Online Appendix to ‘How Important Is Health Inequality for Lifetime Earnings Inequality?’

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1 Data Description

1.1 Panel Study of Income Dynamics

We use waves 2003–2017 of the PSID (covering years 2002–2016). The PSID is biennial over this period. We do not use waves prior to 2003 because the PSID expanded its disability and health-related questions in the 2003 wave to include questions on specific medical conditions, activities of daily living (ADL's) and instrumental activities of daily living (IADL's) which we rely on to construct individuals' frailty indices. For the base sample, the only restriction is that a person is a household head or the spouse of a household head and at least 25 years of age. PSID only collects detailed health information for household heads and spouses. A good description of the PSID household head definition is in Heathcote et al. (2010). The base sample consists of 22,143 individuals (10,600 men, 11,543 women).

Table 1 lists the 27 variables we used to construct the frailty index for PSID respondents. The index is constructed by summing the variables in the first column of the table using their values which are assigned according to the rules in the second column. Then dividing this sum by the total number of variables observed for the individual in the year. The

Table 1: Health Variables used to construct frailty index for PSID respondents

Variable	Value
Some difficulty with ADL/IADLs:	
Eating	Yes=1, No=0
Dressing	Yes=1, No=0
Getting in/out of bed or chair	Yes=1, No=0
Using the toilet	Yes=1, No=0
Bathing/showering	Yes=1, No=0
Walking	Yes=1, No=0
Using the telephone	Yes=1, No=0
Managing money	Yes=1, No=0
Shopping for personal items	Yes=1, No=0
Preparing meals	Yes=1, No=0
Heavy housework	Yes=1, No=0
Light housework	Yes=1, No=0
Getting outside	Yes=1, No=0
Ever had one of following conditions:	
High Blood Pressure	Yes=1, No=0
Diabetes	Yes=1, No=0
Cancer	Yes=1, No=0
Lung disease	Yes=1, No=0
Heart disease	Yes=1, No=0
Heart attack	Yes=1, No=0
Stroke	Yes=1, No=0
Arthritis	Yes=1, No=0
Asthma	Yes=1, No=0
Loss of memory or mental ability	Yes=1, No=0
Psychological problems	Yes=1, No=0
Other serious, chronic condition	Yes=1, No=0
BMI ≥ 30	Yes=1, No=0
Has ever smoked	Yes=1, No=0

construction of this frailty index mostly follows the guidelines laid out in Searle et al. (2008), and uses a set of PSID variables similar to the index created in Yang and Lee (2009).

Table 2 reports summary statistics on the PSID sample used for the dynamic panel estimations. The sample consists of household heads and spouses aged 25 to 64. All individuals in the sample are in at least 3 consecutive waves of the PSID over the 2002–2016. Annual earnings are total annual labor earnings (including wages and salaries, bonuses, overtime tips, commissions, professional practice or trade, any additional job income, and any miscellaneous labor income). Annual hours are the total annual work hours for all jobs, including overtime. Hourly wage is a PSID constructed variable that is constructed using annual

Table 2: Summary statistics on our dynamic panel PSID sample

	2002	2004	2006	2008	2010	2012	2014	2016	Pooled 2002-2016
Panel A: Mean (median) [standard deviation] of sample characteristics									
Age	40.75	41.2	41.73	42.36	42.97	43.77	45.64	47.53	42.65
	(41)	(42)	(42)	(42)	(42)	(42)	(44)	(46)	(42)
	[11.11]	[11.77]	[12.33]	[12.85]	[13.34]	[13.7]	[13.7]	[13.69]	[12.72]
Frailty	0.08	0.09	0.10	0.10	0.11	0.11	0.12	0.13	0.11
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.10)	(0.10)	(0.07)
	[0.09]	[0.09]	[0.1]	[0.1]	[0.11]	[0.11]	[0.12]	[0.12]	[0.11]
Annual Earnings	$39,913.5	$39,951.17	$39,779.58	$39,670.04	$36,294.58	$36,659.7	$36,554.79	$38,088.25	$38,526.71
	(30,944.81)	(30,446.27)	(30,277.88)	(29,730.3)	(26,121.94)	(25,100)	(26,256.93)	(27,860.24)	(29,174.36)
	[73,161.16]	[68,148.32]	[65,088.35]	[77,401.9]	[58,809.46]	[92,687.86]	[70,310.25]	[56,168.13]	[68,482.15]
Annual Hours	1,698.71	1,675.51	1,647.33	1,550.34	1,466.27	1,492.25	1,495.81	1,482.53	1,590.6
	(1,960)	(1,960)	(1,944)	(1,880)	(1,820)	(1,856)	(1,872)	(1,888)	(1,920)
	[965.19]	[990.17]	[989.62]	[949.76]	[1,011.75]	[1,030.75]	[1,051.32]	[1,064.97]	[999.24]
Hourly Wage	$22.84	$23.27	$23.03	$24.38	$24.01	$23.27	$23.67	$25.27	$23.50
	(17.84)	(17.94)	(17.74)	(18.96)	(18.09)	(17.56)	(18.04)	(18.89)	(18.06)
	[25.85]	[28.3]	[23.46]	[27.15]	[26.59]	[25.73]	[23.07]	[26.81]	[25.37]
Panel B: Fraction of sample by characteristics									
Male	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.45
High School Dropouts (HSD)	13.47	13.31	13.06	13.02	13.04	13.04	13.12	12.86	13.21
High School Graduates (HS)	55.62	55.06	54.56	54.33	53.97	53.47	53.49	53.42	54.51
College Graduates (CL)	30.91	31.63	32.39	32.66	32.99	33.48	33.39	33.72	32.28
$+\Delta$ Frailty	-	0.28	0.32	0.3	0.28	0.28	0.27	0.27	0.29
$-\Delta$ Frailty	-	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.13
Observations (N)	9,665	10,100	10,647	11,174	11,536	11,663	10,809	10,206	85,800
# of Individuals (n)									14,269
Average # of Years Observed (T)									6.01

Note: Means are reported; median values are reported in parentheses; standard deviations are reported in brackets.

earnings and annual hours. It is adjusted by PSID for outliers. Education was cleaned and reassigned so that education is constant across all waves for each individual. Labor force status is considered not employed if annual hours is between 0 and 259 and employed (workers) if annual hours are 260 or more.

1.2 Health and Retirement Survey

The HRS is a biennial longitudinal survey of Americans over age 50. Aside from spouses of respondents, the HRS does not survey individuals under the age of 51. We use the HRS waves spanning the period 1998 to 2014. Our sample consists of 205,711 observations of 36,032 individuals (15,860 men and 20,172 women). We construct a frailty index for HRS respondents in the same way as for PSID respondents. The lifecycle dynamics of frailty in the HRS and PSID samples are very similar even though the HRS contains a larger number of deficit variables (36 versus 27). See Hosseini et al. (forthcoming) for additional details.

Table 3: Diff-in-Hansen test, Y-lag set only (p-value) for regressions in Tables 2 and 3 in the paper

	Everyone				Workers			
	(1) Overall	(2) By educ	(3) By health	(4) By age	(5) Overall	(6) By educ	(7) By health	(8) By age
Effect of frailty on earnings	0.796	0.516	0.960	0.479	0.434	0.388	0.283	0.249
Effect of frailty on hours	0.971	0.730	0.838	0.557	0.060	0.059	0.063	0.069
Effect of frailty on wages					0.085	0.097	0.098	0.065

1.3 Medical Expenditure Panel Survey

The MEPS consists of a collection of rotating two-year panels. We use MEPS data from the 2000 to 2016 period. Our sample consists of respondents aged 25 to 84 years. We do not include individuals aged 85 years or older because, starting in 2001, MEPS top codes age at 85. The base sample contains 345,022 observations on 191,165 individuals (88,389 men and 102,776 women). The frailty index is constructed in the same way as for PSID and HRS respondents as has similar lifecycle dynamics. See Hosseini et al. (forthcoming) for additional details.

2 Dynamic Panel Analysis: More Results

In Section 2 of the paper we use a dynamic GMM panel estimator to estimate the impact of frailty on earnings, hours and wages. In this section of the appendix we present additional results regarding validity of instruments, causality, and further diagnostics.

2.1 Additional diagnostic tests

Table 3 presents p-values of the diff-in-Hansen tests on the y-lag explanatory variables only for the regressions in Tables 2 and 3 in the paper. Notice that in all regressions we fail to reject the null that the instruments for the y-lag variables are valid.

2.2 Comparison with OLS and fixed effect estimators

For purposes of comparison, we estimate Equation (1) in Section 2 of the paper using OLS and fixed effect estimators, and compare the results to our system GMM estimates. The results are presented in Tables 4, 5, 6 and 7 for the overall effect, the effect by education, by health, and by age group, respectively. The three panels in the table show results for earnings, hours, and wages, respectively.

Table 4: Comparison with OLS and Fixed Effect Estimator, Average Frailty Effect

	Everyone			Workers		
	OLS	FE	SYS-GMM	OLS	FE	SYS-GMM
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.564***	0.206***	0.283	0.555***	0.098***	1.474***
	(0.006)	(0.004)	(0.364)	(0.013)	(0.006)	(0.509)
log(earnings$_{t-2}$)	0.188***	-0.021***	0.396	0.240***	-0.031***	-0.640
	(0.006)	(0.005)	(0.298)	(0.012)	(0.006)	(0.454)
frailty$_t$	-4.973***	-8.818***	-5.374***	-0.519***	-0.471***	-0.978**
	(0.138)	(0.235)	(1.653)	(0.044)	(0.084)	(0.447)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.580	0.432		0.601	0.080	
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.554***	0.200***	0.399	0.332***	-0.027***	0.003
	(0.006)	(0.004)	(0.322)	(0.008)	(0.006)	(0.345)
log(hours$_{t-2}$)	0.180***	-0.028***	0.263	0.157***	-0.090***	0.304
	(0.006)	(0.004)	(0.257)	(0.007)	(0.006)	(0.218)
frailty$_t$	-3.626***	-6.655***	-3.887***	-0.175***	-0.442***	0.070
	(0.100)	(0.172)	(1.188)	(0.028)	(0.056)	(0.246)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.556	0.400		0.234	0.001	
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.525***	0.067***	0.212
				(0.010)	(0.006)	(0.541)
log(wage$_{t-2}$)				0.288***	-0.028***	0.532
				(0.009)	(0.006)	(0.489)
frailty$_t$				-0.378***	-0.028	-0.623**
				(0.037)	(0.073)	(0.263)
Observations				34,170	34,170	34,170
R^2				0.592	0.056	

Notes: Panel A (top) shows regression results for the effect of frailty on earnings. Panel B (middle) shows regression results for the effect of frailty on hours. Panel C (bottom) shows regression results for the effect of frailty on wages. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and quadratic in age). 'FE' is fixed effect (within groups) estimation. 'Good/Bad Health' is frailty below/above the 75th percentile. 'Young/Old' are individuals younger/older than 45 years of age. Standard errors are in parenthesis. R^2 is adjusted R-squared for OLS, and overall R-squared for FE. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

We would like to point out couple of observations. It is well known that the OLS estimates of the coefficients on lagged values of the left-hand-side variable have an upward bias. Moreover, as Nickell (1981), Arellano and Bond (1991), and Bond (2002) have shown, the estimates acquired via a fixed effects estimator have downward bias. Therefore, an unbiased estimate should lie between the OLS and FE estimates. As Bond (2002) argues, if multiple lags of the left-hand-side variable are included on the right-hand-side, the sum of the coefficients on these variables must satisfy this condition. In other words, a necessary condition for the dynamic panel estimates to be unbiased is that the sum of the estimated values of α_1 and α_2 in Equation (1) in the paper are smaller than the corresponding sum of OLS estimates, but larger than those from the fixed effect estimation. We cannot statistically reject this condition in any of our estimations. Therefore, our regressions pass this consistency test.

Note, also that in Tables 4 through 7 the OLS estimation shows a significant effect of frailty on hours even for those who continuously work. This is likely due to the fact that, in these OLS estimations, individuals' fixed effects are ignored. The fixed effects are included in the FE estimation but this estimator is biased.

2.3 Robustness to instrument set

Following the recommendation of Roodman (2009), we explore the robustness of our estimates to the set of lagged levels and differences we use as instruments. For the results reported in Section 2 in the paper we used lags 4–5 as instruments for everyone and 5–6 as instruments for workers. Here, we report the results of each estimation using either lags 3–4, lags 4–5, or lags 5–6.

We find that the results are robust to variation in the set of instruments used. Table 8 reports the results for the overall effect of frailty on earnings, Table 9 reports results for the effect by education, Table 10 reports the results for the effect by health, and Table 11 reports results for the effect by age group. The three panels in the tables show results for earnings, hours, and wages, respectively. Notice that, while not all of the alternative regressions pass all the diagnostic tests, the estimated effects of frailty are generally similar in magnitude and significance across the choice of lags used for instruments. The estimated effects using the full sample are generally more consistent across the lag set than the ones run only on the workers. However, the alternative worker results that differ the most from the baseline ones are also the ones where the empirical specification tends to fail the tests for instrument validity.

2.4 Instrument power tests

The Hansen and diff-in-Hansen tests only test for instrument exogeneity, not instrument power. To test instrument power, we use the methodology of Staiger and Stock (1997) and Stock and Yogo (2005) following Wintoki et al. (2012). That is, we look at the strength of the F-statistics in the first stage regressions. Under the system-GMM, there are two "first stage" equations, one for levels with instruments of first differences and one for first differences with instruments of levels. We regress the endogenous variables from each equation on their corresponding instrument set, which yields an F-statistic that we evaluate for instrument strength.

To run the instrument power tests, we run OLS regressions of the endogenous variables specified on the right-hand-side of the system-GMM structure on the appropriate instrument specification allowing for dynamic adjustments in the time periods available. Each endogenous variable is regressed on it's instruments starting with the fourth lag alone and then adding the fifth lag. Each equation generates an F-statistic which is used to test whether the parameters estimated in each equation are jointly equal to zero. This tells us the statistical power of the instruments in explaining the variation in the endogenous variable. A general rule is that the F-statistic should be greater than or equal to 10 to reject the null hypothesis that all the parameters are jointly equal to zero.

We conduct the instrument power tests for the system GMM estimation of the overall impact of frailty on earnings that is reported in column (2) of Table 2 in the paper. The results of the tests are reported in Table 12. Notice that, across each result, the F-statistic is decreasing with the specification of further lags of the instrument set. Excluding the last row of the table, all the F-statistics are greater than 10 suggesting that the instruments have sufficient power in explaining the variation in the endogenous variables. Panel B of the table indicates that the lagged levels are relatively weak instruments for first-differences as compared to the strength of lagged differences as instruments for the levels. As we mentioned in Section 2 of the paper, this is not surprising given that both frailty and log earnings are highly persistent variables. It is also the reason we use the system GMM estimator as opposed to working only with the difference equation.

Table 5: Comparison with OLS and Fixed Effect Estimator, Frailty Effects by Education

	Everyone			Workers		
	OLS	FE	SYS-GMM	OLS	FE	SYS-GMM
Panel A. Earnings Regressions						
$\log(\text{earnings}_{t-1})$	0.560***	0.206***	0.370	0.544***	0.097***	1.371***
	(0.006)	(0.004)	(0.319)	(0.013)	(0.006)	(0.400)
$\log(\text{earnings}_{t-2})$	0.183***	-0.022***	0.318	0.233***	-0.031***	-0.569
	(0.006)	(0.005)	(0.259)	(0.011)	(0.006)	(0.356)
$\text{frailty}_t \times$ HSD	-6.143***	-8.533***	-6.269***	-1.340***	-0.742***	-1.846**
	(0.213)	(0.526)	(1.777)	(0.111)	(0.254)	(0.807)
$\text{frailty}_t \times$ HS	-5.215***	-9.586***	-5.591***	-0.762***	-0.712***	-1.239***
	(0.155)	(0.289)	(1.574)	(0.052)	(0.107)	(0.460)
$\text{frailty}_t \times$ CL	-3.003***	-6.900***	-2.519*	0.053	-0.014	-0.558
	(0.209)	(0.457)	(1.402)	(0.053)	(0.132)	(0.484)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.581	0.435		0.605	0.089	
Panel B. Hours Regressions						
$\log(\text{hours}_{t-1})$	0.550***	0.200***	0.383	0.331***	-0.027***	0.074
	(0.006)	(0.004)	(0.319)	(0.008)	(0.006)	(0.313)
$\log(\text{hours}_{t-2})$	0.176***	-0.028***	0.269	0.156***	-0.091***	0.168
	(0.006)	(0.004)	(0.253)	(0.007)	(0.006)	(0.221)
$\text{frailty}_t \times$ HSD	-4.433***	-6.526***	-4.770***	-0.403***	-0.942***	-0.533
	(0.157)	(0.385)	(1.320)	(0.078)	(0.169)	(0.356)
$\text{frailty}_t \times$ HS	-3.732***	-7.241***	-4.303***	-0.189***	-0.440***	-0.033
	(0.112)	(0.211)	(1.224)	(0.032)	(0.071)	(0.281)
$\text{frailty}_t \times$ CL	-2.380***	-5.119***	-2.219**	-0.092***	-0.311***	0.248
	(0.150)	(0.334)	(1.118)	(0.035)	(0.088)	(0.254)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.557	0.402		0.234	0.001	
Panel C. Wage Regressions						
$\log(\text{wage}_{t-1})$				0.514***	0.067***	0.122
				(0.010)	(0.006)	(0.368)
$\log(\text{wage}_{t-2})$				0.279***	-0.029***	0.600*
				(0.009)	(0.006)	(0.328)
$\text{frailty}_t \times$ HSD				-1.040***	0.191	-1.854***
				(0.102)	(0.222)	(0.616)
$\text{frailty}_t \times$ HS				-0.602***	-0.268***	-0.889***
				(0.043)	(0.094)	(0.307)
$\text{frailty}_t \times$ CL				0.123***	0.298***	-0.216
				(0.046)	(0.116)	(0.309)
Observations				34,170	34,170	34,170
R^2				0.596	0.063	

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). 'FE' is fixed effect (within groups) estimation. Standard errors are in parenthesis. R^2 is adjusted R-squared for OLS, and overall R-squared for FE. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

Table 6: Comparison with OLS and Fixed Effect Estimator, Frailty Effects by Health Status

	Everyone			Workers		
	OLS	FE	SYS-GMM	OLS	FE	SYS-GMM
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.564***	0.206***	0.220	0.555***	0.097***	1.293***
	(0.006)	(0.004)	(0.362)	(0.013)	(0.006)	(0.410)
log(earnings$_{t-2}$)	0.188***	-0.021***	0.444	0.240***	-0.031***	-0.498
	(0.006)	(0.005)	(0.297)	(0.012)	(0.006)	(0.377)
frailty$_t$ × Good Health	-3.076***	-6.816***	-1.930	-0.610***	-0.230*	-1.765
	(0.305)	(0.499)	(4.816)	(0.082)	(0.135)	(1.775)
frailty$_t$ × Bad Health	-4.818***	-8.607***	-5.207***	-0.522***	-0.446***	-0.963**
	(0.137)	(0.239)	(1.745)	(0.044)	(0.085)	(0.469)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.580	0.433		0.601	0.079	
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.553***	0.200***	0.386	0.332***	-0.027***	0.040
	(0.006)	(0.004)	(0.317)	(0.008)	(0.006)	(0.311)
log(hours$_{t-2}$)	0.180***	-0.028***	0.272	0.157***	-0.091***	0.282
	(0.006)	(0.004)	(0.253)	(0.007)	(0.006)	(0.219)
frailty$_t$ × Good Health	-1.957***	-5.137***	-2.216	-0.046	-0.292***	-0.060
	(0.222)	(0.365)	(3.455)	(0.049)	(0.090)	(0.910)
frailty$_t$ × Bad Health	-3.491***	-6.494***	-3.707***	-0.171***	-0.426***	0.026
	(0.099)	(0.175)	(1.242)	(0.028)	(0.056)	(0.258)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.556	0.402		0.234	0.001	
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.525***	0.067***	0.303
				(0.010)	(0.006)	(0.449)
log(wage$_{t-2}$)				0.288***	-0.028***	0.461
				(0.009)	(0.006)	(0.419)
frailty$_t$ × Good Health				-0.561***	0.061	0.348
				(0.071)	(0.118)	(1.685)
frailty$_t$ × Bad Health				-0.384***	-0.019	-0.581*
				(0.037)	(0.074)	(0.332)
Observations				34,170	34,170	34,170
R^2				0.592	0.055	

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). 'Good/Bad Health' is frailty below/above the 75th percentile. 'FE' is fixed effect (within groups) estimation. Standard errors are in parenthesis. R^2 is adjusted R-squared for OLS, and overall R-squared for FE. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 7: Comparison with OLS and Fixed Effect Estimator, Frailty Effects by Age Group

	Everyone			Workers		
	OLS	FE	SYS-GMM	OLS	FE	SYS-GMM
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.564***	0.206***	0.628**	0.555***	0.098***	1.127***
	(0.006)	(0.004)	(0.291)	(0.013)	(0.006)	(0.302)
log(earnings$_{t-2}$)	0.188***	-0.021***	0.115	0.241***	-0.031***	-0.308
	(0.006)	(0.005)	(0.239)	(0.012)	(0.006)	(0.273)
frailty$_t$ × Young	-4.870***	-8.547***	-4.992***	-0.660***	-0.483***	-1.650**
	(0.202)	(0.297)	(1.784)	(0.061)	(0.099)	(0.673)
frailty$_t$ × Old	-5.034***	-8.943***	-4.030***	-0.376***	-0.463***	-0.293
	(0.161)	(0.249)	(1.317)	(0.054)	(0.091)	(0.365)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.580	0.433		0.601	0.080	
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.554***	0.200***	0.669***	0.332***	-0.027***	0.382
	(0.006)	(0.004)	(0.257)	(0.008)	(0.006)	(0.318)
log(hours$_{t-2}$)	0.180***	-0.028***	0.048	0.157***	-0.090***	0.254
	(0.006)	(0.004)	(0.206)	(0.007)	(0.006)	(0.246)
frailty$_t$ × Young	-3.457***	-6.411***	-3.564***	-0.200***	-0.484***	-0.286
	(0.149)	(0.217)	(1.325)	(0.039)	(0.066)	(0.387)
frailty$_t$ × Old	-3.726***	-6.767***	-3.131***	-0.151***	-0.414***	0.144
	(0.116)	(0.182)	(0.936)	(0.036)	(0.060)	(0.259)
Observations	64,965	64,965	64,965	34,274	34,274	34,274
R^2	0.556	0.401		0.234	0.001	
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.525***	0.067***	0.511
				(0.010)	(0.006)	(0.399)
log(wage$_{t-2}$)				0.289***	-0.029***	0.272
				(0.009)	(0.006)	(0.359)
frailty$_t$ × Young				-0.481***	0.028	-1.106**
				(0.050)	(0.086)	(0.463)
frailty$_t$ × Old				-0.274***	-0.064	-0.414
				(0.045)	(0.079)	(0.295)
Observations				34,170	34,170	34,170
R^2				0.592	0.055	

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). 'Young/Old' are individuals younger/older than 45 years of age. 'FE' is fixed effect (within groups) estimation. Standard errors are in parenthesis. R^2 is adjusted R-squared for OLS, and overall R-squared for FE. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

Table 8: Comparison With Different IV Lags, Average Frailty Effect

	Everyone			Workers		
IV Lags	3-4	4-5	5-6	3-4	4-5	5-6
Number of Instruments	20	20	20	20	20	20
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.689***	0.283	0.013	0.367***	-0.235	1.474***
	(0.105)	(0.364)	(0.545)	(0.120)	(0.446)	(0.509)
log(earnings$_{t-2}$)	0.046	0.396	0.684	0.089**	0.833**	-0.640
	(0.044)	(0.298)	(0.439)	(0.041)	(0.346)	(0.454)
frailty$_t$	-4.462***	-5.374***	-5.415**	-0.606**	-0.251	-0.978**
	(1.498)	(1.653)	(2.584)	(0.238)	(0.390)	(0.447)
AR(2) test (p-value)	0.115	0.380	0.233	0.494	0.051	0.130
Hansen test (p-value)	0.060	0.796	0.465	0.475	0.063	0.434
Diff-in-Hansen test (p-value)	0.063	0.652	0.440	0.297	0.027	0.255
Diff-in-Hansen test (p-value), Y-lag set	0.060	0.796	0.465	0.475	0.063	0.434
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.669***	0.399	0.292	-0.275	-0.208	0.003
	(0.119)	(0.322)	(0.387)	(0.379)	(0.288)	(0.345)
log(hours$_{t-2}$)	0.046	0.263	0.459	0.117**	0.448**	0.304
	(0.048)	(0.257)	(0.293)	(0.058)	(0.192)	(0.218)
frailty$_t$	-3.366***	-3.887***	-3.068*	-0.563***	-0.091	0.070
	(1.195)	(1.188)	(1.642)	(0.206)	(0.233)	(0.246)
AR(2) test (p-value)	0.158	0.596	0.302	0.219	0.060	0.273
Hansen test (p-value)	0.068	0.971	0.433	0.141	0.133	0.060
Diff-in-Hansen test (p-value)	0.073	0.944	0.450	0.453	0.083	0.080
Diff-in-Hansen test (p-value), Y-lag set	0.068	0.971	0.433	0.141	0.230	0.060
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.605***	0.603	0.212
				(0.086)	(0.865)	(0.541)
log(wage$_{t-2}$)				0.041	0.184	0.532
				(0.027)	(0.742)	(0.489)
frailty$_t$				-0.167	-0.302	-0.623**
				(0.197)	(0.266)	(0.263)
AR(2) test (p-value)				0.042	0.958	0.454
Hansen test (p-value)				0.335	0.056	0.085
Diff-in-Hansen test (p-value)				0.187	0.024	0.044
Diff-in-Hansen test (p-value), Y-lag set				0.335	0.056	0.085

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). Standard errors are in parenthesis. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 9: Comparison With Different IV Lags, Frailty Effects by Education

	Everyone			Workers		
IV Lags	3-4	4-5	5-6	3-4	4-5	5-6
Number of Instruments	26	26	26	26	26	26
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.676***	0.370	0.055	0.410***	0.077	1.371***
	(0.110)	(0.319)	(0.264)	(0.112)	(0.290)	(0.400)
log(earnings$_{t-2}$)	0.050	0.318	0.632***	0.070*	0.580**	-0.569
	(0.046)	(0.259)	(0.210)	(0.038)	(0.229)	(0.356)
frailty$_t$ × HSD	-5.133***	-6.269***	-5.772***	-1.561***	-1.359**	-1.846**
	(1.809)	(1.777)	(2.050)	(0.540)	(0.692)	(0.807)
frailty$_t$ × HS	-5.009***	-5.591***	-6.532***	-1.137***	-0.577	-1.239***
	(1.610)	(1.574)	(1.876)	(0.294)	(0.364)	(0.460)
frailty$_t$ × CL	-3.237**	-2.519*	-3.125*	0.379	0.526	-0.558
	(1.313)	(1.402)	(1.743)	(0.252)	(0.402)	(0.484)
AR(2) test (p-value)	0.156	0.474	0.024	0.760	0.052	0.082
Hansen test (p-value)	0.022	0.132	0.116	0.681	0.050	0.826
Diff-in-Hansen test (p-value)	0.015	0.360	0.151	0.323	0.008	0.484
Diff-in-Hansen test (p-value), Y-lag set	0.053	0.516	0.516	0.219	0.005	0.388
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.657***	0.383	0.216	-0.366	-0.192	0.074
	(0.123)	(0.319)	(0.253)	(0.383)	(0.280)	(0.313)
log(hours$_{t-2}$)	0.049	0.269	0.495***	0.130**	0.433**	0.168
	(0.050)	(0.253)	(0.189)	(0.058)	(0.186)	(0.221)
frailty$_t$ × HSD	-3.795***	-4.770***	-3.609**	-0.726*	-0.121	-0.533
	(1.412)	(1.320)	(1.580)	(0.380)	(0.342)	(0.356)
frailty$_t$ × HS	-3.749***	-4.303***	-4.232***	-0.749***	-0.076	-0.033
	(1.256)	(1.224)	(1.422)	(0.248)	(0.255)	(0.281)
frailty$_t$ × CL	-2.473**	-2.219**	-2.058	-0.334	-0.092	0.248
	(1.061)	(1.118)	(1.314)	(0.206)	(0.249)	(0.254)
AR(2) test (p-value)	0.196	0.569	0.071	0.149	0.062	0.572
Hansen test (p-value)	0.090	0.317	0.053	0.515	0.384	0.166
Diff-in-Hansen test (p-value)	0.050	0.597	0.108	0.618	0.582	0.062
Diff-in-Hansen test (p-value), Y-lag set	0.105	0.730	0.283	0.430	0.230	0.019
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.598***	0.564	0.122
				(0.087)	(0.481)	(0.368)
log(wage$_{t-2}$)				0.040	0.203	0.600*
				(0.027)	(0.409)	(0.328)
frailty$_t$ × HSD				-0.792*	-1.104**	-1.854***
				(0.410)	(0.547)	(0.616)
frailty$_t$ × HS				-0.516**	-0.566**	-0.889***
				(0.234)	(0.244)	(0.307)
frailty$_t$ × CL				0.356	0.239	-0.216
				(0.241)	(0.356)	(0.309)
AR(2) test (p-value)				0.044	0.884	0.189
Hansen test (p-value)				0.446	0.104	0.374
Diff-in-Hansen test (p-value)				0.198	0.059	0.145
Diff-in-Hansen test (p-value), Y-lag set				0.181	0.038	0.097

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). Standard errors are in parenthesis. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 10: Comparison With Different IV Lags, Frailty Effects by Health Status

	Everyone			Workers		
IV Lags	3-4	4-5	5-6	3-4	4-5	5-6
Number of Instruments	23	23	23	23	23	23
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.799***	0.220	0.009	0.409***	-0.088	1.293***
	(0.106)	(0.362)	(0.492)	(0.114)	(0.387)	(0.410)
log(earnings$_{t-2}$)	0.001	0.444	0.695*	0.077*	0.734**	-0.498
	(0.045)	(0.297)	(0.396)	(0.039)	(0.304)	(0.377)
frailty$_t$ × Good Health	-4.191	-1.930	-4.126	0.220	1.049	-1.765
	(3.587)	(4.816)	(7.067)	(0.763)	(1.326)	(1.775)
frailty$_t$ × Bad Health	-2.963*	-5.207***	-4.941*	-0.621**	-0.191	-0.963**
	(1.570)	(1.745)	(2.665)	(0.255)	(0.408)	(0.469)
AR(2) test (p-value)	0.010	0.298	0.178	0.685	0.055	0.138
Hansen test (p-value)	0.014	0.826	0.544	0.345	0.067	0.543
Diff-in-Hansen test (p-value)	0.007	0.827	0.400	0.162	0.017	0.259
Diff-in-Hansen test (p-value), Y-lag set	0.004	0.960	0.451	0.262	0.019	0.283
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.819***	0.386	0.258	-0.274	-0.085	0.040
	(0.118)	(0.317)	(0.391)	(0.372)	(0.236)	(0.311)
log(hours$_{t-2}$)	-0.014	0.272	0.493*	0.118**	0.383**	0.282
	(0.049)	(0.253)	(0.296)	(0.057)	(0.160)	(0.219)
frailty$_t$ × Good Health	-2.545	-2.216	-2.880	0.434	-0.262	-0.060
	(2.717)	(3.455)	(4.901)	(0.535)	(0.773)	(0.910)
frailty$_t$ × Bad Health	-1.883	-3.707***	-2.900	-0.504**	-0.140	0.026
	(1.236)	(1.242)	(1.845)	(0.205)	(0.239)	(0.258)
AR(2) test (p-value)	0.007	0.565	0.259	0.208	0.064	0.312
Hansen test (p-value)	0.013	0.838	0.478	0.114	0.251	0.174
Diff-in-Hansen test (p-value)	0.007	0.713	0.340	0.250	0.235	0.108
Diff-in-Hansen test (p-value), Y-lag set	0.005	0.838	0.250	0.228	0.187	0.063
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.593***	0.151	0.303
				(0.087)	(0.410)	(0.449)
log(wage$_{t-2}$)				0.045	0.581*	0.461
				(0.027)	(0.351)	(0.419)
frailty$_t$ × Good Health				-0.007	1.661*	0.348
				(0.649)	(0.986)	(1.685)
frailty$_t$ × Bad Health				-0.229	-0.053	-0.581*
				(0.212)	(0.292)	(0.332)
AR(2) test (p-value)				0.059	0.244	0.474
Hansen test (p-value)				0.262	0.210	0.207
Diff-in-Hansen test (p-value)				0.600	0.168	0.082
Diff-in-Hansen test (p-value), Y-lag set				0.465	0.137	0.098

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). 'Good/Bad Health' is frailty below/above the 75th percentile. Standard errors are in parenthesis. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table 11: Comparison With Different IV Lags, Frailty Effects by Age Group

	Everyone			Workers		
IV Lags	3-4	4-5	5-6	3-4	4-5	5-6
Number of Instruments	23	23	23	23	23	23
Panel A. Earnings Regressions						
log(earnings$_{t-1}$)	0.754***	0.628**	0.356	0.334**	0.288	1.127***
	(0.105)	(0.291)	(0.403)	(0.130)	(0.218)	(0.302)
log(earnings$_{t-2}$)	0.019	0.115	0.408	0.099**	0.440**	-0.308
	(0.045)	(0.239)	(0.328)	(0.043)	(0.176)	(0.273)
frailty$_t$ × Young	-5.068***	-4.992***	-4.360*	-0.545	-0.346	-1.650**
	(1.631)	(1.784)	(2.649)	(0.341)	(0.465)	(0.673)
frailty$_t$ × Old	-3.265**	-4.030***	-4.238**	-0.861***	-0.472*	-0.293
	(1.422)	(1.317)	(1.802)	(0.232)	(0.262)	(0.365)
AR(2) test (p-value)	0.029	0.949	0.435	0.383	0.078	0.160
Hansen test (p-value)	0.342	0.752	0.414	0.163	0.000	0.465
Diff-in-Hansen test (p-value)	0.286	0.464	0.389	0.314	0.000	0.214
Diff-in-Hansen test (p-value), Y-lag set	0.204	0.479	0.195	0.766	0.000	0.249
Panel B. Hours Regressions						
log(hours$_{t-1}$)	0.739***	0.669***	0.467	0.281	0.245	0.382
	(0.115)	(0.257)	(0.286)	(0.231)	(0.310)	(0.318)
log(hours$_{t-2}$)	0.017	0.048	0.325	0.035	0.208	0.254
	(0.047)	(0.206)	(0.221)	(0.037)	(0.211)	(0.246)
frailty$_t$ × Young	-3.640***	-3.564***	-2.511	-0.648***	-0.149	-0.286
	(1.286)	(1.325)	(1.871)	(0.235)	(0.321)	(0.387)
frailty$_t$ × Old	-2.537**	-3.131***	-2.623**	-0.518***	-0.210	0.144
	(1.087)	(0.936)	(1.121)	(0.141)	(0.198)	(0.259)
AR(2) test (p-value)	0.039	0.706	0.438	0.741	0.642	0.642
Hansen test (p-value)	0.251	0.811	0.609	0.024	0.006	0.051
Diff-in-Hansen test (p-value)	0.185	0.545	0.485	0.007	0.002	0.037
Diff-in-Hansen test (p-value), Y-lag set	0.108	0.557	0.373	0.014	0.002	0.069
Panel C. Wage Regressions						
log(wage$_{t-1}$)				0.524***	0.306	0.511
				(0.096)	(0.382)	(0.399)
log(wage$_{t-2}$)				0.063**	0.434	0.272
				(0.029)	(0.325)	(0.359)
frailty$_t$ × Young				-0.022	-0.227	-1.106**
				(0.295)	(0.379)	(0.463)
frailty$_t$ × Old				-0.304*	-0.328	-0.414
				(0.174)	(0.211)	(0.295)
AR(2) test (p-value)				0.298	0.398	0.734
Hansen test (p-value)				0.202	0.024	0.170
Diff-in-Hansen test (p-value)				0.317	0.031	0.104
Diff-in-Hansen test (p-value), Y-lag set				0.147	0.036	0.065

Notes: Panel A (B) [C] shows regression results for the effect of frailty on earnings (hours) [wages]. All regressions include controls (marital status, marital status interacted with gender, number of kids, number of kids interacted with gender, time dummies, and a quadratic in age). 'Young/Old' are individuals younger/older than 45 years of age. Standard errors are in parenthesis. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 12: Results of instrument power tests for system GMM estimation of earnings on frailty

Dependent variable	Explanatory variables	F-statistic	R^2
Panel A. Dependent variables in levels			
y_t	Δy_{t-4}	175.0	0.099
y_t	$\Delta y_{t-4}, \Delta y_{t-5}$	93.71	0.10
f_t	Δf_{t-4}	135.5	0.078
f_t	$\Delta f_{t-4}, \Delta f_{t-5}$	68.55	0.075
Panel B. Dependent variables in first-differences			
Δy_t	y_{t-4}	40.63	0.003
Δy_t	y_{t-4}, y_{t-5}	13.62	0.003
Δf_t	f_{t-4}	23.18	0.002
Δf_t	f_{t-4}, f_{t-5}	3.10	0.000

Notes: F-statistics and R^2 values from OLS regressions of the endogenous variables in the main system GMM estimation (column (2) of Table 2 in the paper) on their instrument sets.

3 Additional Information about the Structural Model

3.1 Recursive competitive equilibrium

In this section we provide the definition of equilibrium we employ in the structural model economy. Let $\{\mu^E(x,i_s), \mu^N(x,n_a), \mu^D(x,n_d), \mu^R(x)\}$ represent the time-invariant measures of individuals. We assume that these are the population measures *after* the labor participation decisions and DI application decisions are made. The concept of a stationary recursive competitive equilibrium can be defined as follows.

Given a fiscal policy $\{Tr(\cdot), SS(\cdot), T(\cdot), \tau_K\}$, a *stationary recursive competitive equilibrium* is a set of value functions $\{V^E(x,i_s), V^N(x,n_a), V^D(x,n_d), V^R(x)\}$, households' consumption decisions $\{c^E(x,i_s), c^N(x,n_a), c^D(x,n_d), c^R(x)\}$, saving decisions $\{a^E(x,i_s), a^N(x,n_a), a^D(x,n_d), a^R(x)\}$, labor force participation decisions $I_E(x,i_s)$ and $I_N(x,n_a)$; prices of labor and capital $\{w,r\}$; government expenditures G; and time-invariant measures of households $\{\mu^E(x,i_s), \mu^N(x,n_a), \mu^D(x,n_d), \mu^R(x)\}$ such that:

1. Given the fiscal policy and prices, households' decision rules solve households' decision problems in equations (6), (8), (10), (12), (13), (15), and (16) in the paper.

2. Rental rate r is exogenously given and the wage is given by equation (18) in the paper.

3. Aggregate labor and capital input satisfy:

$$N = \sum_{\{x,i_s\}} \eta(x)\, \mu^E(x,i_s),$$
$$r = (1-\tau_K)\left(\alpha A (K/N)^{\alpha-1} - \delta\right).$$

4. Government expenditures G are such that the government's budget constraint holds

$$\begin{aligned}\sum_{\{x,i_s\}} T(w\eta(x))\, \mu^E(x,i_s) + \tau_K\left(\alpha A (K/N)^{\alpha-1} - \delta\right) + B = G& \\ + \sum_{\{x,n_d\}} \left(\mu^D(x,n_d) + \mu^R(x)\right) SS(\bar{e})& \\ + \sum_{\{x,i_s,n_d\}} \left(\mu^E(x,i_s) + \mu^D(x,n_d) + \mu^R(x)\right) Tr(x),&\end{aligned}$$

where accidental bequests

$$B = \sum_{\{x,i_s\}} (1-p(x))a^E(x,i_s)\mu^E(x,i_s) + \sum_{\{x,n_a\}} (1-p(x))a^N(x,n_a)\mu^N(x,n_a) + \sum_{\{x,n_a\}} (1-p(x))a^D(x,n_a)\mu^D(x,n_a) + \sum_{\{x\}} (1-p(x))a^R(x)\mu^R(x).$$

5. The measures $\{\mu^E(x,i_s), \mu^N(x,n_a), \mu^D(x,n_d), \mu^R(x)\}$ are stationary

   (a) Employed:

$$\mu^E(x',0) = \frac{I_E(x',0)}{1+\nu} \sum_{\{x,i_s\}} (1-\sigma)\, p(j,f)\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^E(x,i_s)} \mu^E(x,i_s)$$

$$\mu^E(x',1) = \frac{I_E(x',1)}{1+\nu} \sum_{\{x,i_s\}} \sigma p(x)\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^E(x,i_s)} \mu^E(x,i_s) + \frac{1}{1+\nu} \sum_{\{x,n_a\}} (1-\theta(f,n_a))\, p(x)\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^N(x,n_a)} I_N(x',n_a+1)\, \mu^N(x,n_a)$$

   (b) Non-employed:

$$\mu^N(x',0) = \frac{1-I_E(x',0)}{1+\nu} \sum_{\{x,i_s\}} (1-\sigma)\, p(x)\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^E(x,i_s)} \mu^E(x,i_s) + \frac{1-I_E(x',1)}{1+\nu} \sum_{\{x,i_s\}} \sigma p(x)\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^E(x,i_s)} \mu^E(x,i_s)$$

$$\mu^N(x',n_a+1) = \frac{1-I_N(x',n_a+1)}{1+\nu} \sum_{\{x,n_a\}} p(x)\,(1-\theta(f,n_a))\, \pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^N(x,n_a)} \mu^N(x,n_a)$$

   (c) DI beneficiary:

$$\mu^D(x',0) = \frac{1}{1+\nu} \sum_{\{x,n_a\}} \theta(f,n_a)\, p(x)\pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^N(x,i_s)} \mu^N(x,n_a)$$

$$\mu^D(x',n_d+1) = \frac{1}{1+\nu} \sum_{\{x\}} p(x)\pi^e(\epsilon'|x)\, \pi^f(f'|x)\, \mathbf{1}_{a'=a^D(x,n_d)} \mu^D(x,n_d)$$

   (d) Retiree:

for $j = R - 1$

$$\begin{aligned}
\mu^R(x') = {} & \frac{1}{1+\nu} \sum_{\{x,n_d\}} p(x)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^D(x,i_s)}\mu^D\left(x,n_d\right) \\
& + \frac{1-I_E(x',1)}{1+\nu} \sum_{\{x,i_s\}} \left(1-\sigma\right)p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^E(x,i_s)}\mu^E\left(x,i_s\right) \\
& + \frac{1-I_E(x',0)}{1+\nu} \sum_{\{x,i_s\}} \sigma p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^E(x,i_s)}\mu^E\left(x,i_s\right) \\
& + \frac{1}{1+\nu} \sum_{\{x,n_a\}} p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^N(x,i_s)}\left(1-I_N\left(x',n_a+1\right)\right)\mu^N\left(x,n_a\right)
\end{aligned}$$

for $j > R - 1$

$$\begin{aligned}
\mu^R(x') = {} & \frac{1}{1+\nu} \sum_{\{x\}} p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^R(x)}\mu^R\left(x\right) \\
& + \frac{1-I_E(x',1)}{1+\nu} \sum_{\{x,i_s\}} \left(1-\sigma\right)p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^E(x,i_s)}\mu^E\left(x,i_s\right) \\
& + \frac{1-I_E(x',0)}{1+\nu} \sum_{\{x,i_s\}} \sigma p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^E(x,i_s)}\mu^E\left(x,i_s\right) \\
& + \frac{1}{1+\nu} \sum_{\{x,n_a\}} p\left(x\right)\pi^e\left(\epsilon'|x\right)\pi^f\left(f'|x\right)\mathbf{1}_{a'=a^N(x,i_s)}\left(1-I_N\left(x',n_a+1\right)\right)\mu^N\left(x,n_a\right)
\end{aligned}$$

4 Additional Calibration Details

This section includes additional information, moments, and estimation results related to the calibration of the structural model as described in Section 4 of the paper. Table 13 shows the distribution of 24-26 year-old males across employment states by education and frailty percentile group in the data. This distribution is used as the initial distribution of individuals across employment states in the model. Individuals who start out as DI beneficiary are assumed to be severely disabled and have permanent zero productivity. Table 14 shows results from the estimation of mortality probits using HRS data. The mortality probit results determine the conditional survival probabilities in the model.

We consider two specifications for the log productivity profiles in the model: one with linear frailty effects and one with quadratic frailty effects. For both specifications, we estimate a process for log wages (our proxy for labor productivity) using our dynamic panel estimator. Since we only observe wages of individuals who work, we employ a selection correction procedure in the estimation. The selection correction procedure requires us to start by estimating a selection equation that includes fixed effects and an exclusion restriction.

Table 13: Distribution (%) of 24–26 year-old males across employment states by education and frailty percentile group: model and data

	Frailty percentile group				
	0–50th	50–70th	70–90th	90–95th	95–100th
High-school dropouts					
Employed	75.0	72.0	68.8	73.1	61.3
Non-employed	24.1	26.3	26.7	17.3	4.3
DI beneficiary	0.9	1.7	4.5	9.7	34.4
High-school graduates					
Employed	92.4	89.7	91.9	92.8	81.8
Non-employed	7.2	8.9	6.4	0.0	0.0
DI beneficiary	0.4	1.4	1.7	7.2	18.2
College graduates					
Employed	95.7	95.0	93.6	100.0	96.9
Non-employed	4.3	5.0	6.4	0.0	0.0
DI beneficiary	0.0	0.0	0.0	0.0	3.1

Note: Percent breakdown of 25–26 year olds males by employment state for each education and frailty percentile group. Authors' calculations using PSID, MEPS, and SSA data.

Table 15 shows the estimation results from this first stage for both the linear and quadratic frailty specifications. Table 16 shows the estimation results from both log productivity specifications both with and without the selection correction. Notice that the coefficients on the high school dropout and high school graduate quadratic frailty terms are not significant above the 10 percent level. In addition, the coefficients have the wrong sign. These two specifications imply that productivity declines in frailty at lower values of frailty and increases in frailty at higher values. The increases occur at values of frailty above the 95th percentile of the frailty distribution and are, thus, estimated off a very small number observations. The rate of decline in log productivity with frailty in both cases is very similar under the linear and quadratic specifications. In contrast the coefficient on the quadratic term in the college regression is strongly significant, has the correct sign, and implies that frailty declines starting from the 76th percentile. Given these findings, we use the linear specification for the non-college groups and the quadratic specification for the college graduates group. The results are robust to whether frailty is treated as exogenous or endogenous. Table 17 shows this for the linear specification. Note that the frailty effects in Table 17 are reported as the effect of one additional deficit.

After we estimate the frailty effects on log wages, we remove them and then, for each education group, we regress the adjusted log wages on age polynomials and year dummies. The residuals from these regressions are used to estimate the stochastic component of the produc-

Table 14: Estimation of mortality probits

	Mortality probit regression
frailty	3.184***
	(0.104)
frailty^2	-1.039***
	(0.126)
age	-0.001
	(0.005)
age^2	0.00025***
	(0.00004)
education (years)	-0.001
	(0.001)
male	0.288***
	(0.011)
constant	-3.725***
	(0.197)
year fixed effects	yes
Observations	212,364
Pseudo R^2	0.218

Note: Standard errors are in parenthesis. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Mortality probits are estimated using 1998–2014 HRS data.

tivity process. This is done via GMM. The targeted moments are a set of variance-covariance moments. High school dropouts and graduates are combined for the GMM estimation of the stochastic component. Table 18 shows the estimation results for these steps.

Table 19 shows the results of the estimation of the zero frailty probits used in the model. Table 20 shows the results from the estimation of the nonzero frailty processes for each education group. Figures 1 and 2 are the counterparts for the high school dropout and college graduate groups to Figure 3 in the paper which shows the high school graduates. Table 21 shows the results of the out-of-pocket medical expenditures estimation for each education group and type.

Table 15: Estimation of the effect of frailty on labor productivity. Stage 1: Selection equation regressions.

	Linear frailty effect	Quadractic frailty effect
frailty × HSD	-0.891	-1.492
	(6.251)	(6.251)
frailty × HSG	-0.874	-1.170
	(6.251)	(6.250)
frailty × CG	-0.535	-0.448
	(6.250)	(6.248)
frailty^2 × HSD		0.426
		(0.272)
frailty^2 × HSG		-0.146
		(0.143)
frailty^2 × CG		-1.192***
		(0.257)
age	0.038***	0.039***
	(0.003)	(0.003)
age^2	-0.0003***	-0.0003***
	(0.00002)	(0.00002)
exclusion restrictions	total of 436 combinations	
joint p-value	0.000	0.000

Note: The left-hand-side variable is employment (1 if employed, 0 otherwise). Standard errors are in parenthesis. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

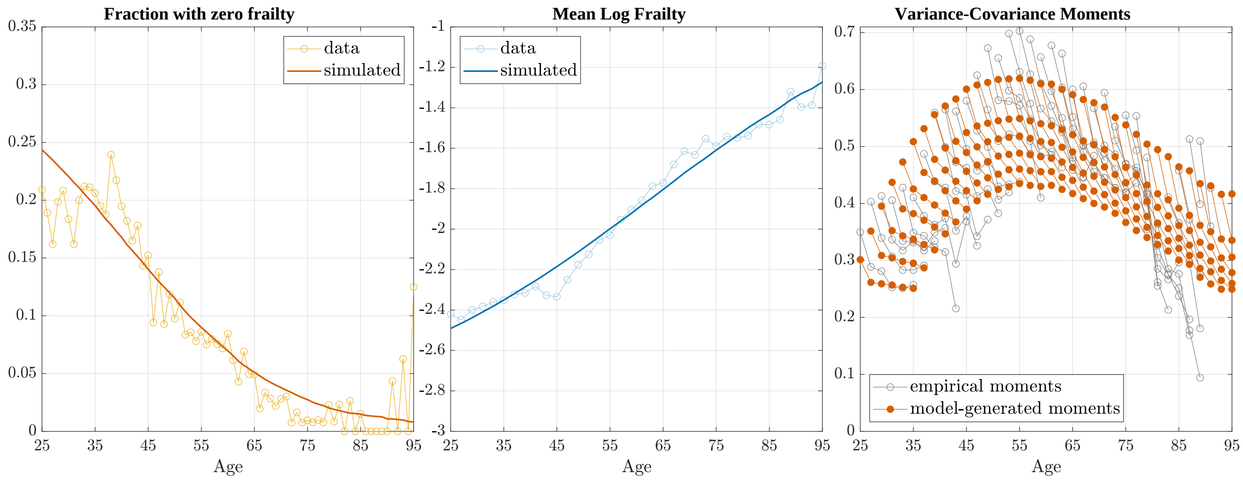


Figure 1: Estimation targets: auxiliary simulation model vs PSID data for high school dropouts. Left panel is the fraction with zero frailty by age, middle panel is mean log frailty by age for those with nonzero frailty, and right panel is the age-profile of the variance and covariances of log frailty residuals (the stochastic component of log frailty).

Table 16: Estimating the effect of frailty on labor productivity. Stage 2: Bias correction.

	Linear frailty effect		Quadratic frailty effect	
	no correction	correction	no correction	correction
$\log(\text{wage}_{t-1})$	1.044***	1.034***	1.039***	1.024***
	(0.298)	(0.295)	(0.298)	(0.295)
$\log(\text{wage}_{t-2})$	-0.263	-0.262	-0.265	-0.259
	(0.270)	(0.262)	(0.268)	(0.260)
$\text{frailty}_t \times$ HSD	-1.128**	-1.201**	-1.952**	-2.078**
	(0.453)	(0.469)	(0.900)	(0.929)
$\text{frailty}_t \times$ HS	-0.662***	-0.741***	-1.048**	-1.169**
	(0.235)	(0.251)	(0.441)	(0.466)
$\text{frailty}_t \times$ CL	0.052	0.025	0.397*	0.392*
	(0.119)	(0.119)	(0.223)	(0.221)
$\text{frailty}^2 \times$ HSD			3.477*	3.595*
			(1.999)	(2.027)
$\text{frailty}^2 \times$ HSG			1.658	1.804*
			(1.015)	(1.036)
$\text{frailty}^2 \times$ CL			-2.058**	-2.146**
			(0.843)	(0.845)
selection term		0.076**		0.090**
		(0.035)		(0.038)
Observations	23,874	23,755	23,874	23,755
AR(2) test (p-value)	0.182	0.163	0.178	0.165
Hansen test (p-value)	0.107	0.096	0.107	0.096
Diff-in-Hansen test (p-value)	0.307	0.417	0.309	0.434

Note: The left-hand-side variable is log wage. The selection term is the predicted fixed effects from the regression in stage 1. Standard errors are in parenthesis. $*p < 0.1$; $**p < 0.05$; $***p < 0.01$.

Table 17: Estimating the effect of frailty on labor productivity: endogenous versus exogenous frailty.

	Endogenous frailty		Exogenous frailty	
	no correction	correction	no correction	correction
log(wage_$t-1$)	0.863***	0.853***	1.044***	1.034***
	(0.172)	(0.170)	(0.298)	(0.295)
log(wage_$t-2$)	-0.093	-0.088	-0.263	-0.262
	(0.158)	(0.159)	(0.270)	(0.262)
frailty × HSD (one add. deficit)	-0.037	-0.039	-0.042**	-0.044**
	(0.024)	(0.024)	(0.017)	(0.017)
frailty × HSG (one add. deficit)	-0.019	-0.026	-0.025***	-0.027***
	(0.018)	(0.019)	(0.009)	(0.009)
frailty × CL (one add. deficit)	0.000	-0.002	0.002	0.001
	(0.021)	(0.021)	(0.004)	(0.004)
selection term		0.059		0.076**
		(0.141)		(0.035)
Observations	23,874	23,755	23,874	23,755
AR(2) test (p-value)	0.195	0.189	0.182	0.163
Hansen test (p-value)	0.228	0.172	0.107	0.096
Diff-in-Hansen test (p-value)	0.370	0.356	0.307	0.417

* $p < .1$, ** $p < .05$, *** $p < .01$

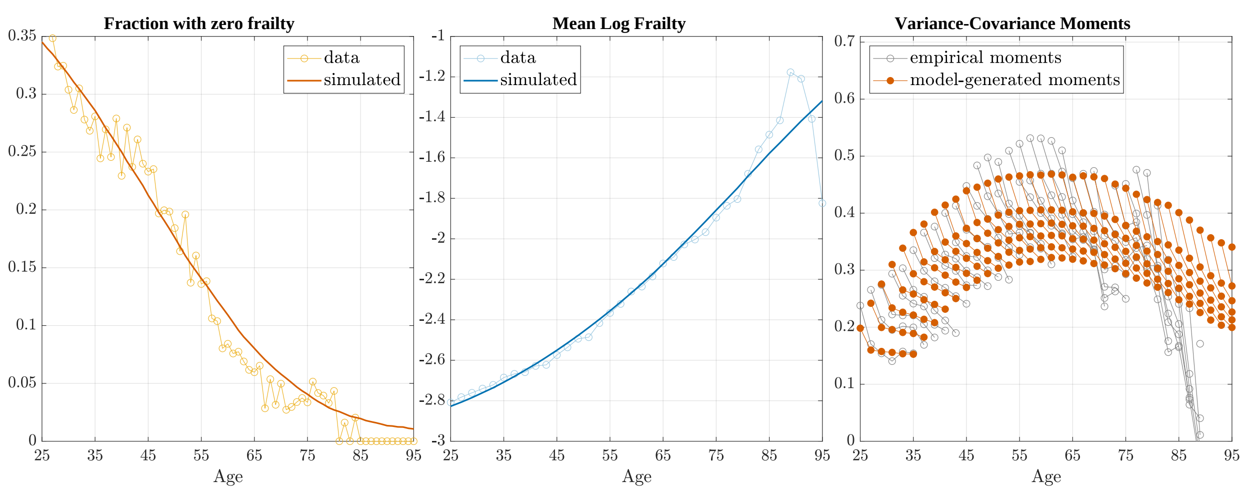


Figure 2: Estimation targets: auxiliary simulation model vs PSID data for college graduates. Left panel is the fraction with zero frailty by age, middle panel is mean log frailty by age for those with nonzero frailty, and right panel is the age-profile of the variance and covariances of log frailty residuals (the stochastic component of log frailty).

Table 18: Estimation of labor productivity process after bias correction and removal of frailty effect

(a) Estimation results for deterministic component of wages (net of frailty effect).

	Ages 25-49 Non-college	Ages 25-59 College	Ages 50+ Non-college	Ages 60+ College
age	0.050	0.092	0.080	0.006
	(0.003)	(0.005)	(0.018)	(0.029)
age^2	-0.0005	-0.0009	-0.0008	-0.0002
	(0.0004)	(5.2e-6)	(0.0001)	(0.0002)
constant	1.878	1.196	1.224	3.932
	(0.075)	(0.108)	(0.574)	(0.924)
year fixed effects	yes	yes	yes	yes
	13,448	9,838	13,286	6,144
R^2	0.042	0.060	0.030	0.019

(b) Estimation results for stochastic component of wages.

	Non-college	Col Graduates
var. of transitory shock	0.0824	0.0985
	(0.0115)	(0.0122)
var. of permanent shock	0.0165	0.0181
	(0.0049)	(0.0059)
var. of fixed effect	0.0920	0.1254
	(0.0145)	(0.0234)
persistence	0.9218	0.9730
	(0.0231)	(0.0114)

Table 19: Estimation of zero frailty probits

	Zero frailty probit regression
age	0.0012
	(0.0027)
age^2	-0.0003***
	(0.00003)
high school grad dummy	-0.107***
	(0.017)
college grad dummy	0.295***
	(0.017)
constant	-0.534***
	(0.0620)
Observations	94,860
Pseudo R^2	0.082

Note: Standard errors are in parenthesis. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Zero frailty probits are estimated using PSID data.

Table 20: Estimation of nonzero frailty process

(a) First Stage: deterministic component

	HS Dropout	HS Graduates	Col Graduates
age	1.26	0.988	0.999
	(0.095)	(0.030)	(0.064)
age^2	2.19	1.40	2.04
	(0.492)	(0.146)	(0.305)
age^3	-0.607	-1.39	-0.838
	(0.951)	(0.380)	(0.585)
age^4	3.03	8.77	3.05
	(0.636)	(0.307)	(0.403)
const.	-2.50	-2.57	-2.83
	(0.006)	(0.003)	(0.004)

Note: age is rescaled so that age = (age-25)/100.

	HS Dropout	HS Graduates	Col Graduates
ρ	0.979	1.001	0.9690
	(0.002)	(0.001)	(0.002)
σ^2_α	0.2232	0.1542	0.1270
	(0.0107)	(0.005)	(0.0050)
σ^2_u	0.0368	0.0506	0.0357
	(0.0039)	(0.002)	(0.0023)
σ^2_ε	0.0286	0.0162	0.0250
	(0.0018)	(0.001)	(0.0012)

(b) Second stage: Stochastic component

Table 21: Estimation of out of pocket medical expenditures

Estimation of log of out of pocket medical expenditures									
	High School Dropouts			High School Graduates			College Graduates		
	on medicare	working	not working	on medicare	working	not working	on medicare	working	not working
age	0.19	-0.23	0.42	-0.08	-0.03	-0.05	0.47	-0.11	-0.75
	(0.10)	(0.09)	(0.22)	(0.07)	(0.06)	(0.16)	(0.16)	(0.08)	(0.30)
age^2	-0.0024	0.00577	-0.00948	0.00238	0.00166	0.00165	-0.00717	0.00339	0.0163
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
age^3	0.0000114	-0.0000391	0.0000749	-0.0000149	-0.0000115	-0.00000646	0.0000359	-0.0000235	-0.000104
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
frailty	21.1	29.15	26.66	15.12	25.01	23.07	12.32	19.89	21.68
	(0.87)	(0.84)	(1.40)	(0.71)	(0.52)	(1.24)	(0.90)	(0.72)	(2.28)
frailty^2	-49.27	-71.78	-62.71	-35.9	-66.46	-55.72	-32.42	-49.45	-62.04
	(2.77)	(4.76)	(4.87)	(2.41)	(3.05)	(4.83)	(3.34)	(4.63)	(9.30)
frailty^3	35.86	55.31	47.43	27.32	54.53	42.95	26.16	37.55	51.05
	(2.45)	(6.36)	(4.56)	(2.27)	(4.28)	(5.03)	(3.33)	(6.77)	(9.67)
constant	-2.138	3.876	-5.45	3.535	1.525	1.232	-5.263	3.977	12.97
	(1.90)	(1.27)	(3.01)	(1.30)	(0.78)	(2.28)	(3.15)	(1.04)	(4.20)
Obs.	7160	17232	3068	10941	46641	5138	5182	24998	1456
R^2	0.162	0.205	0.312	0.113	0.181	0.278	0.0694	0.142	0.259

Table 22: Effect of work limitation on wages (% decline in wages relative to no limitation)

	mean frailty	Low and Pistaferri (2015) non-college	Our estimation non-college	HSD	HSG	College
No limitation	0.07					
Mod. limitation	0.18	-5.7	-9.0	-13.1	-8.1	-5.7
Severe limitation	0.28	-17.7	-18.0	-26.1	-16.1	-13.8

4.1 Comparing frailty effects on wages to Low and Pistaferri (2015)

Low and Pistaferri (2015) estimate the effect of *disability status* on wage for non-college men. They use self-reported responses in PSID to define three disability groups: no work limitations, moderate work limitations and severe work limitations. As the second column of Table 22 shows, they find that having a moderate (severe) work limitation reduces wages by 5.7% (17.7%) relative to no work limitation.

To compare our estimates with theirs, we sort inidividuals in our PSID sample into the same three groups and calculate mean frailty by group. We then calculate the effects on wages of moving from the mean frailty of the no work limitation group to that of both the moderate and severe group. Mean frailty for each group is reported in column 1 of Table 22. Wage effects are reported in columns 3–6. We find that moderate (severe) work limitations reduce non-college wages by 9.0% and 18.0%. These are similar, albeit slightly larger, effects than those found by Low and Pistaferri (2015). We also find that there is substantial variation in the effect within the non-college group. Workers with less than a high school degree experience significantly larger wage effects, on average, as compared to those with a high school degree. Effects, in general, decline with education. However, even college workers experience signficant wage declines due to either moderate or severe declines in their health.

4.2 Calculation of labor force participation rates of denied DI applicants

In the structural model, we do not explicitly model the decision to apply for DI. Instead, we assume that individuals who are non-employed for one period are DI applicants. Under this assumption, the fraction of those denied DI benefits in their first year of application who are working 3 years later is the same as the fraction of individuals non-employed for 1 year that are working 3 years later. The first column of Table 23 shows these fractions. However, some non-employed individuals have low frailty values and therefore low probabilities of DI acceptance. For instance, the probability of getting on DI is less than 0.1 percent for

Table 23: Fraction of those who were non-employed for 1 year who are working 3 years later in the benchmark economy

Age	All	By frailty level frailty > 0.1	frailty > 0.2	frailty > 0.3
25–65	31.9	30.8	27.7	24.6
35–64	28.5	27.8	26.3	23.2
45–64	26.2	25.9	24.7	21.2

individuals with a frailty value below 0.1. Thus, we also report the fractions working 3 years later conditional on frailty level in the non-employment year to show how these numbers vary with alternative assumptions about who the DI applicants are in the model. While the variation is relatively small, not surprisingly, the probability of being employed 3 years later is declining in frailty level at the time of non-employment.

For the purpose of comparing the labor force participation rates of those denied DI to those in the literature, we use the second column of Table 23 which reports the fraction working 3 years later among those who were non-employed and had a frailty value greater than 0.1. We use these values for two reasons. First, given how low the probability of getting DI is for individuals with frailty below 0.1, it is very reasonable to assume that these non-employed individuals are not in fact DI applicants. Second, when only individuals with frailty values above 0.1 are counted as DI applicants than the fraction of individuals who get on DI one year after application in the benchmark model is approximately 0.50 which is consistent with the corresponding fraction in the data as reported by French and Song (2014).

5 Additional Results

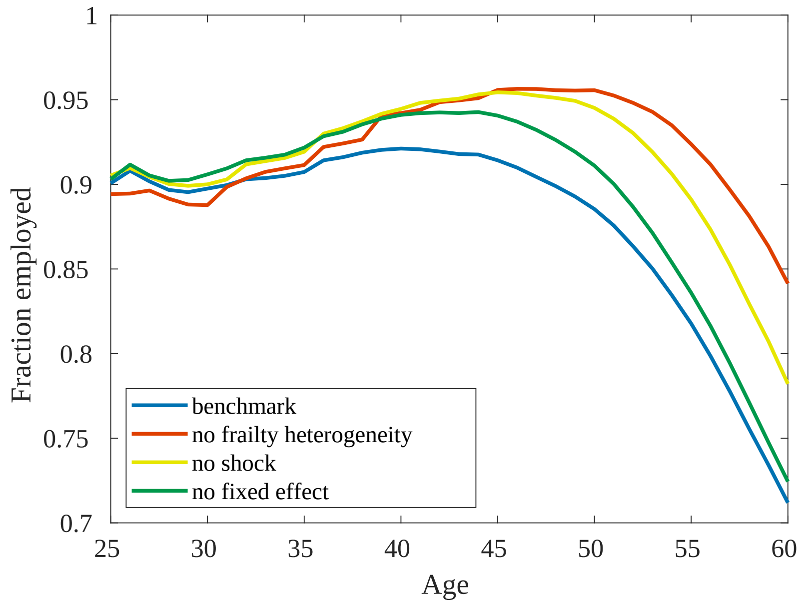
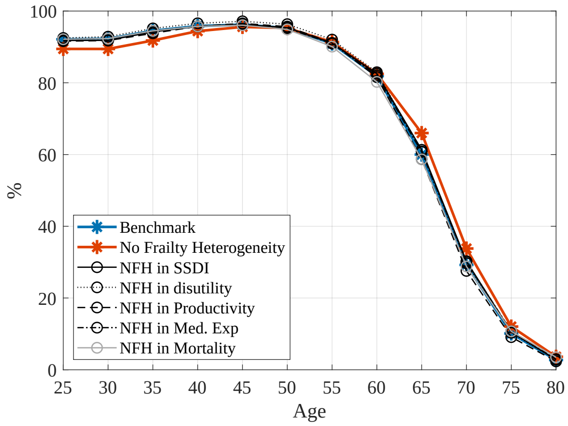
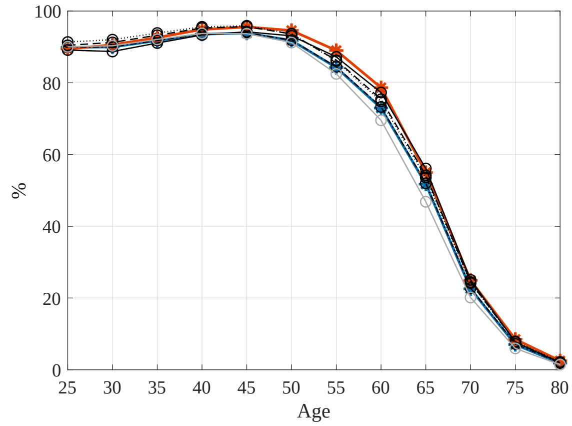


Figure 3: Fraction employed by age in the benchmark economy, the no-frailty-heterogeneity economy, the economy with no frailty shocks, and the economy with no frailty fixed effects.

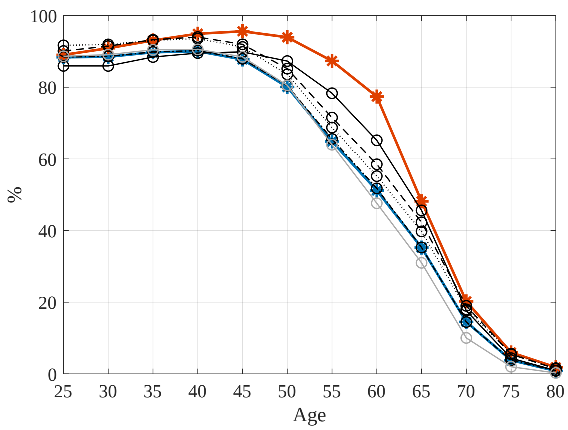
Figure 3 shows the fractions employed by age in the benchmark economy, the no-frailty-heterogeneity economy, the economy with no frailty shocks, and the economy with no frailty fixed effects. The figure shows that the patterns of labor supply over the lifecycle vary across the different economies. While removing all frailty heterogeneity increases labor supply the most at older ages relative to only removing shocks or only removing fixed effects, it reduces labor supply relative to the benchmark at very young ages (below age 35). In contrast, removing only shocks or only fixed effects increases labor supply at all ages with small effects on labor supply relative to removing both after age 45. The reason for these patterns is provided in Section 6 of the paper.



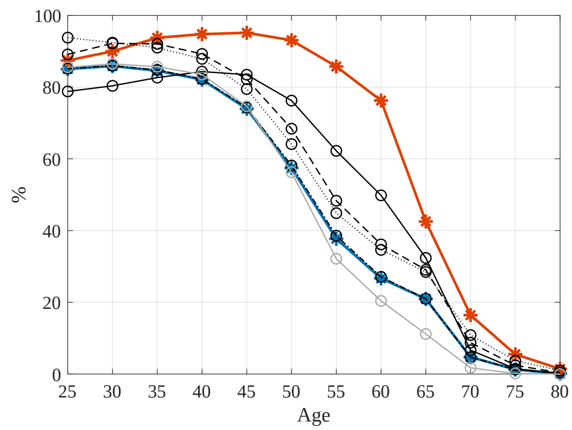
(a) Bottom half



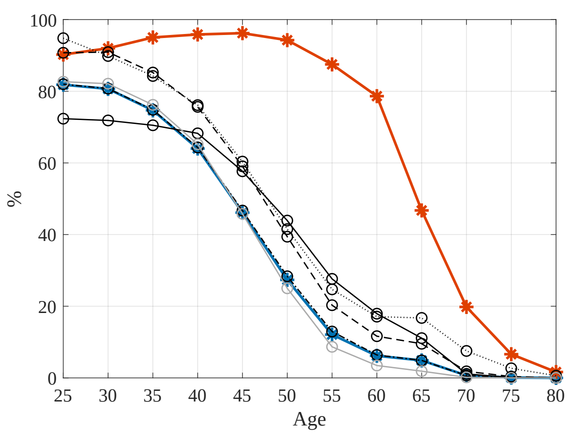
(b) 50th to 70th percentile



(c) 70th to 90th percentile

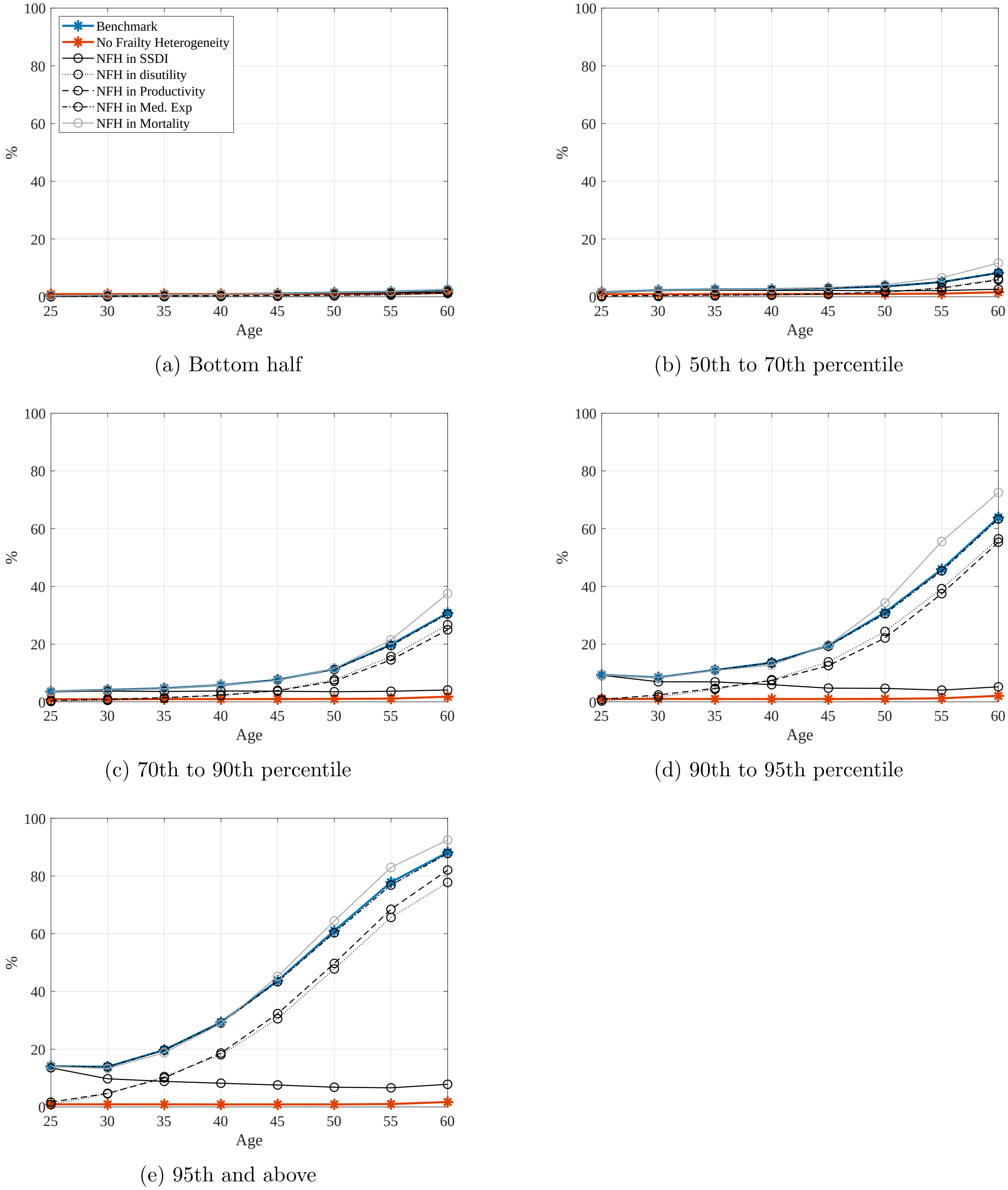


(d) 90th to 95th percentile



(e) 95th and above

Figure 4: Labor force participation rates by age and frailty percentile groups: comparison between the benchmark (blue), no-frailty-heterogeneity (red), and additional five counterfactual (black and grey) economies.



(a) Bottom half

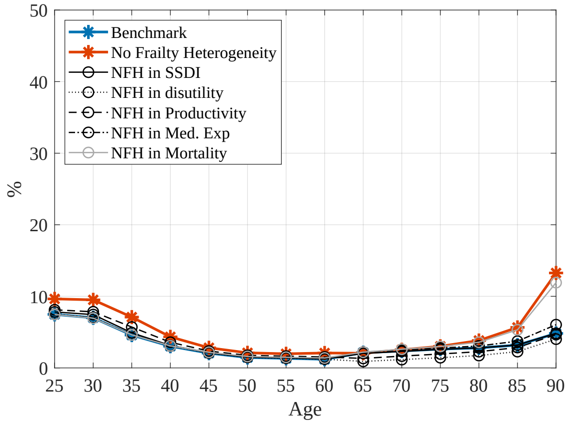
(b) 50th to 70th percentile

(c) 70th to 90th percentile

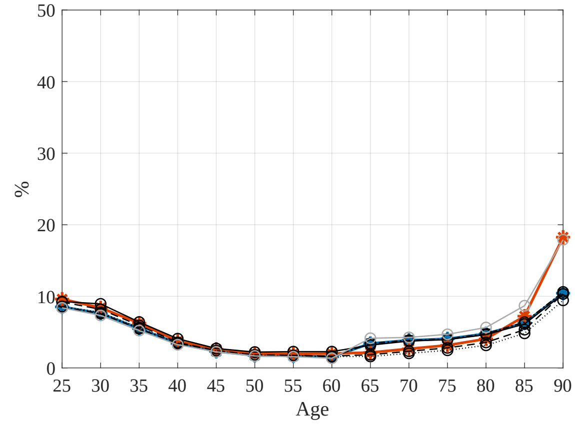
(d) 90th to 95th percentile

(e) 95th and above

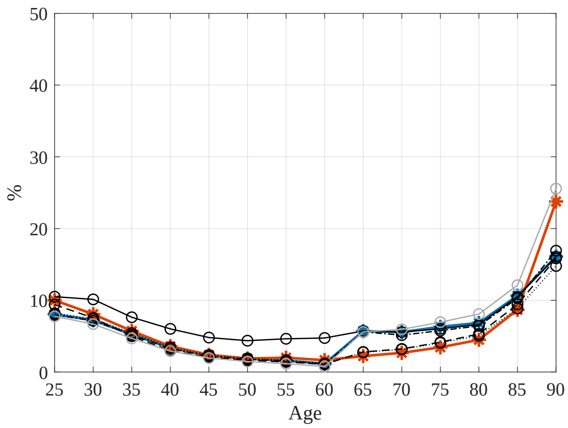
Figure 5: SSDI recipiency rates by age and frailty percentile groups: comparison between the benchmark (blue), no-frailty-heterogeneity (red), and additional five counterfactual (black and grey) economies.



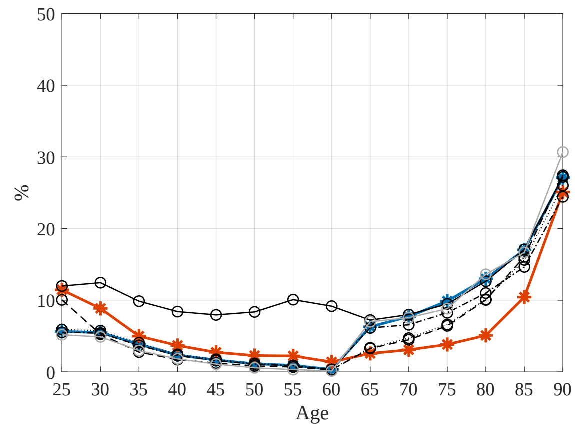
(a) Bottom half



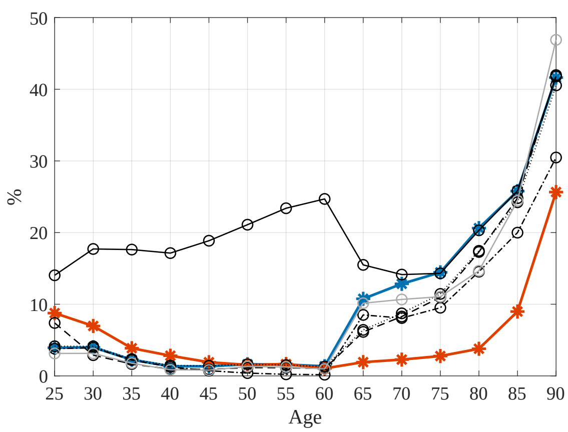
(b) 50th to 70th percentile



(c) 70th to 90th percentile



(d) 90th to 95th percentile



(e) 95th and above

Figure 6: Means-tested transfer recipiency rates by age and frailty percentile groups: comparison between the benchmark (blue), no-frailty-heterogeneity (red), and additional five counterfactual (black and grey) economies.

Table 24 shows the variance of log lifetime disposable income in the benchmark economy,

Table 24: Variance of log lifetime disposable income: frailty shocks versus initial frailty heterogeneity

	age 45	age 55	age 65	age 75
Benchmark	0.302	0.328	0.326	0.318
No frailty heterogeneity (NFH)	0.267	0.276	0.283	0.272
% Δ relative to benchmark	-11.7	-15.8	-13.3	-14.5
No frailty shocks	0.261	0.277	0.286	0.275
% Δ relative to benchmark	-13.5	-15.7	-12.4	-13.4
No frailty fixed effect	0.265	0.287	0.286	0.274
% Δ relative to benchmark	-12.4	-12.5	-12.2	-13.7

Note: In the "No frailty heterogeneity" counterfactual all individuals have the average frailty profile. "No frailty shocks" removes only ex post shocks but retains all fixed-effect heterogeneity. "No frailty fixed effect" removes fixed effect heterogeneity but retains all shocks.

the economy with no frailty heterogeneity, the economy with only individual fixed effect heterogeneity (and no shock), and the economy with only frailty shocks (and no fixed effect heterogeneity). Relative to the case of the variance of log lifetime earnings, initial fixed effect heterogeneity plays a larger role in accounting for the decline in the variance of log lifetime disposable income. This is for two reasons. First, individuals with a high initial fixed frailty component may never work. These individuals have positive disposable lifetime income but because they have zero lifetime earnings are not accounted for in the variance of log lifetime earnings calculations. Second, DI provides more insurance against frailty shocks than high initial and permanent frailty because benefits are based on past earnings.

5.1 Aggregate effects of health inequality

We report the aggregate implications of removing health inequality and removing its effect through each of the five channels through which health operates in the model in Table 26. Each column shows the change in GDP per capita, aggregate consumption, aggregate capital, aggregate labor services, aggregate hours, and labor productivity (GDP per hours) for each of our counterfactual economies relative to benchmark. The first column shows that removing all inequality in frailty raises GDP per capita by 2.15 percent and aggregate consumption by 0.92 percent. It also increases hours worked (employment) by 2.15 percent. As we explain in Section 6 of the paper, removing inequality in frailty mainly increases participation of workers at the bottom of the income/wage distribution. Since these are on average the less productive workers, the resulting GDP per hours (per employed worker)

Table 25: Variance of log consumption.

	age 45	age 55	age 65	age 75
Benchmark	0.373	0.478	0.534	0.487
No frailty heterogeneity (NFH)	0.304	0.370	0.383	0.375
% Δ relative to benchmark	-18.5	-22.5	-28.3	-23.1
No frailty shocks	0.303	0.395	0.416	0.422
% Δ relative to benchmark	-18.7	-17.4	-22.0	-13.2
No frailty fixed effect	0.328	0.437	0.470	0.441
% Δ relative to benchmark	-12.1	-8.6	-12.0	-9.4

Note: In the "No frailty heterogeneity" counterfactual all individuals have the average frailty profile. "No frailty shocks" removes only ex post shocks but retains all fixed-effect heterogeneity. "No frailty fixed effect" removes fixed effect heterogeneity but retains all shocks.

falls by 1.29 percent.

Columns 2 through 6 show that the main drivers of the aggregate effects are the disutility and labor productivity channels. Notice, also, that the effect of SSDI on consumption is less than half as much as the effect of GDP and hours. This is due to the fact that removing only the SSDI channel has opposite effects on labor supply at young and old ages. Moreover, while it reduces the aggregate disability benefit, it increases the fraction of individuals who are eligible for the means-tested welfare transfers. These opposing effects aggregate to smaller impacts on consumption and hours from the SSDI channel (relative to the impact of the disutility channel), even-though it is a significantly more important channel in terms of affecting individual labor supply and income inequality. Finally, removing frailty inequality in mortality increases survival and tilts the age distribution of the model towards older (mostly retired) individuals. For this reason it has a negative impact on all aggregate measures.

Table 27 shows the SSDI recipiency rates (top panel), labor force participation rates (middle panel), and the share of people who receive means-tested transfers (bottom panel) in the benchmark economy, NFH economy and the five additional counterfactual economies. Looking at the first two columns, the effect of removing frailty inequality on SSDI recipiency is large for all three educations groups. Although, college graduates have very low SSDI usage in the benchmark so the increase in labor force participation is concentrated among high school dropouts and to a lesser extent high school graduates. Notice that the effect on the fraction receiving means-tested transfers is small. The effect of removing frailty inequality on means-tested program usage is due to a balance of two opposing forces. On the one hand, shutting down the SSDI channel pushes young frail workers out of the labor force and onto

Table 26: Aggregate Effect of Healthy Inequality

	NFH in model	NFH in SSDI	NFH in Disutility	NFH in Labor prod.	NFH in Med. Exp.	NFH in Mortality
	% change relative to benchmark					
GDP	2.15	1.35	2.25	1.75	0.13	−0.72
Consumption	0.92	0.61	1.68	1.14	0.09	−1.54
Capital	2.15	1.35	2.25	1.75	0.13	−0.72
Labor input	2.15	1.35	2.25	1.75	0.13	−0.72
Hours	3.48	1.35	2.95	2.23	0.17	−0.50
GDP per Hour	−1.29	0.01	−0.67	−0.46	−0.04	−0.23

Note: Each column shows the difference in aggregate measure between the respective counterfactual and benchmark. NFH: no frailty heterogeneity. NFH in SSDI: probability of SSDI acceptance is the same for all individuals at same age, NFH in Labor Prod.: there is no heterogeneous effect of frailty on wage, NFH in Disutility: there is no heterogeneous effect of frailty on disutility from work, NFH in Med. Exp.: no heterogeous effect of frailty on out of pocket medical expenditures, NFH in Mortality: no heterogeneous effect of frailty on mortality.

these programs. On the other hand, removing the disutility and mortality channels creates additional incentives to work at older ages reducing the usage of these programs.

Table 27: Effects of removing health inequality (overall and via different channels) on SSDI recipiency, labor force participation, and receipt of means-tested transfers

	Benchmark	NFH in model	NFH in SSDI	NFH in Disutility	NFH in Labor prod.	NFH in Med. Exp.	NFH in Mortality
	SSDI Recipiency Rate (% of 25 to 64 year olds)						
ALL	5.84	1.00	2.36	3.38	3.55	5.79	6.25
HSD	13.21	1.81	5.77	7.68	7.29	13.15	13.92
HSG	7.42	1.45	3.16	4.07	4.51	7.34	7.94
CG	1.12	0.06	0.08	0.96	0.92	1.11	1.19
	Labor-Force Participation Rate (% of 25 to 64 year olds)						
ALL	87.28	91.16	88.11	89.67	89.16	87.37	86.99
HSD	76.04	85.06	77.12	81.34	81.09	76.16	75.80
HSG	85.33	90.21	86.36	88.58	87.59	85.49	84.97
CG	93.82	94.64	94.29	94.02	94.12	93.80	93.73
	Means-tested Transfers Recipiency Rate (%)						
ALL	4.24	5.06	5.87	4.01	4.35	4.18	4.17
HSD	7.98	9.37	12.22	7.46	8.14	7.90	7.64
HSG	4.20	5.09	6.17	3.88	4.40	4.07	4.07
CG	3.10	3.52	3.42	3.08	3.07	3.14	3.14

Note: The top (middle) [bottom] panel shows SSDI recipiency (labor-force participation) [means-tested transfers recipiency] rates in the benchmark and each counterfactual economy. HSD: high school dropout, HSG: high school graduate, CG: college graduate. NFH: no frailty heterogeneity. NFH in SSDI: probability of SSDI acceptance is the same for all individuals at same age and determined by the average frailty profile, NFH in Labor Prod.: effect of frailty on labor productivity is determined by the average frailty profile, NFH in Disutility: disutility from work is determined by average frailty profile, NFH in Med. Exp.: out-of-pocket medical expenditures are determined by the average frailty profile, NFH in Mortality: mortality is determined by the average frailty profile.

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