

A DURATION MODEL OF SOCIAL SECURITY DISABILITY PROGRAM ENTITLEMENT

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Main Issues

- ▣ What explains the increase in the number workers on the Disability Insurance (DI) program over time?
 - Both entitlements onto the rolls, and duration of stay on the program determine the number. I study only the determinants of new entrants in this paper.
- ▣ Hypothesized reasons:
 - DI policy changes in 1984
 - Economic conditions:
 - a) Increased unemployment rates,
 - b) Falling earnings of workers leading to increasing replacement of DI benefits as a ratio of potential earnings
 - Health of the future generations is deteriorating (due to obesity and others)

Plan of this presentation

- ▣ Previous work
- ▣ Major DI Policy Changes
- ▣ Aggregate Time Trends in DI Entitlements
- ▣ Growth Accounting:
 - The time trend of the DI entitlements by: Age group, Gender, Race and cohort
 - Time trend of the individual incentives (a) DI benefits replacement rate and (b) Unemployment rate
- ▣ A counting process model of first DI entitlement
- ▣ Parameter estimates
- ▣ Conclusion

Previous Work

- ▣ Autor and Duggan (2006), Duggan and Imberman (2007)
- ▣ Lahiri, Kajal, Jae Song and Bernard Wixon (2008)
- ▣ Rupp, Kalman and Paul S. Davies (2004)

Changes in Disability Policy and Economic environment

- ▣ 1960 - extended benefits to age less than 50, and to widow and widowers
- ▣ 1972 - waiting period reduced from 6 months to 5 months, extended Medicare benefits if stayed on the program for 24 or more months
- ▣ 1978 - tightened the review process, disallowed benefits to incarcerated felons.
- ▣ 1984 - DI eligibility rule changes making it easier to qualify particularly for two groups: musculoskeletal and mental disorder.

Figure 1: Number of workers (in millions) covered, insured and on the rolls.

Figure 1: Number of workers (in millions) Covered, Insured, and on the Rolls

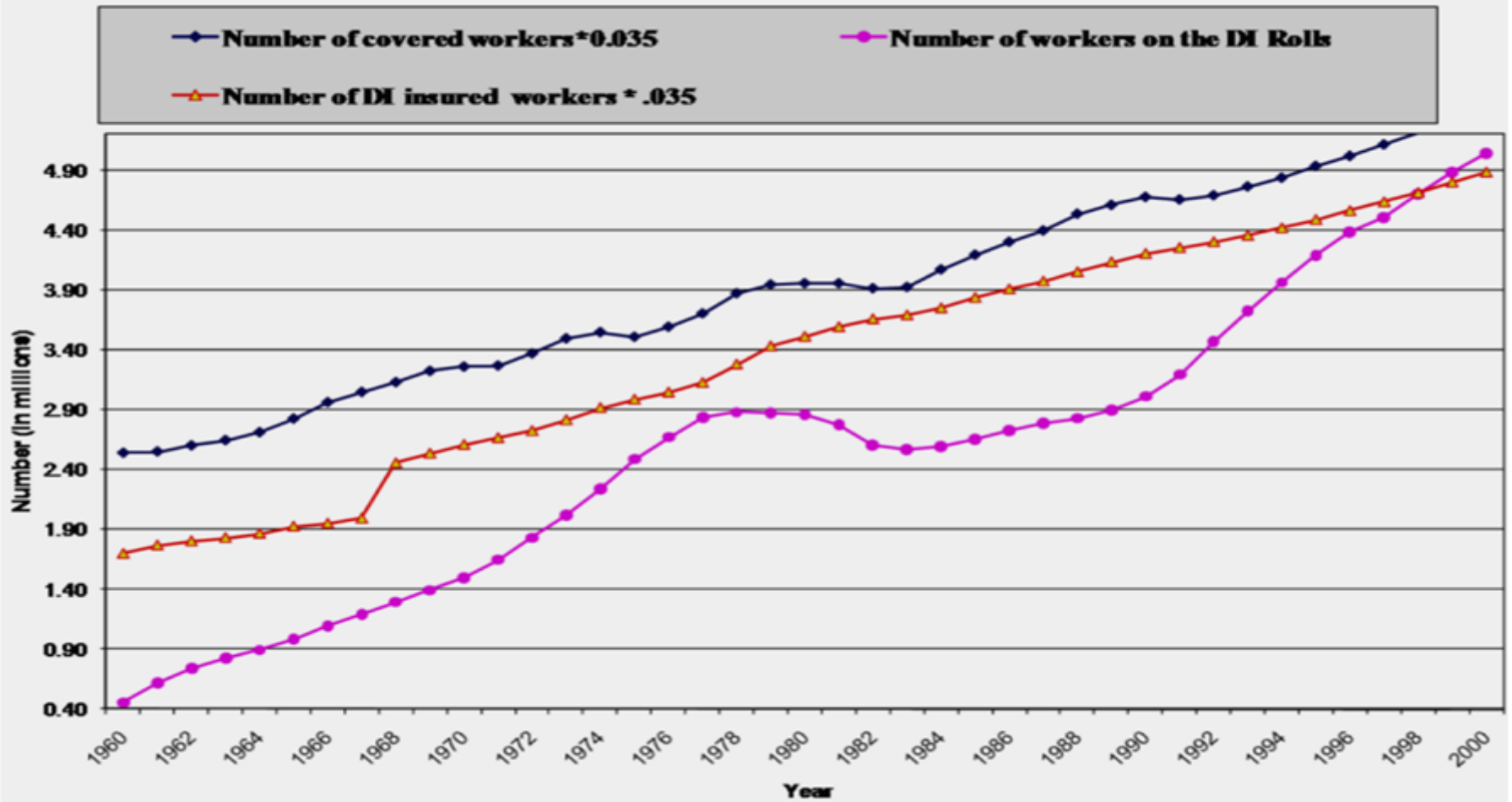
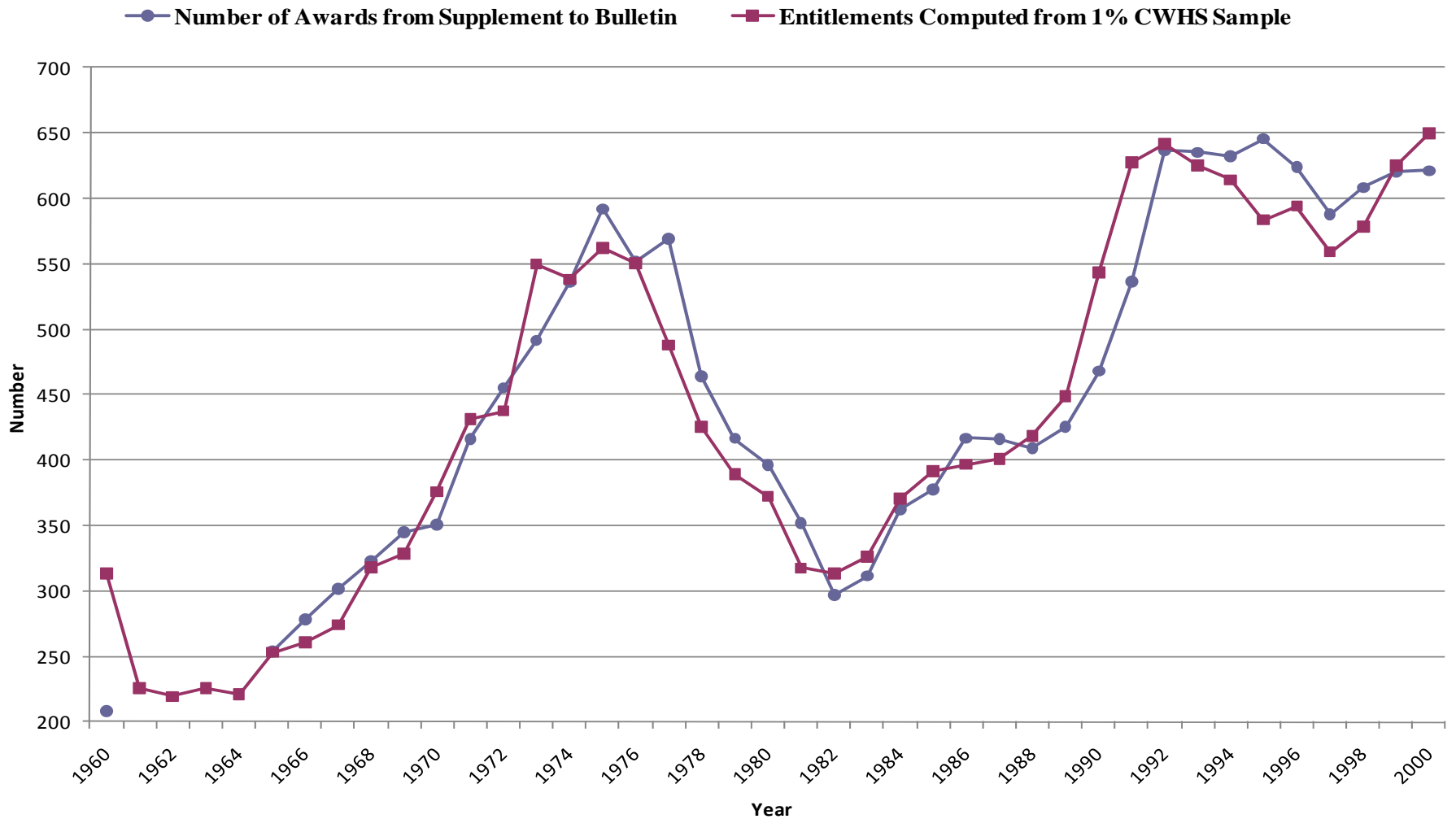


Figure 3: Number of Disability Awards and Entitlements over Time

Figure 3: Comparison of published disability awards data with entitlements tabulated from the CWHS sample.



Accounting of growth in the new entrants onto the rolls

- ▣ P_t Size of Working Population in time t
- ▣ $h_t(a)$ Disability hazard rate at age a and time t
- ▣ $\pi_t(a)$ Proportion of disability insured population of age a in period t
- ▣ N_t Number of new entitlement onto the DI Rolls

$$N_t = P_t \sum_a h_t(a) \cdot \pi_t(a)$$

Growth in new entrants in terms of growth of its components

$$g_N = g_P + \sum_a [g_h(a) + g_\pi(a)] \cdot w_t(a), \text{ where } w_t(a) = \frac{h_t(a) \pi_t(a)}{\sum_a h_t(a) \cdot \pi_t(a)}$$

Figure 4: The proportion of never disabled disability insured workers entitled to disability benefits

Figure 4: The proportion of DI insured never disabled workers entitled to DI rolls over time for the Overall, Black and Female workers

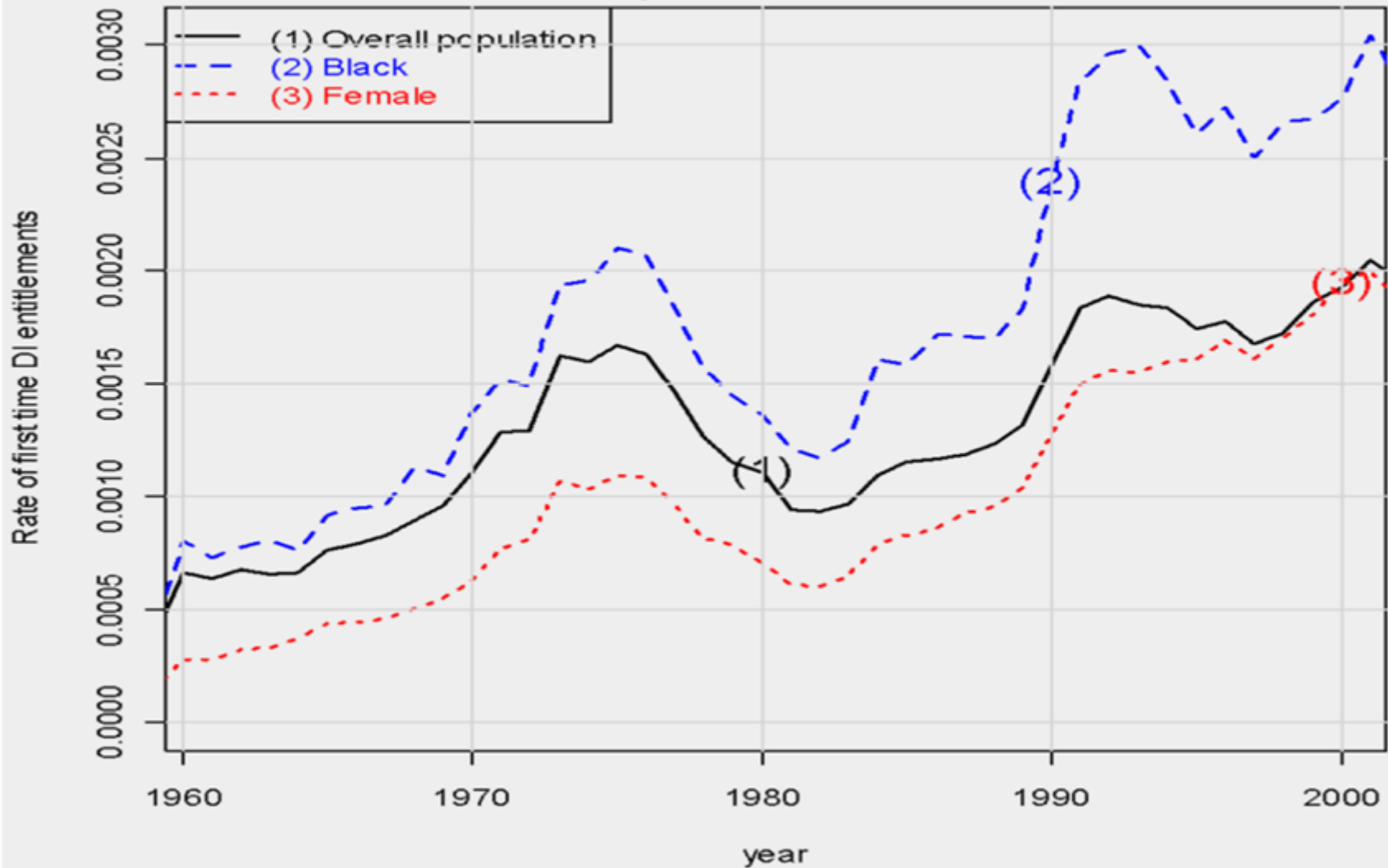


Figure 5: The proportion of never disabled disability insured workers entitled to disability benefits by age group

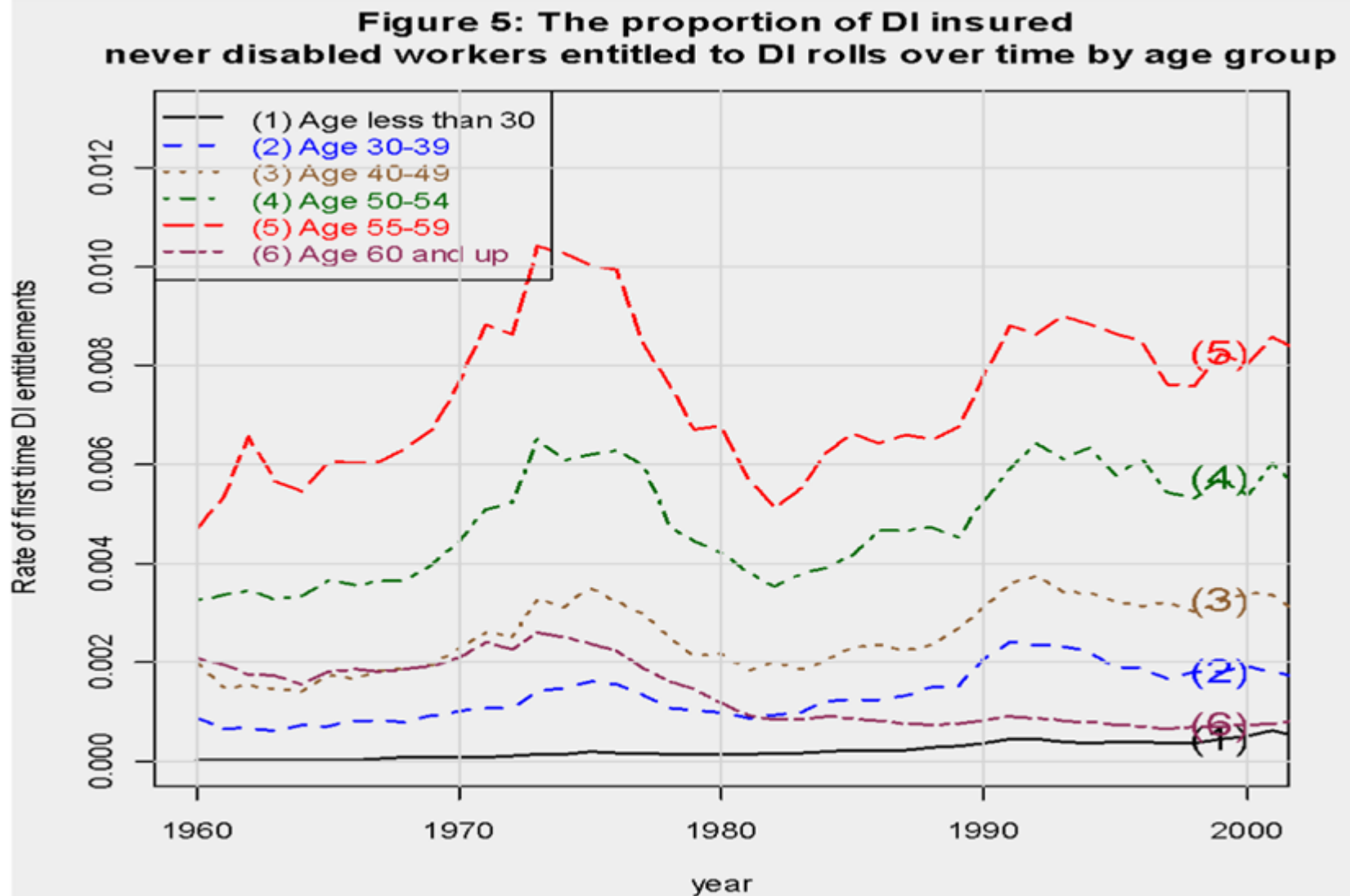
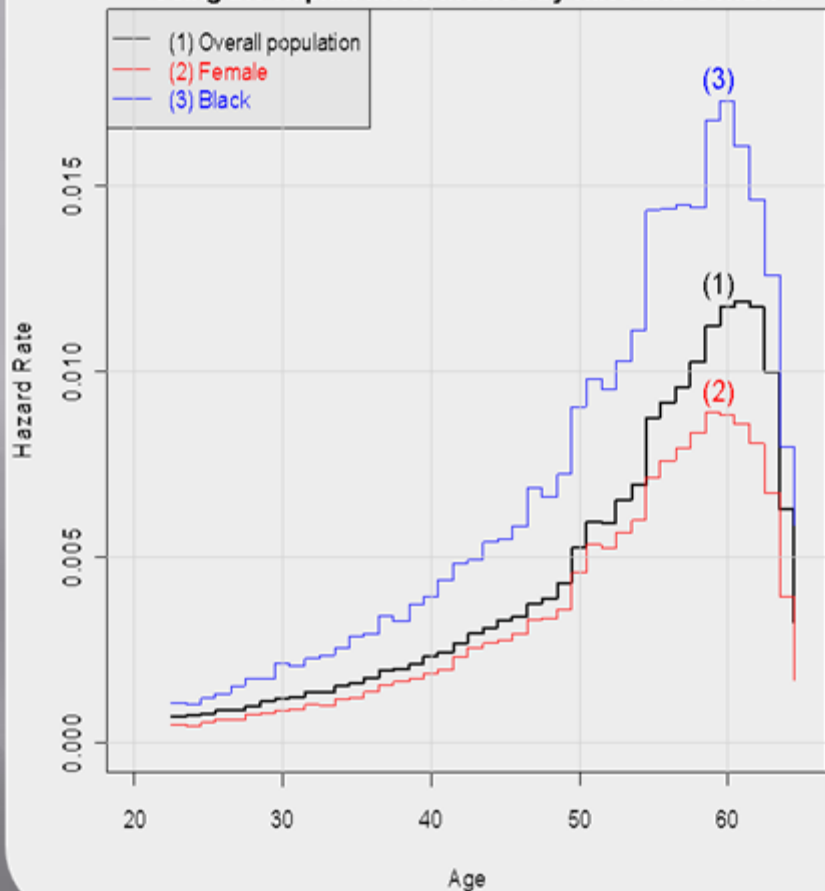
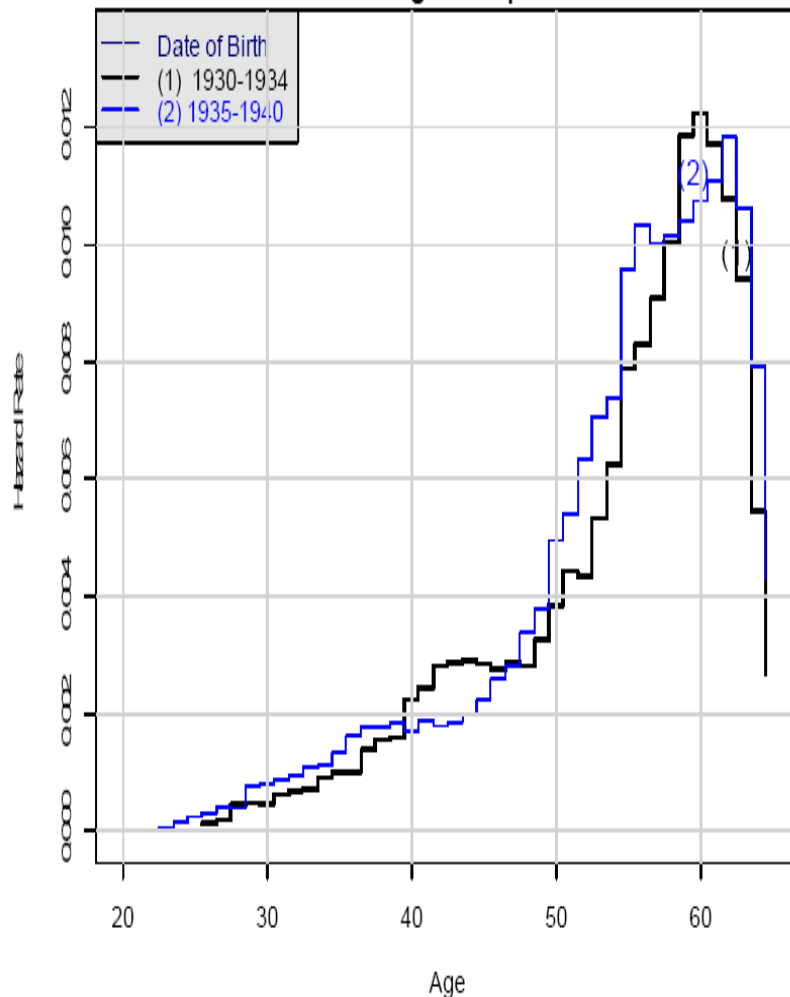


Figure 7: The estimated age specific hazard rate of the first entitlement to the disability program for two cohorts

Figure 6: Estimated Hazard Rate of the First Time Disability Entitlement for Cohorts Born in or After 1930 Using the Kaplan-Meier Method by Race and Gender

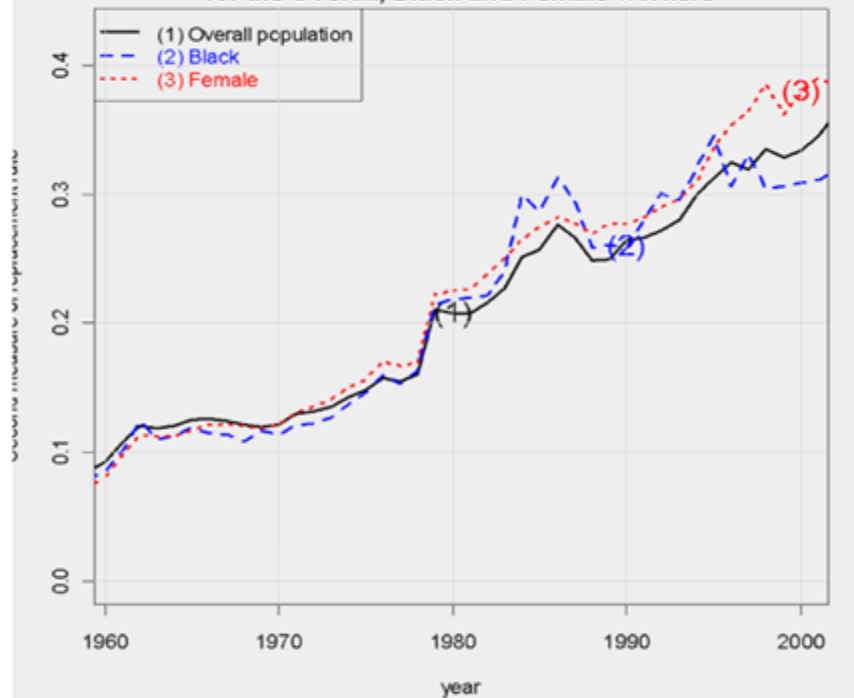


and 1930-1940 using the Kaplan-Meier method



Replacement rate and unemployment Rate over Time

Figure 14. The second measure of replacement rate over time for the Overall, Black and Female workers



Unemployment Rate

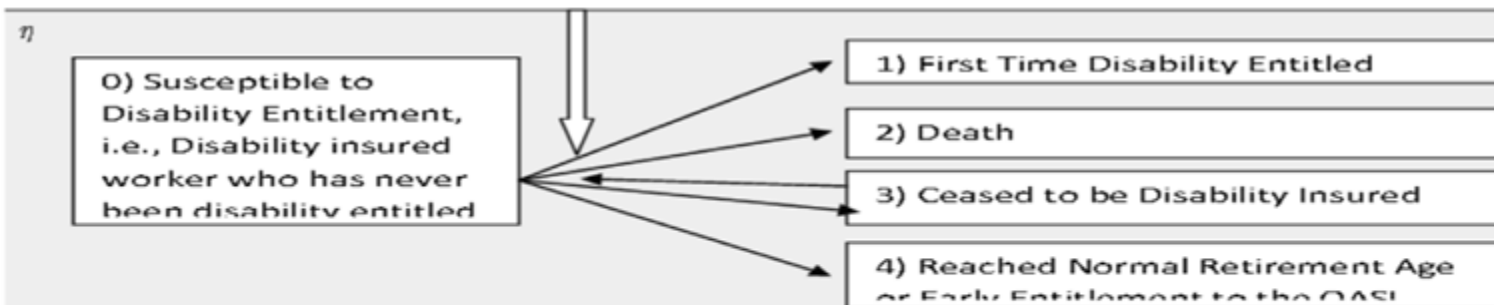


Counting Process Model of First Time Disability Entitlement

Chart 1 : A Schematic Representation of the Disability Entitlement Model

Characteristics determining the likelihood of receiving disability health shocks and incentives to get into the disability roll

- Age, Sex, Race.
- Policy Rule changes.
- Economic conditions over the life cycle – unemployment, replacement rate.



Note: In the above, case 4) is treated as censored

$$N_i^c(t) = E_i^c(t) + M_i^c(t), \quad \text{i.e., Data = Model + Error as in Regression}$$

$$E_i^c(t) = f(t; \vec{X}_i(t), \eta_i) = \lambda_0^c(t) \cdot \exp^{X_i(t)' \beta^c}$$

Parameter Estimates from the Counting Process Model

Effects of Time varying covariates for Cohorts Born after 1930

Variables	Without Time varying covariates				With Time Varying covariates replacement rate of non-employment rate			
	Parameter Estimate	Standard Error	Pr > ChiSq	Hazard Ratio	Parameter Estimate	Standard Error	Pr > ChiSq	Hazard Ratio
Year of Birth	0.0037	0.0010	0.0003	1.0040	-0.0048	0.0011	<.0001	0.9950
Dummy variable for Race, = 1 if Black, = 0 otherwise	0.5667	0.0076	<.0001	1.7620	0.6624	0.0077	<.0001	1.9390
Dummy variable for Sex, = 1 if Female, = 0 otherwise	-0.3999	0.0060	<.0001	0.6700	-0.1898	0.0060	<.0001	0.8270
Policy Dummy, = 1 on or after 1984, = 0 otherwise					0.2132	0.0195	<.0001	1.2380
Replacement Rate with respect to average positive earnings of past five years					0.0001	0.0001	0.0146	1.0000
Average number of years not working over the past three years					2.3757	0.0150	<.0001	10.7590
n (percent censored)	2,016,406 (94.23)							

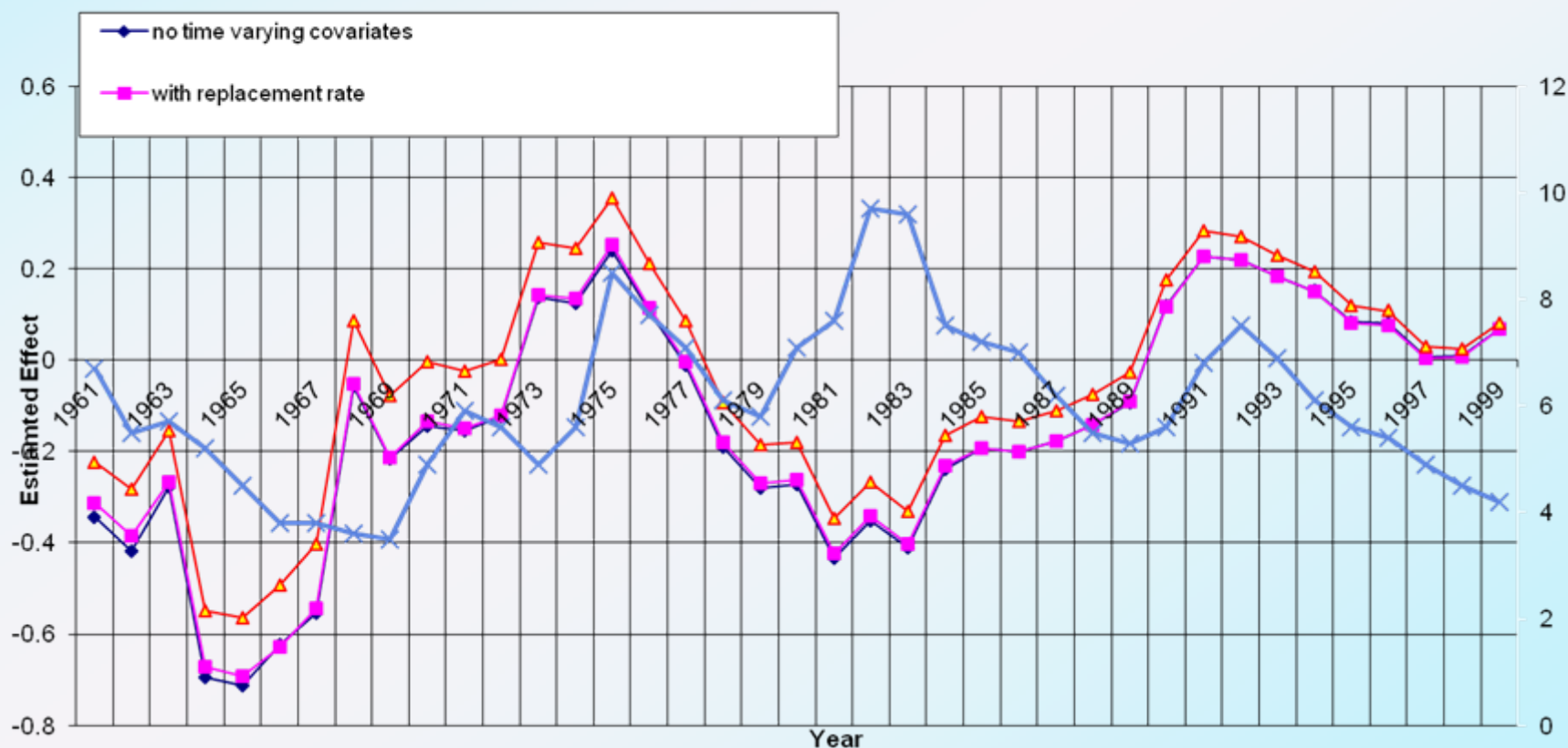
Parameter Estimates with More detailed policy dummies

Variables	With Year Dummies *				With dummies for major policy years *			
	Parameter Estimate	Standard Error	Pr > ChiSq	Hazard Ratio	Parameter Estimate	Standard Error	Pr > ChiSq	Hazard Ratio
Year of Birth					-0.01916	0.00196	<.0001	0.981
Dummy variable for Race, = 1 if Black, = 0 otherwise	0.65953	<.0001	1.934	1.83	0.66266	0.01083	<.0001	1.94
Dummy variable for Sex, = 1 if Female, = 0 otherwise	-0.18839	<.0001	0.828	0.76	-0.18217	0.00854	<.0001	0.833
Aggregate Unemployment Rate 1 year earlier					-0.02272	0.00745	0.0023	0.978
Aggregate Unemployment Rate 2 years earlier					-0.01259	0.01006	0.2106	0.987
Aggregate Unemployment Rate 3 years earlier					-0.05489	0.00751	<.0001	0.947
Policy Dummy, = 1 on or after 1972, = 0 otherwise					0.61823	0.04634	<.0001	1.856
Policy Dummy, = 1 on or after 1978, = 0 otherwise					-0.26191	0.03402	<.0001	0.77
Policy Dummy, = 1 on or after 1984, = 0 otherwise					0.40625	0.03124	<.0001	1.501
Replacement Rate with respect to average positive earnings of past five years	0.0000976	0.3044	1	1	0.000187	0.0000743	0.0119	1
Average number of years not working over the past three years	2.37286	0.01729	10.728	10.15	2.38311	0.0212	<.0001	10.839
n (percent censored)	1,491,566 (93.33)							

Notes : * based on full sample of the 50 percent CWS data

Effects of Policy and Economic Environment on First time Disability incidence rate

Figure 18: Cox Regression Estimates of Year Dummies with and without Time varying Individual Characteristics



Conclusion

- ▣ (Robust) Females have lower and blacks have higher propensity to get onto the DI rolls.
- ▣ The effect of policy change of 1984 is exaggerated in the academic research. Its effect depends on the reference groups and controlling for other policy changes.
 - The effects after 1984 high relative to the DI tightening period, 1980-1984
 - Relative to 1976 (i.e., right after 1972 policy change), the effects are comparable or rather lower. (Based on the yearly dummy effects of the Cox regression)
- ▣ Replacement rate is might be capturing other time effects
- ▣ (Robust) Non-employment duration over the past three years has most significant positive effect. However, the estimated effect might have endogeneity bias since it might be correlated with disability health status.
- ▣ Year of birth capturing the left-over aggregate health status of cohorts is not robust across model specifications.
- ▣ Thank you....