Meyer Mok 2019

- Research Question: How does becoming disabled change economic and material well-being of households?

Meyer Mok 2019

- Research Question: How does becoming disabled change economic and material well-being of households?
- Why it is important?
  - As a measure of the safety net for disabled households. How well are we insuring against disability?
  - Understanding the labor market opportunities/outcomes of those with a disability.
  - Considering variation among the disabled population.

Meyer Mok 2019

- How do they do it?
- Longitudinal data (PSID) with individual effects
- (Measure pre- and post- disability outcomes)

$$y_{it} = \alpha_i + \gamma_t + X_{it}\beta + \sum_g \sum_k \delta_k^g A_{kit}^g + \varepsilon_{it},$$

Meyer Mok 2019

- What do they find? Lots of things! But lets go through a few:
- Rates of disability decrease from 15% around 1970 to 12.5% recently.
- Among disabled, 17% are chronic severe, 27% are chronic not-severe, 30% are temporary and 25% are one-time.

Meyer Mok 2019

- Percent with zero hours worked

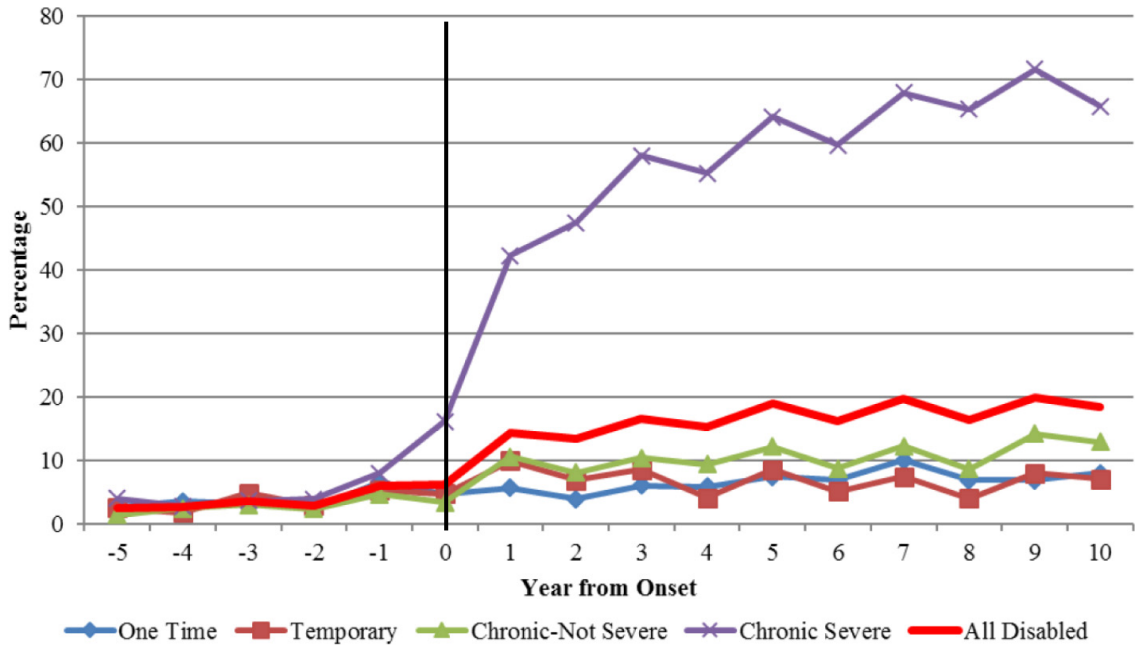


Fig. 2. Percentage of disabled with zero hours of work before and after disability onset, extent of disability groups and all disabled (without controls).

Meyer Mok 2019

- Change in annual earnings:
- Note that average drop in income declines from 25% drop to 15% when taxes included, and 10% when transfers included.

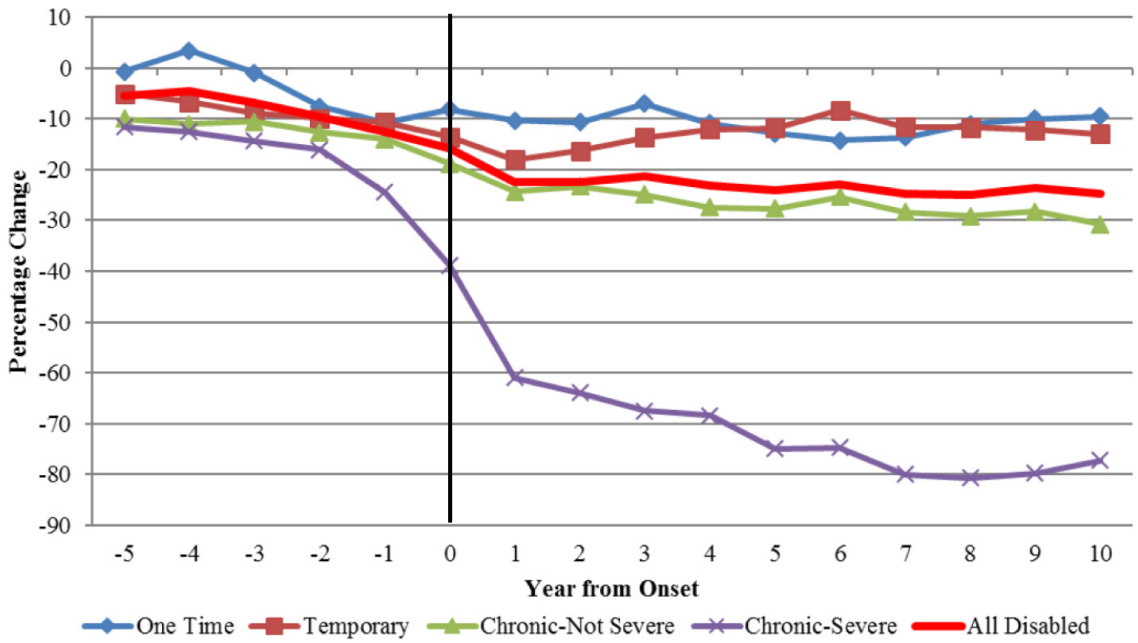


Fig. 3. Percent change in annual earnings before and after disability onset, extent of disability groups and all disabled. Note: The estimates in this figure are from a fixed effects Poisson model.

Meyer Mok 2019

- Change in Food plus Housing Consumption:

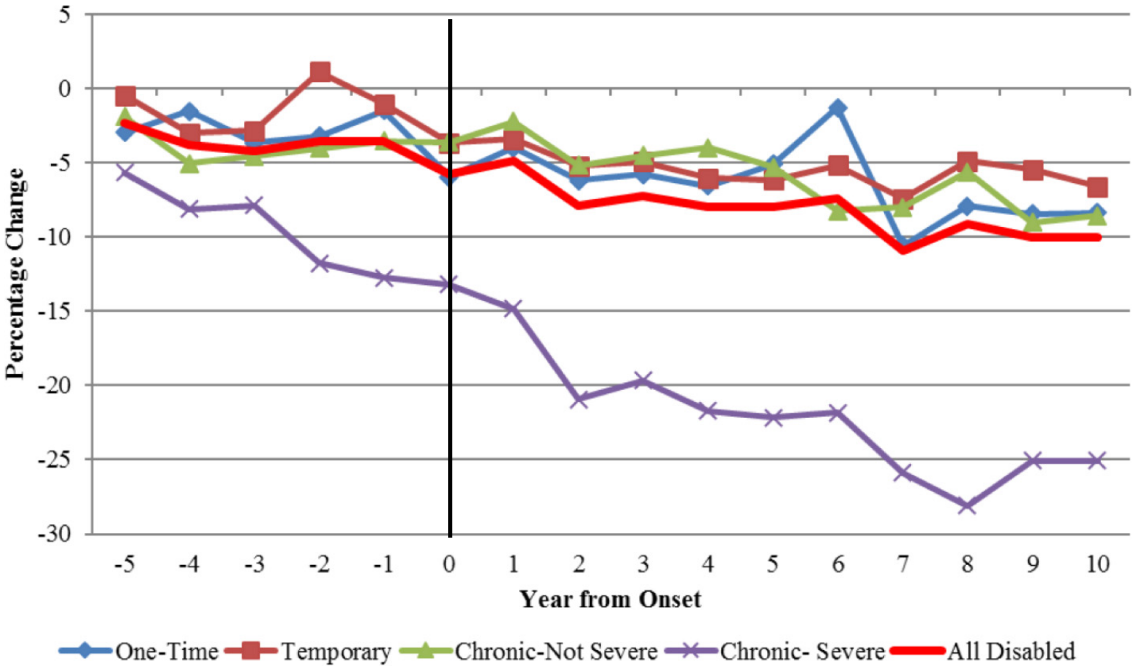


Fig. 9. Percentage change in food plus housing consumption before and after disability onset, extent of disability groups and all disabled. Note: The estimates in this figure are from a fixed effects Poisson model.

Meyer Mok 2019

- Provide evidence nutrition declines with food consumption drop (not just substitution to cooking more or better shopping)
- Time-use survey evidence finds that the disabled watch more TV (15 hrs/week more), obtain medical care (1.3 hours/wk), sleep more (6.6 hrs/wk), and relax more (2.5 hrs/wk).

Meyer Mok 2019

- Optimal Disability Benefits Evidence:
- Fit their results into Baily-Chetty model using an 18% drop in consumption.
- Find that optimal DI benefits would be higher than current rate (taking some assumed values of risk aversion and benefit elasticity)

Gruber 2000

- Question: What is the elasticity of labor force participation w.r.t. DI benefit generosity?

Gruber 2000

- Question: What is the elasticity of labor force participation w.r.t. DI benefit generosity?
- Use natural experiment in Canada where disability benefits raised in all provinces but Quebec.
- How did LFP respond to this increase in generosity?

Gruber 2000

- Why is this important?

Gruber 2000

- Why is this important?
- The more elastic LFP response to DI generosity, the larger the DWL from increasing benefits and lower optimal DI generosity.
- If LFP response is inelastic, can set DI benefits closer to full consumption smoothing.

Gruber 2000

- How does he measure the LFP elasticity?

Gruber 2000

- How does he measure the LFP elasticity?
- In Jan 1987, benefits raised by 36 percent in non-Quebec.
- Policy also introduced an early retirement option (so he excludes workers 60 and over)
- Data comes from the Canadian Survey of Consumer Finances, uses 1985-1989 men aged 45-59 (cross-section).

Gruber 2000

Change in the "flat-rate" or lump-sum portion of Canadian DI benefits:

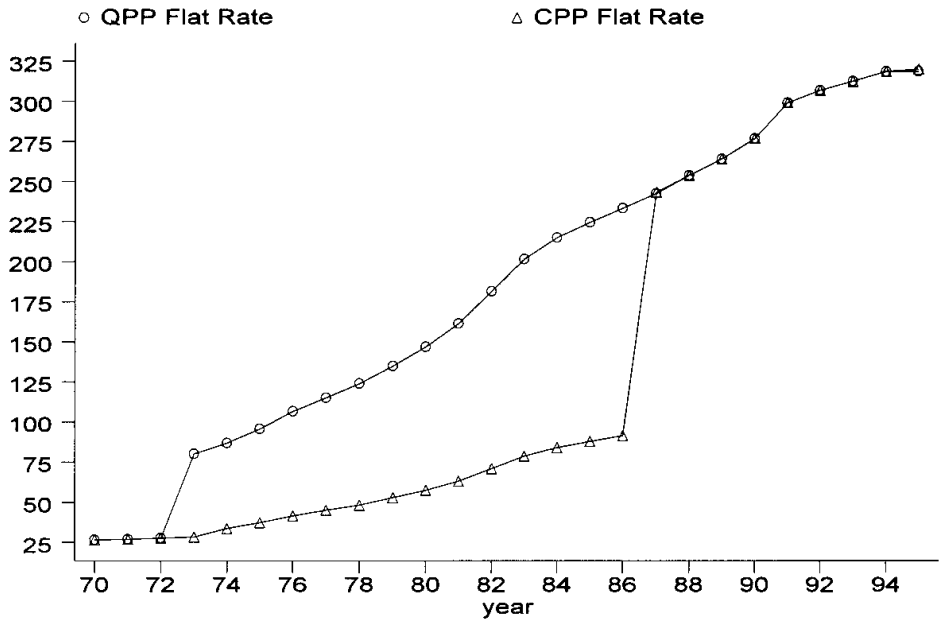


FIG. 1.—Flat-rate portion in Quebec and the rest of Canada

Gruber 2000

- How does he measure the LFP elasticity?

Gruber 2000

- How does he measure the LFP elasticity?
- Empirical strategy: Diff-in-diff. Before/After, Quebec/Non-Quebec.
- Controls for other covariates.

Gruber 2000

- Comparison of means:
- We can see the increase in benefits
- Evidence of LFP response.

TABLE 1
MEANS

	CPP		QPP		DIFERENCE IN DIFFERENCE
	Before (1)	After (2)	Before (3)	After (4)	(5)
Benefits	5,134	7,776	6,878	7,852	1,668 (17)
Replacement rate	.245	.328	.336	.331	.088 (.003)
Not employed last week	.200	.217	.256	.246	.027 (.013)
Married?	.856	.856	.817	.841	−.024
Any kids < 17?	.367	.351	.354	.336	.002
Less than 9 years of education	.303	.274	.454	.421	.004
9–10 years of education	.202	.199	.179	.178	−.002
11–13 years of education	.246	.254	.169	.187	-.010
Postsecondary education	.249	.273	.198	.214	.008
Number of observations	11,349	18,059	2,134	3,113	

NOTE.—Based on author's tabulations. QPP refers to Quebec; CPP refers to the remainder of Canada. Before is 1985–86; after is 1987–89. Standard deviations are in parentheses.

Gruber 2000

- Running the DID in a logistic regression, the policy led to a 2.3 percent increase in non-employment (11.5% from base value)
- Implied elasticity from the 36% benefit increase: 0.36 (coincidence)

TABLE 2
DIFFERENCE-IN-DIFFERENCE MODEL
(34,655 Observations)

Variable	Estimate
Married	−.952
	(.035)
Less than 9 years of education	1.291
	(.041)
9–10 years of education	.835
	(.045)
11–13 years of education	.390
	(.046)
CPP region	−.173
	(.058)
After policy change	−.005
	(.068)
CPP region × after policy change	**.150**
	(.075)
Implied probability effect	.023
Arc elasticity	.36

NOTE.—Table presents logistic estimation of eq. (1). Standard errors are in parentheses. Regressions also include a full set of dummies for age and number of children.

MMS 2013

- Research Question What is the causal effect of SSDI benefit receipt on employment and earnings?
- This is a primary question of the DI program but tough to estimate. (National program, no RCT or clear, easy eligibility cutoffs or criteria.)

MMS 2013

- How do they do it?
- Uses novel approach: variation in examiner leniency.
- Applicants randomly assigned to examiner. Some examiners are more lenient than others.
- Administrative records tracking DI applications and earnings matched with application examiners (2005 and 2006).

Labor force participation relative to initial decision:

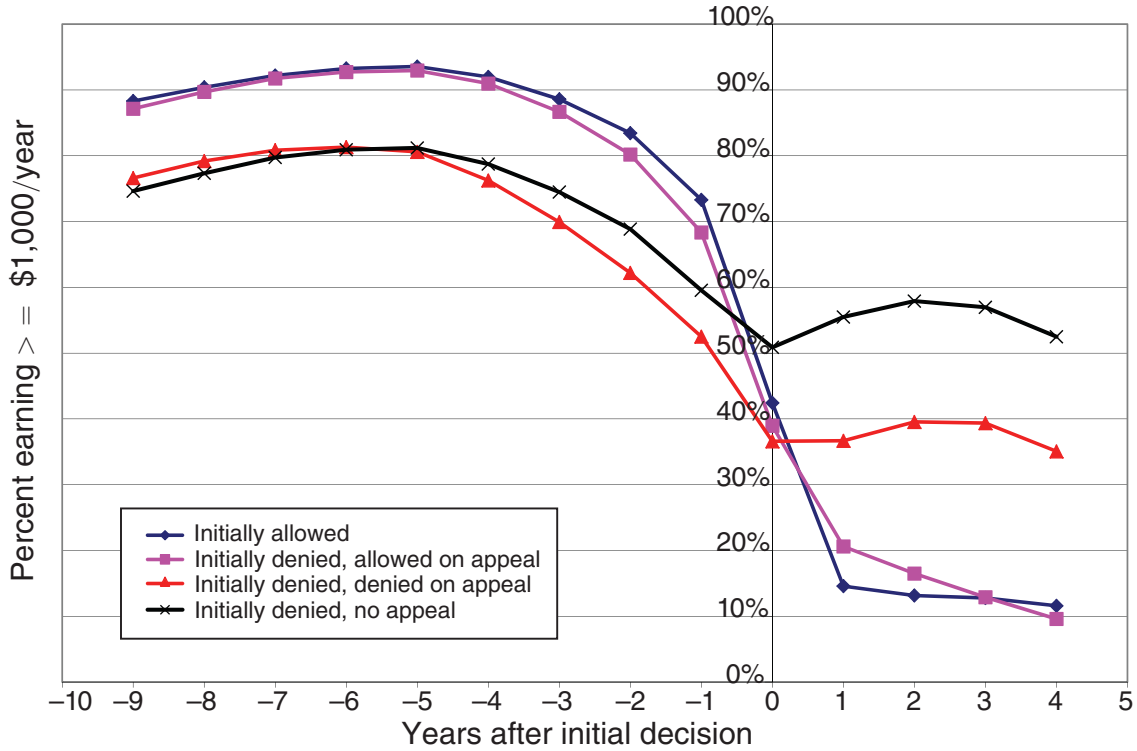


FIGURE 2. EMPLOYMENT BEFORE AND AFTER INITIAL DECISION, 2005 DECISIONS

MMS 2013

- Look at similarity between allowed and allowed in appeal.
- Does this indicate that the current marginally denied applicant is in fact disabled?

MMS 2013

- Empirical strategy: trying to estimate impact of receiving DI benefits on earnings.
- But we imagine that severity of disability is related to both earnings and DI receipt (also unobserved to econometrician).
- Examiners review application, determine severity and decide whether to accept or reject applicant.

MMS 2013

- If examiners systematically vary in their leniency, we can use this as an IV to determine effect of DI on earnings.
- We still can't observe severity directly, but will construct the examiner effect "*EXALLOW*" as the rate of DI acceptances: $\approx \frac{\#Allowed}{\#Cases}$

How DI receipt and employment vary with our instrument (examiner effects):

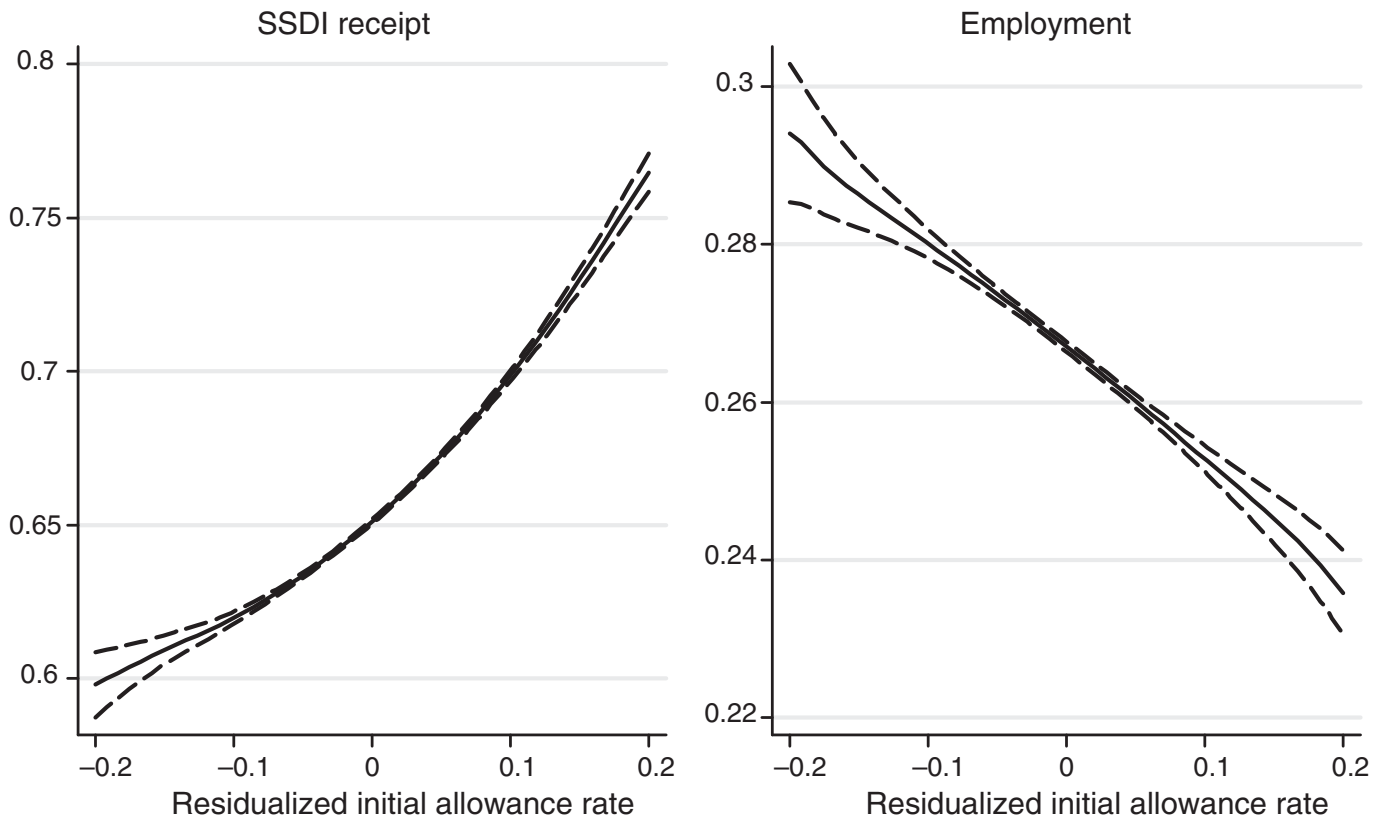


FIGURE 4. SSDI RECEIPT AND LABOR SUPPLY BY INITIAL ALLOWANCE RATE

Relationship between examiner leniency and allowance rate (severity)

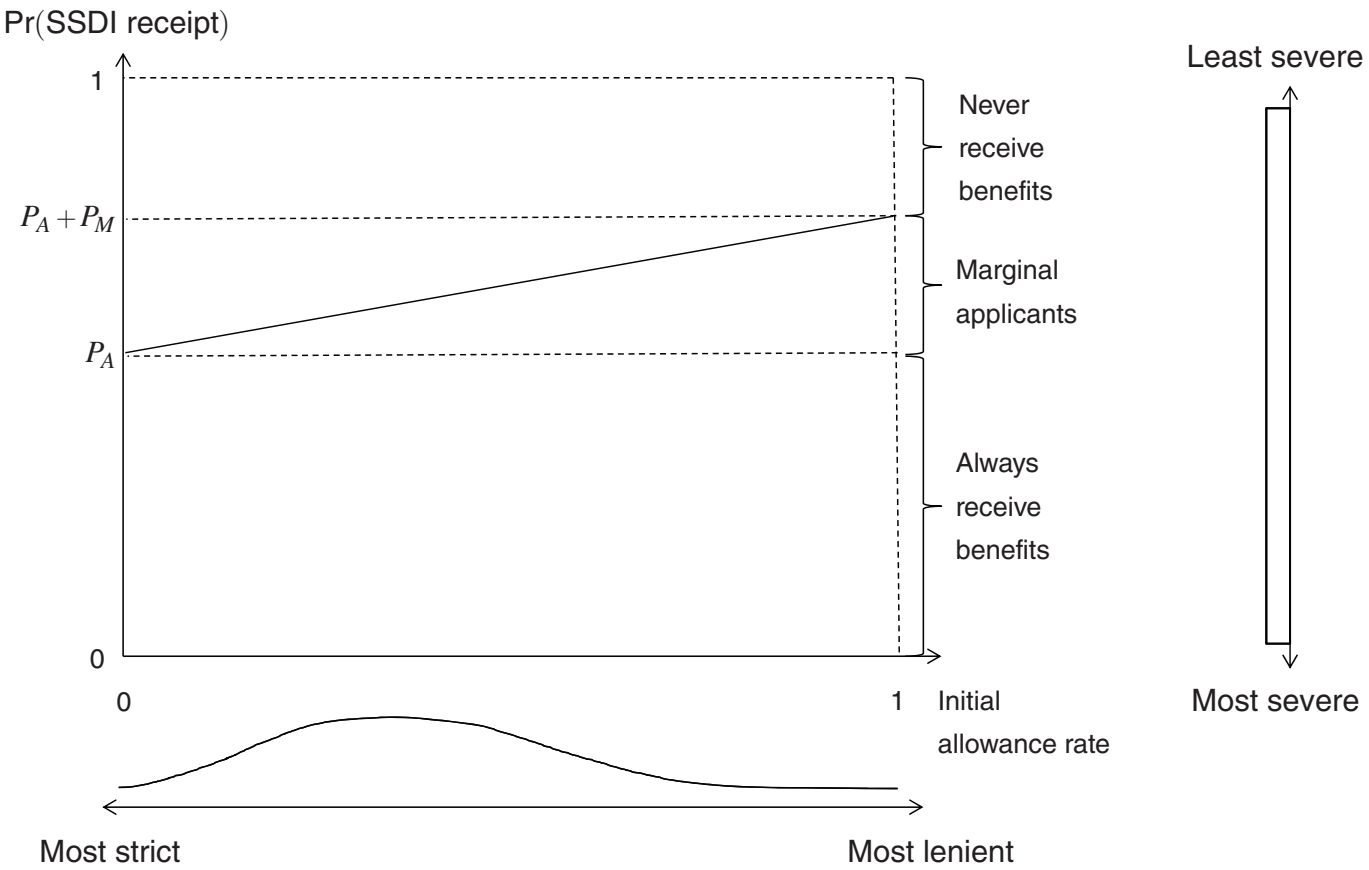


FIGURE 5. MODEL OF EFFECT OF INITIAL ALLOWANCE RATE ON PROBABILITY OF SSDI REPORT

MMS 2013

- Can think of splitting into always-taker case, never-taker, and marginal applicant.
- From first-stage, 23 percent of cases are "marginal".
- 57 percent of applicants accepted regardless of examiner, 20 percent are never-takers.

MMS 2013

- Effects on Labor Supply (2-4 years after determination):
- IV estimates 28 percentage point drop in employment 2 years after determination, loss of $3,800-$4,600 drop in annual earnings.
- Although note that earnings of denied applicants still one-half to one-quarter of pre-application earnings.

TABLE 4—EFFECTS OF SSDI RECEIPT ON EMPLOYMENT AND EARNINGS

	Two years after decision		Three years after decision		Four years after decision	
Outcome	OLS	IV	OLS	IV	OLS	IV
Panel A. 2005 decisions						
1) Earn > = $1,000/year						
Mean dependent variable | allowed	0.148		0.128		0.106	
Mean dependent variable | denied	0.522		0.515		0.471	
Coefficient on ALLOW	−0.347***	−0.279***	−0.361***	−0.227***	−0.345***	−0.158***
	(−322.48)	(−8.64)	(−336.60)	(−6.99)	(−321.81)	(−4.83)
R^2	0.200	0.195	0.218	0.200	0.209	0.171
2) Earn > = SGA						
Mean dependent variable | allowed	0.050		0.043		0.033	
Mean dependent variable | denied	0.293		0.302		0.270	
Coefficient on ALLOW	−0.242***	−0.192***	−0.255***	−0.166***	−0.233***	−0.113***
	(−256.29)	(−7.62)	(−264.05)	(−6.70)	(−252.71)	(−4.59)
R^2	0.149	0.144	0.166	0.152	0.156	0.128
3) Earnings						
Mean dependent variable | allowed	1,951		1,737		1,494	
Mean dependent variable | denied	8,928		9,191		8,496	
Coefficient on ALLOW	−7,435***	−3,781***	−7,715***	−3,007***	−7,221***	−1,716
	(−126.50)	(−3.05)	(−182.51)	(−2.92)	(−176.24)	(−1.60)
R^2	0.133	0.117	0.145	0.114	0.125	0.084
Observations	1,090,345		1,069,494		1,042,666	

- DI effect varies substantially by diagnosis type:

TABLE 6— HETEROGENEITY: EFFECTS OF SSDI RECEIPT ON EMPLOYMENT (*two years later*), 2005 AND 2006 COMBINED

				OLS		IV	
	Observations	Mean employment | allowed	Mean employment | denied	Coefficient on ALLOW	*t*-stat	Coefficient on ALLOW	*t*-stat
Body system code							
Musculoskeletal system	839,847	0.125	0.520	−0.361***	−300.48	−0.173***	−3.42
Mental disorders	455,433	0.171	0.535	−0.333***	−210.25	−0.366***	−11.73
Cardiovascular system	185,063	0.116	0.462	−0.328***	−134.18	−0.335***	−5.81
Neurological	181,162	0.119	0.538	−0.386***	−144.34	−0.359***	−7.40
Endocrine system	94,156	0.130	0.467	−0.316***	−100.41	−0.494**	−2.14
Respiratory system	88,578	0.099	0.462	−0.309***	−84.61	−0.061	−0.51
Special/other	85,587	0.132	0.322	−0.222***	−57.78	2.000	0.59
Malignant neoplastic diseases	77,021	0.212	0.621	−0.390***	−94.75	−0.347***	−6.18
Immune system disorders	59,188	0.170	0.531	−0.330***	−65.02	−0.048	−0.61
Digestive system	53,224	0.158	0.523	−0.353***	−80.64	−0.324***	−3.08
Special senses and speech	48,396	0.158	0.529	−0.344***	−77.59	−0.158	−1.37
Genitourinary impairments	31,837	0.185	0.540	−0.327***	−41.38	−0.084	−0.74
Skin disorders	7,483	0.156	0.560	−0.377***	−32.25	−0.916***	−3.66
Hematological disorders	7,091	0.219	0.590	−0.336***	−26.35	0.116	0.44

MMS 2013

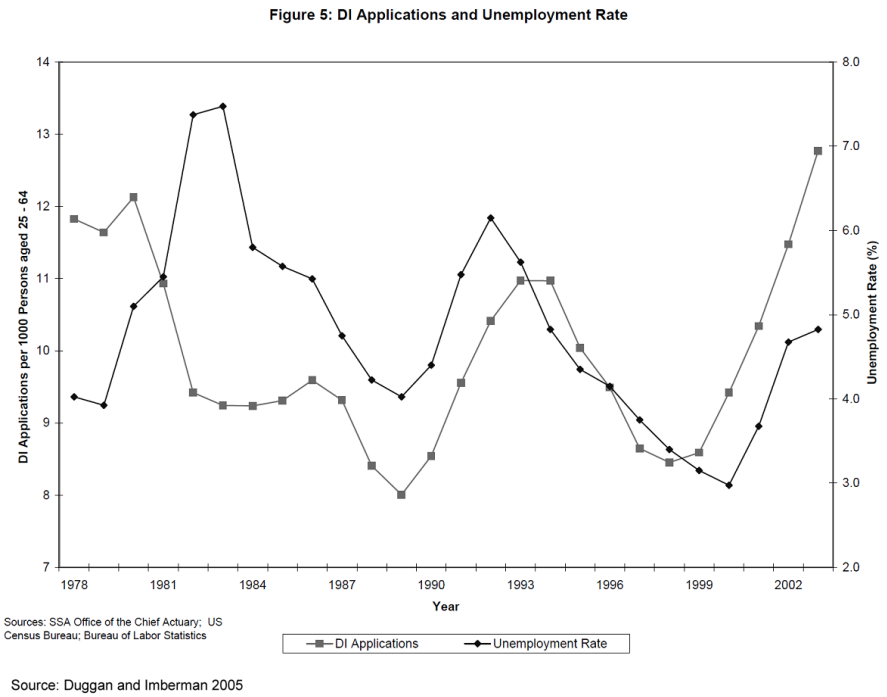
- Remember, these estimates only apply to the *marginal* applicants.
- Suggest DI has substantial negative effect on earnings and employment.
- Not really surprising. It also shows large loss of earnings and employment relative to pre-application.
- Only looking at initial application here. Other paper (French and Song) look at variation at the ADJ level.
- Looking at other program participation would be interesting.

Autor Duggan 2003

- Explaining the rise in disability rolls and the decline in unemployment, 1984-2001.
- Between 1984 and 2001, share of non-elderly adults on DI rose by 60 percent (5.3 million)
- Observe that DI claims rise in recessions, may reduce measured unemployment rate.

Autor Duggan 2003

DI applications follow the business cycle. Why?



Source: Duggan and Imberman 2005

Autor Duggan 2003

- Idea: consider a worker laid off in a recession:
  - Given generosity of DI program, instead of claiming UI and searching for job, he applies for DI
  - One less unemployed person $\Rightarrow$ unemployment rate lower
- But economic situation is the same: one less person working

Autor Duggan 2003

- Cite three main reasons for increase to DI rolls:
  - Reduced standards for screening (supply of DI increased)
  - Reduced demand for low-skilled workers (increase in demand for DI)
  - Rise in the Earnings replacement rate (result of benefits formula calculation and increasing income inequality. Also b/c of increasing value of healthcare).

Autor Duggan 2003

DI replacement rate has been increasing. Most for low-income older workers.

TABLE I
POTENTIAL DI INCOME AS A PERCENTAGE OF CURRENT EARNINGS FOR NONELDERLY MALES AT VARIOUS PERCENTILES OF THE WAGE DISTRIBUTION, 1979 AND 1999

Age	Earnings percentile	Cash income replacement rate		Adding in-kind Medicare benefit	
		1979	1999	1979	1999
55–61	10	52	74	67	104
	25	45	54	48	63
	50	37	47	36	47
	75	27	32	26	31
	90	20	24	19	23
50–54	10	47	57	61	81
	25	41	47	44	55
	50	34	41	33	42
	75	26	32	25	31
	90	19	23	18	22
40–49	10	48	53	61	80
	25	41	45	44	55
	50	34	41	33	42
	75	26	33	25	32
	90	20	26	19	25
30–39	10	46	54	59	84
	25	41	46	44	58
	50	36	41	35	44
	75	29	36	27	35
	90	23	28	21	27

Autor Duggan 2003

DI increases greatest for HS dropouts. Unemployment increase greatest for HS dropouts. Big female increase in DI receipt.

TABLE II
DI Receipt and Labor Force Participation by Gender, Education, and Age
1979, 1984, and 1999

	A. Males									B. Females								
	All			HS dropout			HS plus			All			HS dropout			HS plus		
Age	79	84	99	79	84	99	79	84	99	79	84	99	79	84	99	79	84	99
A. DI Recipients per 1000 nonelderly adults (SSA and Survey of Income and Program Participation data)																		
25–39	11	10	15	21	53		5	11		4	4	10	7	21		4	8	
40–54	35	28	42	52	105		18	26		15	12	30	35	60		10	21	
55–64	113	96	108	148	201		46	59		51	43	72	92	164		29	62	
B. Percent of nonelderly, nonparticipants receiving DI benefits (Survey of Income and Program Participation data)																		
25–39		17.2	17.0		23.5	26.8		14.1	13.7		1.3	3.2		1.5	3.9		1.1	3.0
40–54		36.9	32.7		38.5	40.0		35.6	29.6		4.9	10.0		7.4	11.7		3.3	9.5
55–64		30.2	26.6		42.5	43.2		20.3	20.3		8.7	16.8		14.2	24.4		5.1	13.8
C. Percent of nonelderly adults participating in labor force (Current Population Survey data)																		
25–39	95.7	94.7	93.1	91.0	88.1	86.1	96.6	95.8	94.1	63.9	70.0	76.3	49.6	50.3	55.0	66.9	73.2	78.7
40–54	92.7	92.7	90.2	86.5	85.0	76.3	95.4	95.0	91.9	60.3	65.7	77.4	48.8	49.8	54.0	64.9	70.6	80.1
55–64	73.0	68.6	68.1	64.2	60.2	53.2	79.0	73.3	71.2	41.9	41.8	51.6	33.8	33.3	32.4	47.0	46.0	55.7
D. Percent of nonelderly adults unemployed (Current Population Survey data)																		
25–39	3.7	6.3	3.1	7.0	12.5	6.0	3.0	5.4	2.7	3.9	5.0	3.2	6.2	8.3	6.7	3.4	4.5	2.8
40–54	2.5	4.3	2.4	4.0	7.2	4.5	1.9	3.4	2.2	2.4	3.4	2.1	3.1	4.8	3.8	2.2	2.9	1.9
55–64	1.9	3.4	1.9	2.3	4.7	2.1	1.7	2.6	1.8	1.3	1.8	1.4	1.5	2.4	1.7	1.1	1.4	1.3

Autor Duggan 2003

Increase in musculo-skeletal disorders (back pain) and mental disorders since 1983 large. Both have low mortality rates.

TABLE III
DISTRIBUTION OF QUALIFYING IMPAIRMENTS OF DI AWARDEES AT FIVE-YEAR INTERVALS, 1983–1999

Qualifying impairment	4-Year mortality rate (%)	Percent of DI awards			
		1983	1988	1993	1999
Neoplasms	81.0	16.8	13.2	12.6	10.6
Circulatory disorders	19.8	21.9	17.6	14.0	12.1
Musculo-skeletal disorders	5.3	13.4	16.8	14.8	23.7
Mental disorders	5.4	16.3	20.9	26.1	22.5
All others	16.0	31.6	31.5	32.5	31.1

Source: Social Security Administration, *Annual Statistical Supplement,* 1984, 1989, 1994, and 2000. Four-year mortality rate is from administrative follow-up of those awarded benefits in 1985 [Hennessey and Dykacz 1993].

Autor Duggan 2003

Many fewer DI terminations since 1984 for medical disqualification.

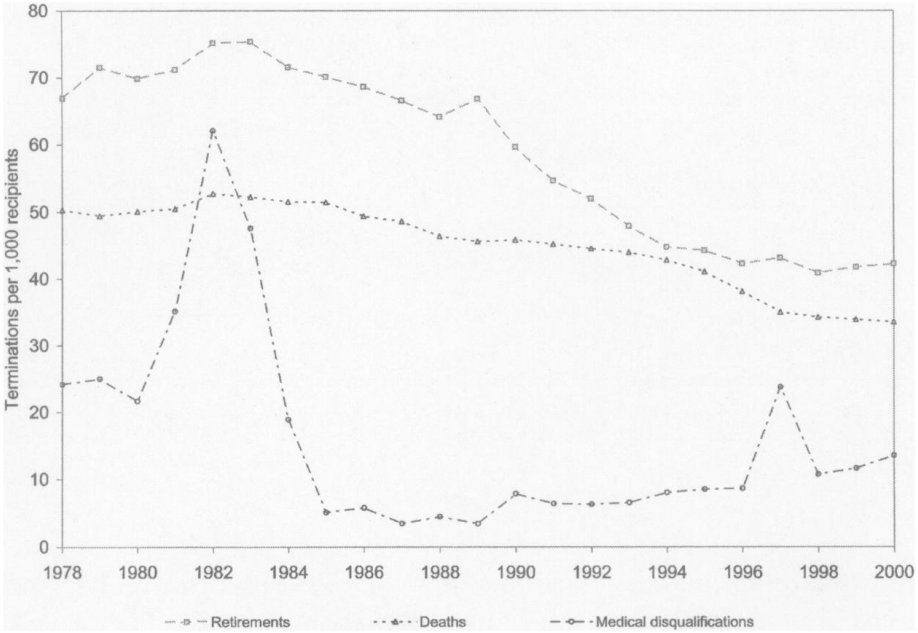


FIGURE I
DI Termination Rates per 1000 Beneficiaries by Reason, 1978–2000
Source: Social Security Bulletin: Annual Statistical Supplement [various years]. Termination rates are equal to the fraction of DI beneficiaries terminated by cause annually.

Autor Duggan 2003

- Two sources of identification:
  - Exploit progressivity of DI benefits formula. Set at a national level, does not adjust for regional wage variation.
  - Identify variation in demand using Bartik Shocks for labor demand.

Autor Duggan 2003

DI benefit is a progressive, piece-wise function of previous earnings:

$$AIME_i = \frac{1}{T}\sum_{t=1}^{T} Y_{it} \cdot \max\left[\frac{\bar{Y}_{T-2}}{\bar{Y}_t}, 1\right], \tag{1}$$

$$PIA = \begin{cases} 0.9 \times AIME & \text{if} \quad AIME \in [0, b1] \\ 0.9 \times b1 + 0.32 \times (AIME - b1) & \text{if} \quad AIME \in (b1, b2] \\ 0.9 \times b1 + 0.32 \times (b2 - b1) + 0.15 \times (AIME - b2) & \text{if} \quad AIME > b2, \end{cases} \tag{2}$$

Note that AIME indexed to change in average, national wages over a 2-year period.

Autor and Duggan 2003: Bartik Shocks

- Standard technique to construct state-level employment shocks over a five year window:
  - Calculate industry shares in a given state in base year
  - Calculate employment changes over five year period by industry using data on national employment (excluding state in question)
  - Project changes in each state's employment using national changes
  - Ex: if car industry declines over a five year period, assign a negative employment shock to Michigan
- Then correlate state employment shocks with DI applications

Autor Duggan 2003

- Empirics:
  - Imagine individual expected LFP as a function of wage, health, individual characteristics and DI benefits "supply" which is a function of both replacement rate and probability of acceptance. (Eq. 6)
    - Interested in how a change in supply impacts LFP
  - Implement using state-level analog, using first differences in variables (Eq 7).
  - For supply changes, start by using change DI recipient rate.
  - Then use IV approach use regional wage level variation in "potential" wage replacement.
    - Imagine in Illinois, wages increased by 20% next year but national wages went up 5%. DI only responds to national change. Does IL DI receipts decrease?

Autor Duggan 2003

- Variation in "supply" of DI benefits
- OLS estimates show changes in DI receipt correlated with changes in LFP, but only among high school dropouts.

TABLE IV

CHANGE IN DI ROLLS AND LABOR FORCE PARTICIPATION OF NONELDERLY ADULTS: OLS AND INSTRUMENTAL VARIABLES ESTIMATES
DEPENDENT VARIABLE: 100 × ANNUALIZED CHANGE IN LABOR FORCE PARTICIPATION RATE

	A. Δ Male labor force participation								B. Δ Female labor force participation							
	OLS estimates				IV estimates				OLS estimates				IV estimates			
	High school dropouts		High school grad plus		High school dropouts		High school grad plus		High school dropouts		High school grad plus		High school dropouts		High school grad plus	
	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ DI Rolls/	−0.61	−0.61	−0.06	−0.07	−1.35	−0.51	−0.20	0.07	−0.22	−0.38	0.16	0.00	−1.01	−0.66	0.28	−0.14
1000 Pop	(0.15)	(0.14)	(0.05)	(0.04)	(0.43)	(0.32)	(0.13)	(0.09)	(0.18)	(0.15)	(0.10)	(0.08)	(0.47)	(0.31)	(0.25)	(0.15)
Intercept	−1.24	0.25	−0.31	−0.09	−2.03	0.18	−0.47	−0.20	−0.19	0.58	1.13	0.57	−1.04	0.59	1.27	0.65
	(0.17)	(0.11)	(0.06)	(0.04)	(0.47)	(0.25)	(0.14)	(0.07)	(0.22)	(0.13)	(0.11)	(0.07)	(0.52)	(0.14)	(0.27)	(0.13)
R^2	0.43	0.59	0.19	0.13					0.08	0.27	0.17	0.02				
1st-stage					−0.77	0.51	−0.86	0.62					−0.87	0.53	−0.75	0.60
Coefficient					(0.24)	(0.16)	(0.24)	(0.14)					(0.25)	(0.14)	(0.25)	(0.12)
× 10^{-1}																

Autor Duggan 2003

- IV estimates first-stage confirms states with higher potential replacement rates have larger change in DI rolls.
- Second stage confirms OLS findings. Higher potential replacement leads to lower LFP. Only high school dropouts.

TABLE IV

CHANGE IN DI ROLLS AND LABOR FORCE PARTICIPATION OF NONELDERLY ADULTS: OLS AND INSTRUMENTAL VARIABLES ESTIMATES

DEPENDENT VARIABLE: 100 × ANNUALIZED CHANGE IN LABOR FORCE PARTICIPATION RATE

	A. Δ Male labor force participation								B. Δ Female labor force participation							
	OLS estimates				IV estimates				OLS estimates				IV estimates			
	High school dropouts		High school grad plus		High school dropouts		High school grad plus		High school dropouts		High school grad plus		High school dropouts		High school grad plus	
	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98	78–84	84–98
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ DI Rolls/	−0.61	−0.61	−0.06	−0.07	−1.35	−0.51	−0.20	0.07	−0.22	−0.38	0.16	0.00	−1.01	−0.66	0.28	−0.14
1000 Pop	(0.15)	(0.14)	(0.05)	(0.04)	(0.43)	(0.32)	(0.13)	(0.09)	(0.18)	(0.15)	(0.10)	(0.08)	(0.47)	(0.31)	(0.25)	(0.15)
Intercept	−1.24	0.25	−0.31	−0.09	−2.03	0.18	−0.47	−0.20	−0.19	0.58	1.13	0.57	−1.04	0.59	1.27	0.65
	(0.17)	(0.11)	(0.06)	(0.04)	(0.47)	(0.25)	(0.14)	(0.07)	(0.22)	(0.13)	(0.11)	(0.07)	(0.52)	(0.14)	(0.27)	(0.13)
R^2	0.43	0.59	0.19	0.13					0.08	0.27	0.17	0.02				
1st-stage					−0.77	0.51	−0.86	0.62					−0.87	0.53	−0.75	0.60
Coefficient					(0.24)	(0.16)	(0.24)	(0.14)					(0.25)	(0.14)	(0.25)	(0.12)
× 10^{-1}																

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- Now the Bartik Shock for variation in labor market conditions.
- In OLS, states with larger drop in employment have larger DI rolls.

TABLE V

IMPACT OF EMPLOYMENT LOSSES ON DI APPLICATIONS FLOWS 1978–1998: REDUCED-FORM AND INSTRUMENTAL VARIABLES ESTIMATES
DEPENDENT VARIABLE: ANNUALIZED FLOW OF DISABILITY APPLICANTS PER NONELDERLY ADULT

	A. OLS reduced-form estimates: impact of predicted Δ(Emp/Pop) on DI Adds/Pop						B. IV Estimates: impact of high school dropout Δ(Emp/Pop), instrumented by predicted Δ(Emp/Pop), on DI Apps/Pop					
	Long changes			Stacked 3-yr diffs			Long changes			Stacked 3-yr diffs		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	78–84	78–98	78–98	78–84	78–98	78–98	78–84	78–98	78–98	78–84	78–98	78–98
Δ Emp/Pop	−0.13	−0.13	−0.11	−0.12	−0.11	0.00	−0.25	−0.30	−0.05	−0.14	−0.12	0.01
	(0.06)	(0.07)	(0.05)	(0.04)	(0.04)	(0.02)	(0.20)	(0.22)	(0.13)	(0.07)	(0.07)	(0.02)
Δ Emp/Pop ×		−0.34	−0.26		−0.17	−0.05		−0.68	−0.34		−0.15	−0.05
Post-1984		(0.09)	(0.06)		(0.05)	(0.02)		(0.67)	(0.23)		(0.11)	(0.03)
State dummies	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R^2	0.29	0.32	0.97	0.31	0.35	0.90						
1st-stage coef.							0.51	0.52	1.07	0.85	0.90	1.26
(main effect)							(0.25)	(0.29)	(0.69)	(0.24)	(0.26)	(0.33)
1-stage coef.								0.54	1.69		1.01	1.62
(interaction)								(0.28)	(1.27)		(0.30)	(0.42)
F-statistic							3.97	7.87	1.19	12.02	17.26	11.41
P-value							0.05	0.00	0.31	0.00	0.00	0.00
n	50	100	100	100	350	350	50	100	100	100	350	350

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- With Bartik IV, states with larger employment loss have higher DI applications.
- (this is also confirmed using within-state Bartik variation in robustness).

TABLE V

IMPACT OF EMPLOYMENT LOSSES ON DI APPLICATIONS FLOWS 1978–1998: REDUCED-FORM AND INSTRUMENTAL VARIABLES ESTIMATES
DEPENDENT VARIABLE: ANNUALIZED FLOW OF DISABILITY APPLICANTS PER NONELDERLY ADULT

	A. OLS reduced-form estimates: impact of predicted Δ(Emp/Pop) on DI Adds/Pop						B. IV Estimates: impact of high school dropout Δ(Emp/Pop), instrumented by predicted Δ(Emp/Pop), on DI Apps/Pop					
	Long changes			Stacked 3-yr diffs			Long changes			Stacked 3-yr diffs		
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	78–84	78–98	78–98	78–84	78–98	78–98	78–84	78–98	78–98	78–84	78–98	78–98
Δ Emp/Pop	−0.13	−0.13	−0.11	−0.12	−0.11	0.00	−0.25	−0.30	−0.05	−0.14	−0.12	0.01
	(0.06)	(0.07)	(0.05)	(0.04)	(0.04)	(0.02)	(0.20)	(0.22)	(0.13)	(0.07)	(0.07)	(0.02)
Δ Emp/Pop ×		−0.34	−0.26		−0.17	−0.05		−0.68	−0.34		−0.15	−0.05
Post-1984		(0.09)	(0.06)		(0.05)	(0.02)		(0.67)	(0.23)		(0.11)	(0.03)
State dummies	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
R^2	0.29	0.32	0.97	0.31	0.35	0.90						
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F-statistic							3.97	7.87	1.19	12.02	17.26	11.41
P-value							0.05	0.00	0.31	0.00	0.00	0.00
n	50	100	100	100	350	350	50	100	100	100	350	350

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You can see the relationship growing stronger over time:

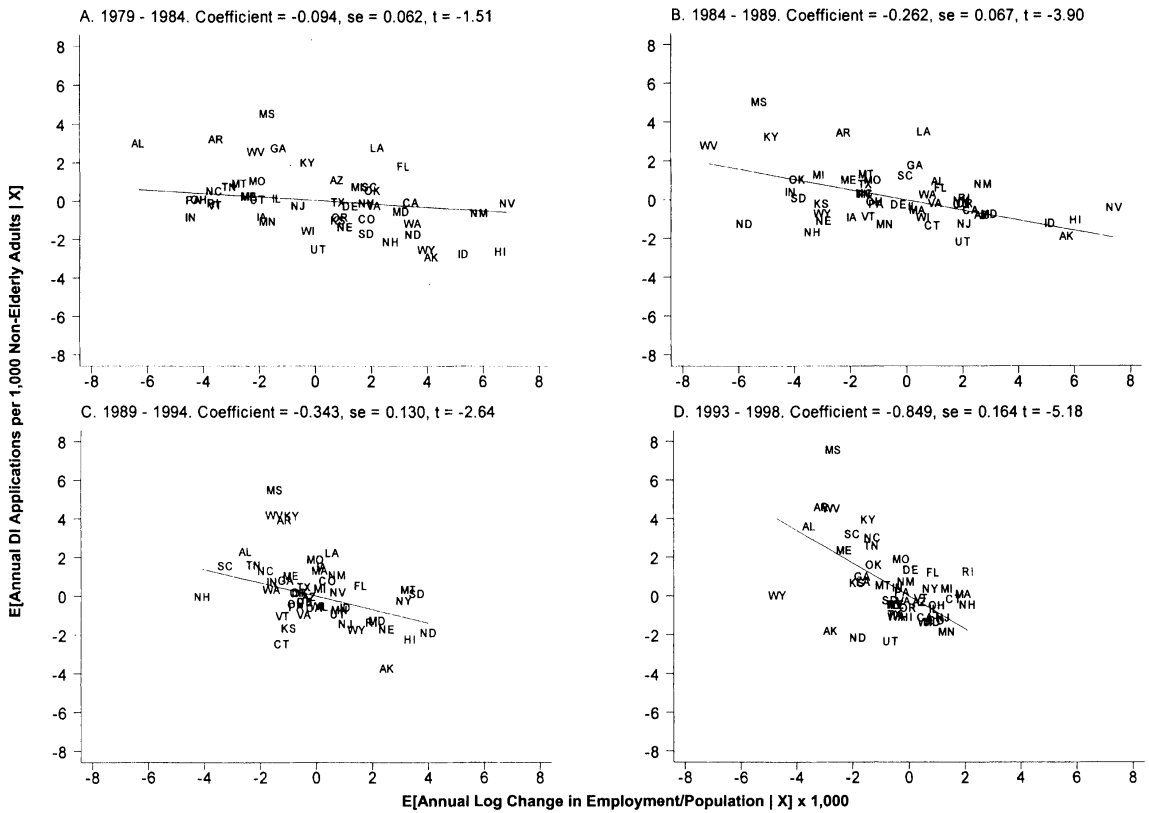

FIGURE III
Impact of Projected Log Employment Shocks on Disability Applications per 1000 Nonelderly Adults at Five-Year Intervals, 1979–1998

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- Makes a good prediction that DI will rise another 40 percent over the next decade.
- Rules out other explanations: declining health, rising immigration and incarceration, unemployment benefits.

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- Conclusions:
  - Finds that after 1984 liberalization, DI applications became 2-3 times more responsive to labor market shocks.
  - Unemployment rate would have been half a point higher in 1998 if not for 1984 liberalization.