0761	1.0803
2.00%	1.0723	1.0792	1.0872

For Males Front Loading Overestimates Across the Board

Net Discount Rate	All Males with FTYR Earn: Average of S-K Model I & II	Average of HS & Bachelor's	High School Diploma

Front Loading Present Value Divided by Present Value Based on Probability of LF Activity – Females

Net Discount Rate	All Females with Earnings: Average of S-K Model I & II	Average of HS & Bachelor's	High School Diploma	Bachelor's Degree	All Education Levels
0.25%	1.0031	1.0479	0.9805	1.0775	1.0422
0.50%	1.0159	1.0571	0.9976	1.0832	1.0535
0.75%	1.0283	1.0659	1.0143	1.0887	1.0645
1.00%	1.0404	1.0745	1.0307	1.0938	1.0752
1.25%	1.0522	1.0827	1.0467	1.0987	1.0856
1.50%	1.0636	1.0906	1.0622	1.1032	1.0957
1.75%	1.0746	1.0982	1.0774	1.1075	1.1054
2.00%	1.0853	1.1055	1.0920	1.1115	1.1148

Net Discount Rate	All Females with FTYR Earnings: Average of S-K Model I & II	Average of HS & Bachelor's	High School Diploma	Bachelor's Degree	All Education Levels
0.25%	0.9909	1.0311	0.9800	1.0547	1.0346
0.50%	1.0045	1.0413	0.9977	1.0615	1.0468
0.75%	1.0178	1.0511	1.0150	1.0679	1.0586
1.00%	1.0307	1.0000	1.0318	1.0740	1.0700
1.25%	1.0432	1.0697	1.0483	1.0798	1.0811
1.50%	1.0553	1.0785	1.0642	1.0853	1.0918
1.75%	1.0670	1.0870	1.0797	1.0904	1.1021
2.00%	1.0784	1.0951	1.0947	1.0952	1.1121

For Females Front Loading Overestimates In All But a Few Instances

Main Conclusions

- **Restricting analysis to FTYR earnings overstates the loss.**
- **Spizman-Kane considers all levels of education, but does not match up with PINC-04, FTEUS or S-C-K WLEs.**
  - Can't use median earnings data.
  - Required data about the child may not be available.
- **High School / Bachelor's range does not consider all levels of education.**
  - 5 to 8 percent greater than S-K for both males and females.
  - 10 percent smaller than all education levels for males.
  - 5 percent smaller than all education levels for females.

Main Conclusions

- **A/E curve for All Levels of Education**
  - Some variation in the population distribution compared to S-K.
  - Assumption that current population distribution is representative of the future is no more of a stretch than assuming S-K or A/E curves represent the future.
  - Produces results that are greater than S-K and a range based on HS and Bachelor's.
- **Front loading overstates the loss across the board for males and females, with just a few exceptions for females for low NDRs.**
  - Overstatement increases with increases in the NDRs.