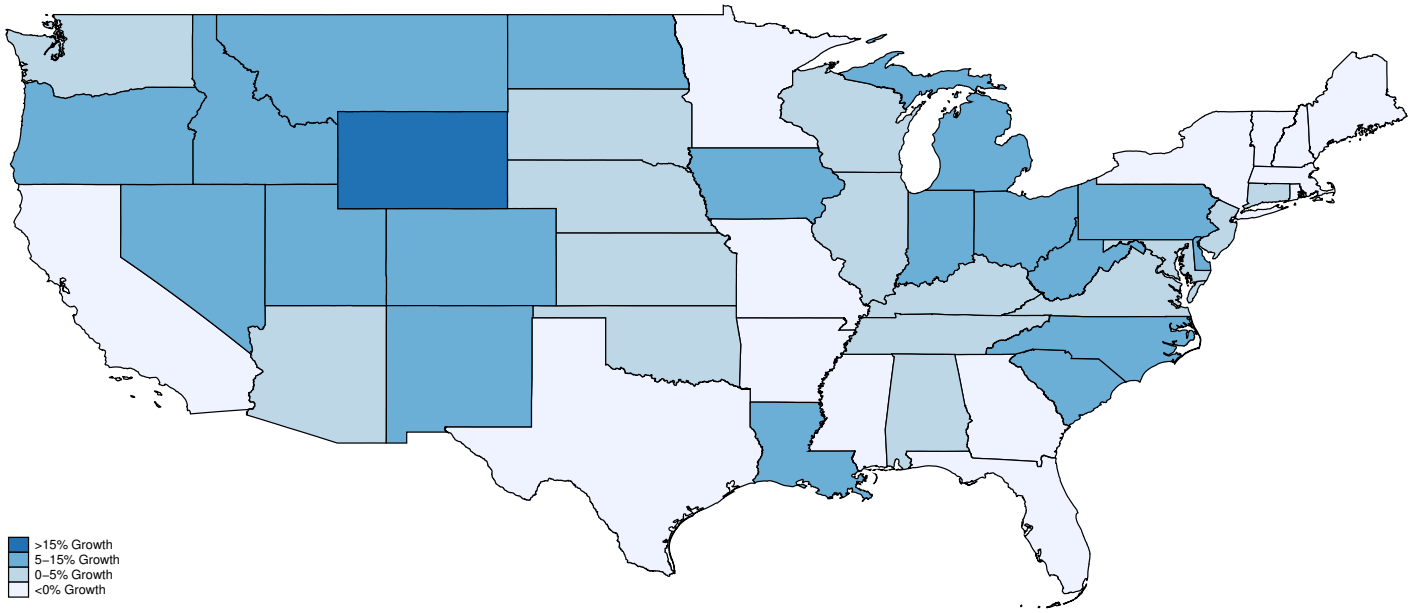
Online Appendix

The Effect of Population Aging on Economic Growth, the Labor Force and Productivity

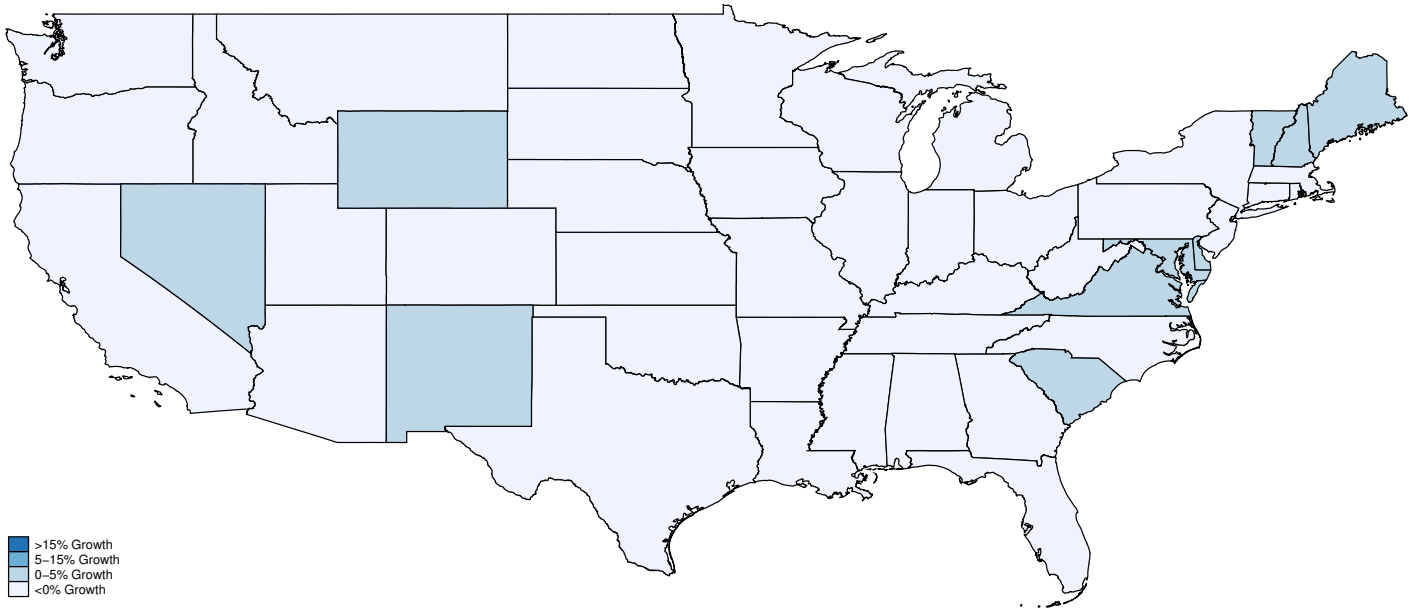
Authors: Nicole Maestas, Kathleen J. Mullen, David Powell

Figure A.1A: Growth Rate in Age 60+ Population by State: 1980-1990



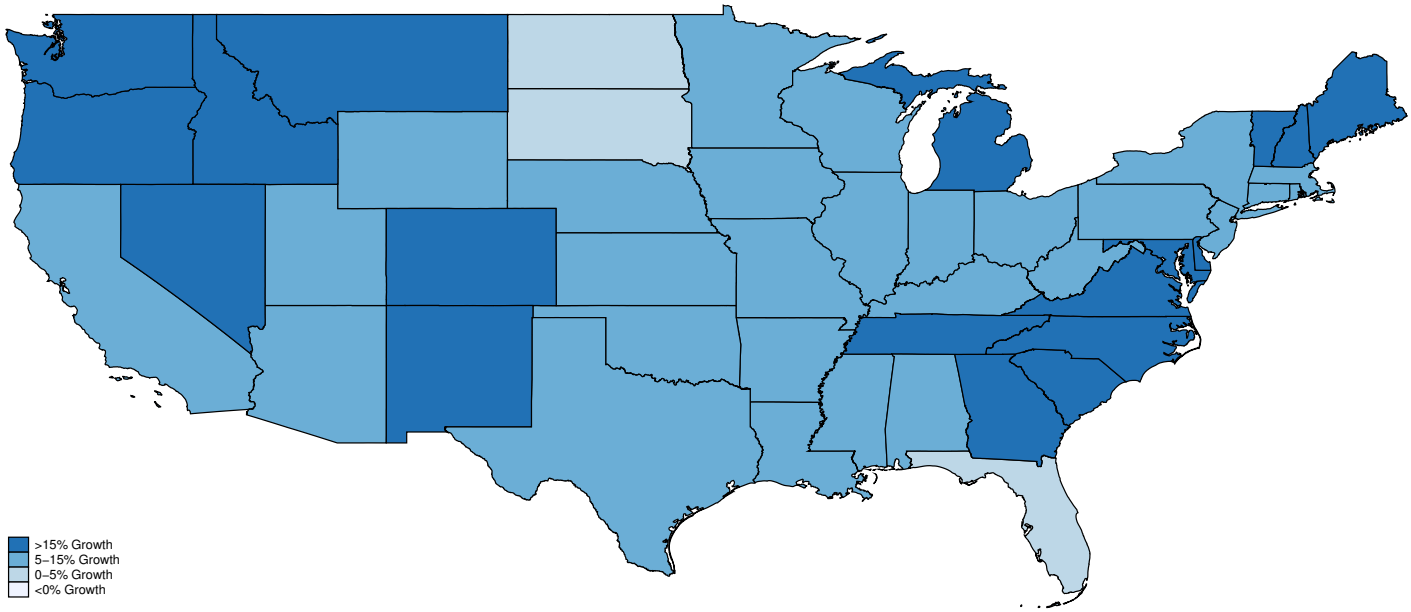
Notes: We use 1980 and 1990 Census data to construct the fraction of each state's population ages 60+. This map refers to the percentage change in this metric between 1980 and 1990.

Figure A.1B: Growth Rate in Age 60+ Population by State: 1990-2000



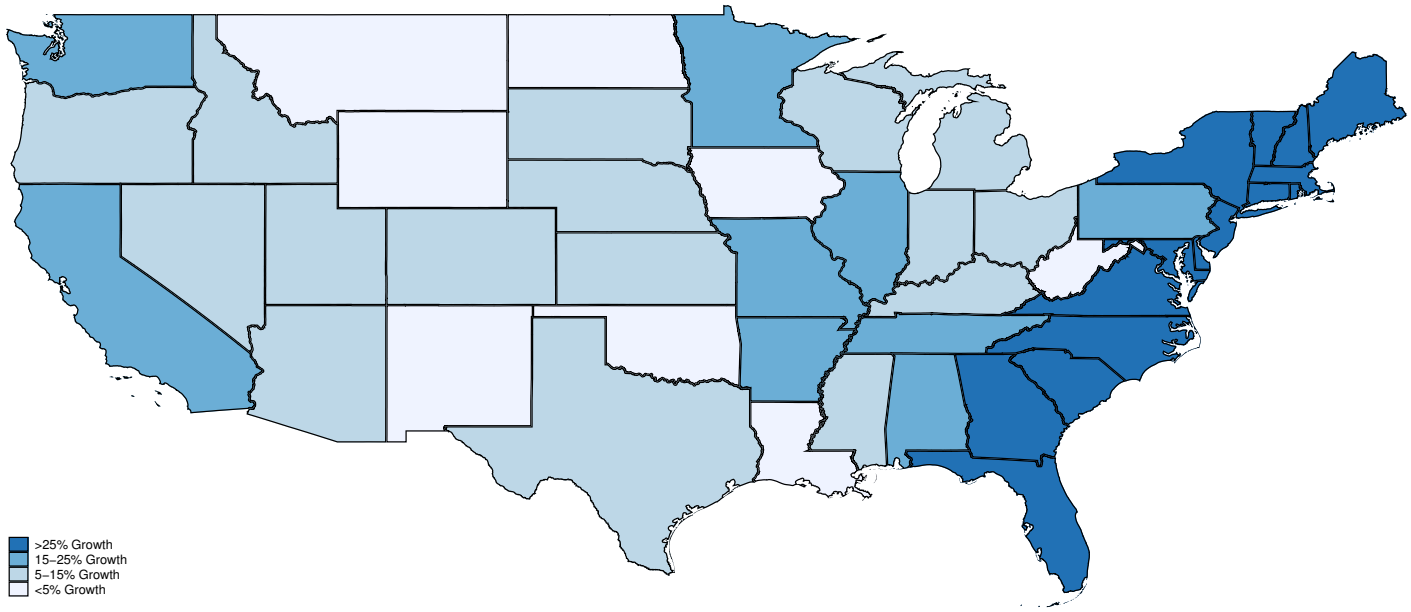
Notes: We use 1990 and 2000 Census data to construct the fraction of each state's population ages 60+. This map refers to the percentage change in this metric between 1990 and 2000.

Figure A.1C: Growth Rate in Age 60+ Population by State: 2000-2010



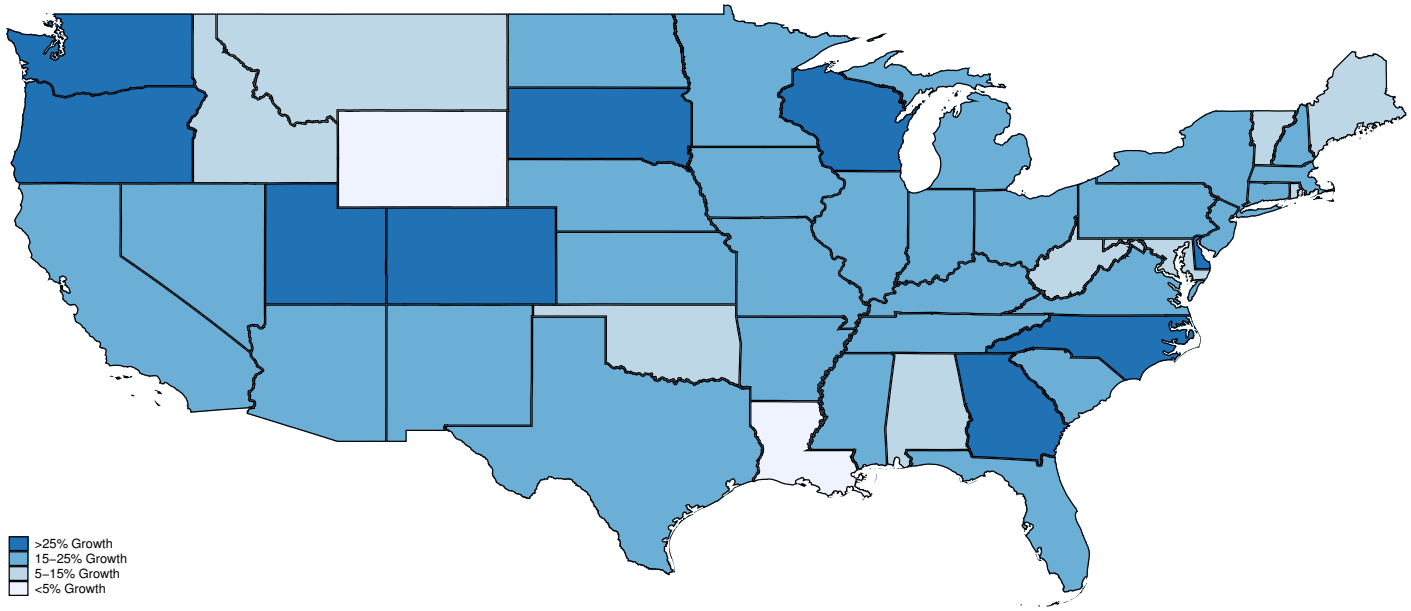
Notes: We use 2000 and 2010 Census data to construct the fraction of each state's population ages 60+. This map refers to the percentage change in this metric between 2000 and 2010.

Figure A.2A: Growth Rate in Real Per Capita GDP by State: 1980-1990



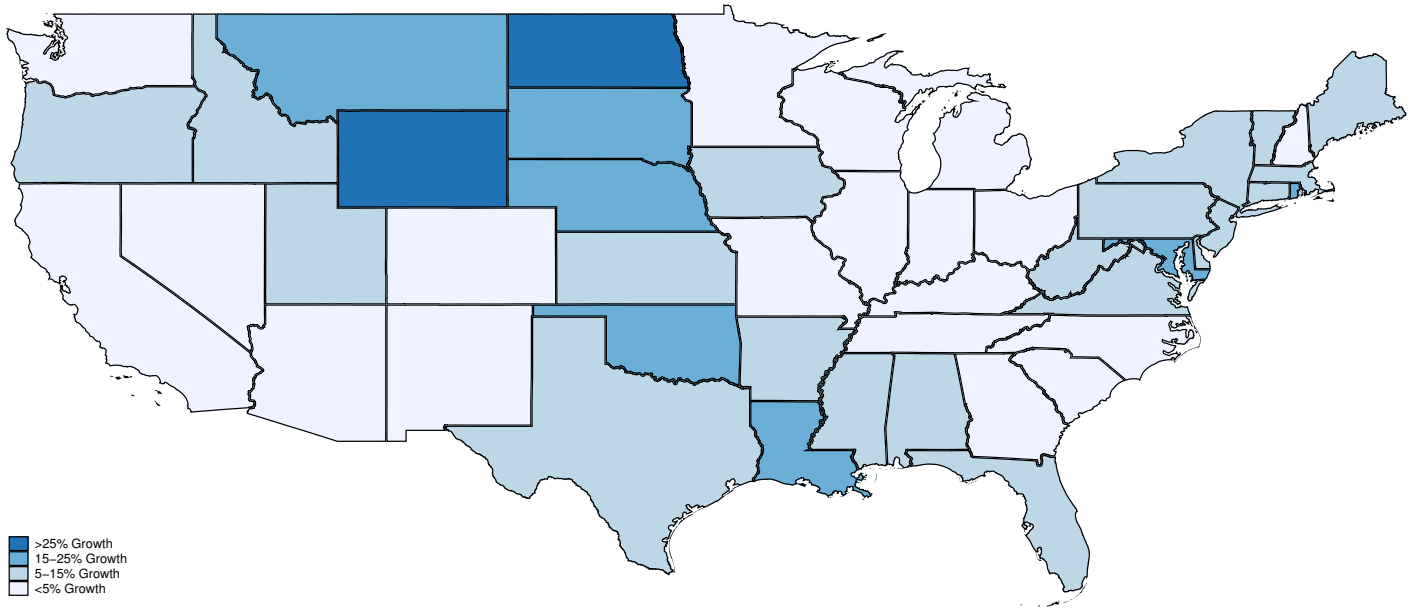
Notes: We use 1980 and 1990 BEA data to construct per capita GDP. This map refers to the percentage change in real terms between 1980 and 1990.

Figure A.2B: Growth Rate in Real Per Capita GDP by State: 1990-2000



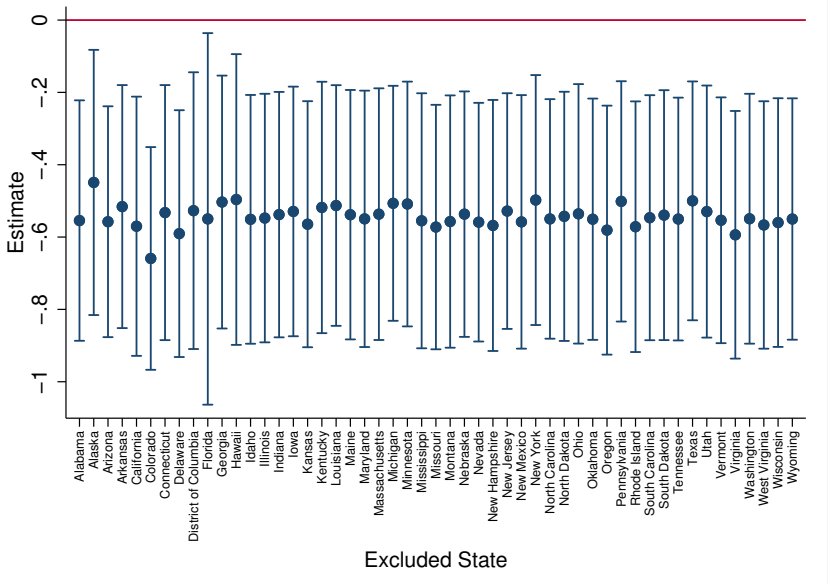
Notes: We use 1990 and 2000 BEA data to construct per capita GDP. This map refers to the percentage change in real terms between 1990 and 2000.

Figure A.2C: Growth Rate in Real Per Capita GDP by State: 2000-2010



Notes: We use 2000 and 2010 BEA data to construct per capita GDP. This map refers to the percentage change in real terms between 2000 and 2010.

Figure A.3: IV Elasticity Estimate: Dropping One State at a Time



Notes: We replicate the Table 2, Panel A, first column estimate (= -0.545) but dropping one state at a time to test whether the result is driven by a specific outlier. We plot the estimate and 95% confidence intervals. See Table 2 notes for more information on estimation.

Table A.1: Summary Statistics

1990, 2000, 2010 (N=153)				
	Mean	Standard Dev	Min	Max
Share Population 60+	0.240	0.029	0.095	0.313
Percent Change in Fraction of Population 60+	4.258	7.901	-9.089	47.073
Predicted Percent Change in Fraction of Population 60+	4.445	8.338	-14.103	59.196
Percent Change in GDP per Capita	12.584	10.473	-33.225	48.423
Percent Change in GDP per Worker	12.826	7.868	-30.268	47.694
Percent Change in GDP per Compensation Dollar	2.090	3.631	-25.977	17.660
Percent Change in Employment-to-Population Ratio	-0.314	4.225	-10.022	9.262
1990 (N=51)				
	Mean	Standard Dev	Min	Max
Share Population 60+	0.236	0.030	0.095	0.313
Percent Change in Fraction of Population 60+	2.141	4.959	-6.802	25.911
Predicted Percent Change in Fraction of Population 60+	2.307	5.078	-9.113	54.631
Percent Change in GDP per Capita	18.387	11.777	-9.888	45.580
Percent Change in GDP per Worker	12.760	9.775	-12.536	36.946
Percent Change in GDP per Compensation Dollar	3.354	3.187	-10.264	12.604
Percent Change in Employment-to-Population Ratio	4.887	1.961	-1.709	9.262
2000 (N=51)				
	Mean	Standard Dev	Min	Max
Share Population 60+	0.228	0.028	0.123	0.297
Percent Change in Fraction of Population 60+	-3.066	3.122	-9.089	28.764
Predicted Percent Change in Fraction of Population 60+	-2.836	4.321	-14.103	39.822
Percent Change in GDP per Capita	16.165	5.762	-33.225	28.652
Percent Change in GDP per Worker	16.649	5.569	-30.268	31.395
Percent Change in GDP per Compensation Dollar	0.674	4.131	-25.977	17.660
Percent Change in Employment-to-Population Ratio	-0.406	1.919	-6.392	3.117
2010 (N=51)				
	Mean	Standard Dev	Min	Max
Share Population 60+	0.255	0.024	0.181	0.308
Percent Change in Fraction of Population 60+	12.324	4.678	0.219	47.073
Predicted Percent Change in Fraction of Population 60+	12.487	5.749	-1.898	59.196
Percent Change in GDP per Capita	4.995	7.885	-17.398	48.423
Percent Change in GDP per Worker	9.514	6.422	-8.197	47.694
Percent Change in GDP per Compensation Dollar	2.370	3.068	-7.499	17.042
Percent Change in Employment-to-Population Ratio	-4.208	2.259	-10.022	1.806

Notes: Unit of observation is state-year. There are 51 observations per year and 153 total. All percent changes are defined in real terms and refer to ten year changes: $\frac{X_t - X_{t-10}}{X_{t-10}}$. "GDP per Compensation Dollar" refers to (real) GDP divided by total compensation to employees (wages and in-kind benefits). The "Predicted Percent Change in Fraction of Population 60+" variable is generated using the $t-10$ age structure and national survival ratios. See equation (2) for details. Population denominators ("per Capita") refer to the age 20+ population.

Table A.2: Ordinary Least Squares Estimates

Dependent Variable:	$\Delta \ln$ (GDP / N)			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.826***	-0.853***	-1.344***	-0.608***
	(0.140)	(0.220)	(0.332)	(0.208)
Num. Obs.	153	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year.

Table A.3: Results by Decade (10 year lagged instrument)

Panel A:	**Reduced Form Estimates**			
Dependent Variable:	$\Delta \ln$ (GDP / N)			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{\hat{A}}{\hat{N}})$	-0.390***	-0.563**	-0.375	-0.306*
	(0.134)	(0.215)	(0.429)	(0.172)
Num. Obs.	153	51	51	51
Panel B:	**First Stage Estimates**			
Dependent Variable:	$\Delta \ln$ (A / N)			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{\hat{A}}{\hat{N}})$	0.716***	0.627***	0.504***	0.865***
	(0.054)	(0.119)	(0.161)	(0.071)
Num. Obs.	153	51	51	51
Panel C:	**Instrumental Variable Estimates**			
Dependent Variable:	$\Delta \ln$ (GDP / N)			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.545***	-0.898**	-0.744	-0.354*
	(0.173)	(0.336)	(0.655)	(0.194)
Num. Obs.	153	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instrument.

Table A.4: Effects of Other Age Groups

Dependent Variable:	$\Delta \ln$ (GDP / N)			
$\Delta \ln$(Ages 30-39/N)	-0.112			
	(0.192)			
$\Delta \ln$(Ages 40-49/N)	-0.279	-0.261		
	(0.226)	(0.218)		
$\Delta \ln$(Ages 50-59/N)	-0.104	-0.051	-0.063	
	(0.228)	(0.200)	(0.198)	
$\Delta \ln$(Ages 60+/N)	-0.594***	-0.550***	-0.527***	-0.545***
	(0.191)	(0.153)	(0.164)	(0.173)
Num. Obs	153	153	153	153
Dependent Variable:	$\Delta \ln$ (GDP / N)			
ΔAges 30-39/N	-0.539			
	(0.939)			
ΔAges 40-49/N	-1.576	-1.45		
	(1.197)	(1.177)		
ΔAges 50-59/N	-0.848	-0.462	-0.543	
	(1.615)	(1.399)	(1.391)	
ΔAges 60+/N	-2.252**	-2.019***	-1.901**	-2.030**
	(0.894)	(0.748)	(0.795)	(0.828)
Num. Obs.	153	153	153	153

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instruments. In the bottom half of the table, age share levels (not logs) are used. The instruments are also expressed in levels.

Table A.5: Controlling for Initial Outcome

Dependent Variable:	$\Delta \ln(GDP/N)$	
	(1)	(2)
$\Delta \ln(\frac{A}{N})$	-0.385***	-0.640***
	(0.146)	(0.161)
Instruments for $\Delta \ln(GDP/N)_t$	10+ years	20+ years
Num. Obs.	153	153

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using IV-GMM with the 10 year lagged instrument. We also control for $\Delta \ln(GDP/N)_t$ and consider this variable endogenous. In Column (1), we include lagged levels of the log of per capita GDP for years $t-10$ and earlier as instruments. In Column (2), we use lagged levels of the log of per capita GDP for years $t-20$ and earlier as instruments.

Table A.6: Including Leads: 1980-2000

Dependent Variable:	$\Delta \ln(GDP/N)_{t+10}$	
	(1)	(2)
$\Delta \ln(\frac{A}{N})_{t+10}$	-0.833**	-1.012***
	(0.361)	(0.329)
$\Delta \ln(\frac{A}{N})_{t+20}$		0.131
		(0.266)
Num. Obs.	102	102

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y_{t+10} \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instrument. In Column (1), we estimate our main specification using only 1980-2000 data. In Column (2), we add the change in aging for the next 10 years. The instruments are the predicted aging variables for years $t+10$ (as before) and $t+20$ (new).

Table A.7: Instrumental Variable Poisson Estimates: Effect of Aging on GDP Growth

Dependent Variable:	GDP / N			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.556***	-0.925***	-0.962**	-0.337**
	(0.135)	(0.283)	(0.453)	(0.136)
Num. Obs.	153	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. The outcome is period $t+1$ per capita GDP. Period t log of GDP per capita is included as an offset (the coefficient is constrained to equal 1). Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using IV-Poisson with the 10 year lagged instrument.

Table A.8: Instrumental Variable Estimates: Weighted vs Unweighted Results

Dependent Variable:	$\Delta \ln$ (GDP / N)			
	Weighted by Population			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.545***	-0.898**	-0.744	-0.354**
	(0.173)	(0.336)	(0.655)	(0.194)
Num. Obs.	153	51	51	51
	Unweighted			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.478***	-0.361	-0.996***	-0.258*
	(0.161)	(0.319)	(0.369)	(0.152)
Num. Obs.	153	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instrument.

Table A.9: IV Estimates with Region-Year Interactions: Effect of Aging on GDP Growth

Dependent Variable:	$\Delta \ln$(GDP / N)			
	1980-2010	1980-1990	1990-2000	2000-2010
$\Delta \ln(\frac{A}{N})$	-0.585**	-0.690	-0.895	-0.447*
	(0.250)	(0.463)	(0.668)	(0.235)
Num. Obs.	153	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies interacted with Census Region indicators; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instrument.

Table A.10: Using Previous Year's State of Residence: 2000-2010

	OLS	Reduced Form	First Stage	IV
$\Delta \ln(\frac{A}{N})$	-0.634***	-0.348*	0.878***	-0.396**
	(0.204)	(0.174)	(0.070)	(0.192)
Num. Obs.	51	51	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. For this table, $\Delta \ln(\frac{A}{N})$ (and the corresponding instrument) are generated using each individual's prior year state of residence. This information is first available in the 2000 Census. $\Delta \ln(\frac{A}{N})$ refers to the predicted value in the Reduced Form and First Stage columns. We estimate using 2SLS with the 10 year lagged instrument.

Table A.11: Decomposition Using Other Age Groups

Dependent Variable:	Δ ln (GDP / Hours)				Δ ln (H / L)				Δ ln (L / N)			
Δ ln(Ages 30-39/N)	-0.082				0.102**				-0.132**			
	(0.174)				(0.039)				(0.052)			
Δ ln(Ages 40-49/N)	-0.228	-0.215			0.075*	0.059			-0.125**	-0.105**		
	(0.219)	(0.213)			(0.039)	(0.037)			(0.050)	(0.046)		
Δ ln(Ages 50-59/N)	-0.056	-0.018	-0.027		0.017	-0.03	-0.028		-0.065	-0.003	-0.008	
	(0.205)	(0.187)	(0.186)		(0.032)	(0.029)	(0.028)		(0.060)	(0.047)	(0.044)	
Δ ln(Ages 60+/N)	-0.386**	-0.354**	-0.335**	-0.343**	0.023	-0.017	-0.022	-0.031	-0.231***	-0.179***	-0.170***	-0.172***
	(0.168)	(0.136)	(0.143)	(0.151)	(0.035)	(0.039)	(0.035)	(0.033)	(0.050)	(0.044)	(0.046)	(0.047)
Num. Obs	153	153	153	153	153	153	153	153	153	153	153	153
Dependent Variable:	Δ ln (GDP / Hours)				Δ ln (H / L)				Δ ln (L / N)			
ΔAges 30-39/N	-0.216				0.508**				-0.830***			
	(0.886)				(0.202)				(0.297)			
ΔAges 40-49/N	-1.148	-1.097			0.363*	0.245			-0.791***	-0.598**		
	(1.136)	(1.132)			(0.205)	(0.196)			(0.259)	(0.237)		
ΔAges 50-59/N	-0.391	-0.236	-0.297		0.152	-0.211	-0.198		-0.609	-0.015	-0.048	
	(1.389)	(1.254)	(1.257)		(0.223)	(0.178)	(0.170)		(0.461)	(0.327)	(0.306)	
ΔAges 60+/N	-1.092	-0.998	-0.909	-0.979	0.097	-0.122	-0.142	-0.189	-1.257***	-0.899***	-0.850***	-0.861***
	(0.745)	(0.629)	(0.667)	(0.680)	(0.185)	(0.183)	(0.164)	(0.156)	(0.233)	(0.201)	(0.215)	(0.218)
Num. Obs.	153	153	153	153	153	153	153	153	153	153	153	153

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instruments. In the bottom half of the table, age share levels (not logs) are used. The instruments are also expressed in levels.

Table A.12: Decomposing Main Effect – Alternative Instrument Lag Lengths

	(1)	(2)	(3)	(4)
Instrument Length:		**20 Year Lag**		
Dependent Variable:	Δ ln(GDP / N)	Δln(GDP / Hours)	Δln(H / L)	Δln(L/N)
$\Delta \ln(\frac{A}{N})$	-0.503***	-0.285*	-0.027	-0.191***
	(0.184)	(0.147)	(0.037)	(0.053)
Instrument Length:		**30 Year Lag**		
Dependent Variable:	Δ ln(GDP / N)	Δln(GDP / Hours)	Δln(H / L)	Δln(L/N)
$\Delta \ln(\frac{A}{N})$	-0.450**	-0.267	-0.033	-0.151***
	(0.214)	(0.192)	(0.035)	(0.047)
Instrument Length:		**40 Year Lag**		
Dependent Variable:	Δ ln(GDP / N)	Δln(GDP / Hours)	Δln(H / L)	Δln(L/N)
$\Delta \ln(\frac{A}{N})$	-0.543	-0.278	-0.023	-0.241***
	(0.325)	(0.311)	(0.057)	(0.078)

Notation: L = number of workers; Hours = total number of hours worked

Notes: Significance Levels: *10%, **5%, ***1%. Num. Obs.=153 in all regressions. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. The coefficients presented in Columns (2), (3), and (4) mechanically sum to the main effect presented in Column (1). Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS.

Table A.13: Effects on Capital per Worker

Dependent Variable:	$\Delta \ln$ (K / L)		
	1980-2000	1980-1990	1990-2000
$\Delta \ln(\frac{A}{N})$	0.106	0.228	-0.061
	(0.291)	(0.340)	(0.575)
Num. Obs.	102	51	51

Notes: Significance Levels: *10%, **5%, ***1%. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. The industry composition variables are interacted with the time dummies to allow the effects of initial industry composition to vary by year. We estimate using 2SLS with the 10 year lagged instrument.

Table A.14: Age-Specific Labor Outcomes by Decade

Sample:	1980-1990			1990-2000			2000-2010		
Outcome:	$\Delta \ln$(Employment Rate)			$\Delta \ln$(Employment Rate)			$\Delta \ln$(Employment Rate)		
Age Group:	20-39	40-59	60+	20-39	40-59	60+	20-39	40-59	60+
$\Delta \ln(\frac{A}{N})$	-0.093	-0.115	-0.663**	0.008	-0.073	-0.175	0.035	0.047	0.180
	(0.090)	(0.106)	(0.277)	(0.089)	(0.090)	(0.386)	(0.052)	(0.032)	(0.191)
Outcome:	$\Delta \ln$(Wage)			$\Delta \ln$(Wage)			$\Delta \ln$(Wage)		
Age Group:	20-39	40-59	60+	20-39	40-59	60+	20-39	40-59	60+
$\Delta \ln(\frac{A}{N})$	-0.647**	-0.901***	-0.969**	-0.169	-0.489	0.058	0.020	-0.003	-0.214
	(0.284)	(0.224)	(0.384)	(0.378)	(0.379)	(0.670)	(0.123)	(0.118)	(0.158)

Notes: Significance Levels: *10%, **5%, ***1%. Number of observations=51. Standard errors in parentheses adjusted for clustering at state level. Each observation is weighted by period t population. $\Delta y \equiv y_{s,t+10} - y_{st}$. The outcome is the log of the number of people working scaled by the total number of people (by age group) or the log of the average wage (total earnings scaled by total hours). Other variables included: year dummies; the log of the fraction of workers in the applicable *initial* period (i.e., period t) working in each of the following industries: agriculture, mining, construction, manufacturing, transportation, communications / utilities, wholesale trade, retail trade, finance / insurance / real estate, business and repair services, personal services, recreation services, professional services, and public administration. We estimate using 2SLS with the 10 year lagged instrument.