Worklife and Earning Capacity

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Overview

- Earnings losses in personal injury cases last through worklife expectancy (WLE).

  Losses may reflect expected earnings or earning capacity.

- Expected earnings are reduced by chance of voluntary & involuntary non-employment.

  Earning capacity is not reduced by chance of voluntary non-employment, beyond retirement.

- Worklife expectancy should be reduced only by relevant chances of non-employment.

- WLE shorter & simpler when reduced only by involuntary non-employment & retirement.

History of WLE in Forensic Economics

1970s: WLE $=$ retirement age, to age 66 or so typically.

1980s: WLE represents chance or probability of employment or labor force participation.

Voluntary non-employment:

1. retirement
2. stay-at-home parent or spouse
3. trust funds, independently wealthy

Involuntary non-employment:

1. death
2. unemployment
3. disability
4. imprisonment

Worklife Models in Forensic Economics, 1980s

1. Brookshire and Cobb (1983, For the Defense), LPE method.
2. Generalized ("increment-decrement") Life Tables

   From demography literature on marriage and divorce:
   Rogers (1973), Schoen & Nelson (1974), Schoen (1975)

   Applied to labor force participation by BLS:
   Shirley Smith (1982, 1986)

More Worklife Research in Forensic Economics

LPE (Life, Participation, Employment) Method:

Baker and Seck (1987)
Brookshire (1987), Altmann (1999)
Brookshire and Barrett (2009), Ireland (2010)
Skoog and Ciecka (2016)

Generalized ("Increment-Decrement") Life Tables:

Nieswiadomy and Silberberg (1988)
Nieswiadomy and Slottje (1988)
Skoog and Ciecka (2000, 2001a, 2001b, 2002)
Millimet, Nieswiadomy, Ryu, and Slottje (2003)
Skoog, Ciecka, and Krueger (2011), Skoog and Ciecka (2016)

Worklife & Earning Capacity

What is Earning Capacity?

1. "The monies that a person is able to earn that results from skills and training." (Black's Law Dictionary, 1910).
2. The "maximal amount of net current earnings which is attainable" given a person's human capital and hours worked. (Weiss 1986).
3. "The expected earnings of a worker who chooses to maximize the expectation of actual earnings." (Horner and Slesnick 1999, 2016).

Earning capacity is not reduced by voluntary non-employment.

Worklife Model

Worklife Expectancy Table/Schedule:

$\text{Prob}_t(\text{work}_{t+h}), h = 1, 2, ...$

t is "current" year,
h is a future "horizon".

Worklife Expectancy:

$$\text{WLE}_t = \sum_{h=1}^{\infty} \text{Prob}_t(\text{work}_{t+h})$$

Interpretation: Expected number of remaining work years.

Earnings Loss Applications

"Front Loaded" Loss Model:

$$Loss = \sum_{h=1}^{\mathrm{WLE_t}} \frac{E_t[\text{earnings}_{t+h}|\text{work}]}{(1 + r_{t,h})^h}$$

"Actuarial" Loss Model:

$$Loss = \sum_{h=1}^{\infty} \frac{Prob_t(\text{work}_{t+h}) E_t[\text{earnings}_{t+h}|\text{work}]}{(1 + r_{t,h})^h}$$

Discount rate(s): $r_{t,h}$.

Putting Earning Capacity in the WLE Model

Assumptions:

1. No work after "normative retirement",

   T_R = years to normative retirement age,

   $\mathrm{Prob}_t(\mathrm{work}_{t+h}) = 0$ for $h > T_R$.

2. Chance of work pre-retirement reflects only involuntary non-employment.

   $$\mathrm{Prob}_t(\mathrm{work}_{t+h}) = 1 - \mathrm{Prob}_t(\text{can't work}_{t+h}),$$

   for $h = 1, 2, \ldots, T_R$.

Note: Compatible with a Generalized (Increment-Decrement) Life Table of employment, and with modified LPE formula.

Earning Capacity Loss Applications

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"Actuarial" Loss Model:

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Earning Capacity and “Collateral Source”

Measuring economic loss in terms of earning capacity makes plaintiff’s voluntary non-work and reliance on spouse (or other) a sort of “collateral source”.

Worklife expectancy may represent the chance of employment, assuming no such “collateral sources”.

Modelling Work Probability, Earning Capacity Framework

$\mathrm{Prob}_t(\mathrm{work}_{t+h}) = 1 - \mathrm{Prob}_t(\text{can't work}_{t+h}),$

event "can't work" composed of sub-events: dead, disabled, etc.

probability of "can't work" is sum of sub-event probabilities.

Example:

$$\begin{aligned}\mathrm{Prob}_t(\text{can't work}_{t+h}) = &\ \mathrm{Prob}_t(\text{death}_{t+h}) + \mathrm{Prob}_t(\text{disabled}_{t+h}) \\ &+ \mathrm{Prob}_t(\text{unemployed}_{t+h})\end{aligned}$$

Estimate via Life Tables, demographics, work history,
and counts/forecasts of disabled, unemployed.

Normative Retirement Age

"Retirement" became normal in 20th century.

Facilitated by: government, labor unions, firms.

Normative retirement age: normal time to retire.

Examples:

- Social Security "full benefits" age
- Medicare benefits age
- pension "normal retirement" age
- median retirement age of some cohort (Gilbert (2015))

Earnings Beyond Retirement?

Earlier, assumed no chance of work past normal retirement.

If retirement is sometimes voluntary, does this assumption fit in an earning capacity framework, for earnings loss calculations?

Yes, so long as either of the following hold:

1. Earning capacity losses "count" only in years before normal retirement.
2. Retirement funds are not a "collateral source", and extra earnings post-normal-retirement not counted as losses.

Linear Model of Worklife in Two Frameworks

Earnings expectation framework, worklife: WLE_e
Earning capacity framework, worklife WLE_c.

- linearly declining chance of work & employability.
- $P_0(\mathrm{employable}_t) = \beta_c \left(1 - \frac{t-1}{T_R}\right)$
- $P_0(\mathrm{work}_t) = \beta_w \left(1 - \frac{t-1}{T_R}\right)$,
- for some constants β_c, β_w: $\beta_c \geq \beta_w$.

$$\rightarrow \mathrm{WLE}_c = \beta_c \left(\frac{T_R+1}{2}\right).$$

$$\rightarrow \mathrm{WLE}_e = \beta_w \left(\frac{T_R+1}{2}\right).$$

Let $\beta_c = 0.95$ and $\beta_w = 0.8$, retire at age 67.

Table 1: Worklife in a Linear Probability Model

age, start	T_R		WLE_e
20	47	19.2	16.00
30	37	15.2	12.67
40	27	11.2	9.33
50	17	7.2	6.00
60	7	3.2	2.67

WLE_c

Pattern: worklife expectancy similar across frameworks at older staring ages, less so at younger ages.

Extended Model – Linear Trend With Intercept

- $P_0(\text{employable}_t) = \alpha_c + \beta_c \left(1 - \frac{t-1}{T_R}\right)$
- $P_0(\text{work}_t) = \alpha_w + \beta_w \left(1 - \frac{t-1}{T_R}\right)$,

Table 2: Worklife in a Linear Probability Model With Intercepts

age, start	T_R	WLE_c	WLE_e
20	47	40.0	29.5
30	37	31.5	23.3
40	27	23.0	17.0
50	17	14.5	10.8
60	7	6.0	4.5

Extended Model, Now with Added Heterogeneity

- $\alpha_c(T_R) = \gamma_{c1} + \gamma_{c2} T_R$
- $\beta_c(T_R) = \delta_{c1} + \delta_{c2} T_R$,
- $\alpha_w(T_R) = \gamma_{w1} + \gamma_{w2} T_R$,
- $\beta_w(T_R) = \delta_{w1} + \delta_{w2} T_R$.

Table 3: Worklife in a Linear Probability Model With Intercepts and Heterogeneity

age, start	T_R	α_c	β_c	α_w	β_w	WLE_c	WLE_e
20	47	0.678	0.339	0.509	0.254	40.0	30.0
30	37	0.629	0.314	0.471	0.236	29.2	21.9
40	27	0.579	0.289	0.434	0.217	19.7	14.8
50	17	0.529	0.265	0.397	0.198	11.4	8.5
60	7	0.479	0.240	0.359	0.180	4.3	3.2

Conclusions

1. Worklife and earning capacity are related, in personal injury cases subject to earning capacity standard.
2. In earning capacity framework, worklife expectancy may represent chance of involuntary non-employment, until normative retirement.
3. Chances of "can't work" can be modelled in terms of death, disability, unemployment.
4. Normative retirement can be modelled via institutionalized retirement systems, profession data on retirement ages.
5. Calculating worklife expectancy (WLE), in earning capacity framework, is feasible.
6. WLE can be much larger/longer in earning capacity framework than in expected earnings framework, at younger starting ages.

Future Research: Application to Personal Injury Cases

1. Apply WLE, in earning capacity framework, using real-world data and statistics.

   Mortality: use Life Tables.
   Disability: use Disabled Workers data, SSA.
   Unemployment: use historical data, surveys.

2. Compare results to Generalized (Increment-Decrement) Life Tables and LPE method.

   "Best" method: most accurate in representing worklife under conditions relevant to given personal injury case.