Appendix

Appendix A. Further results and robustness check

Table A.1: Contribution of changing age-sex shares to changes in measures of labor market fluidity.

	CPS labor market flows					
	EN	**EU**	**UE**	**NE**	Fraction changing employers in previuos year	Fraction changing state in previuos year
				A. Change from 1981-1985 to 2010-2014		
Average (in percent), 1981-1985	2.9	1.8	23.1	4.3	14.5	4.6
Average (in percent), 2010-2014	2.7	1.4	18.2	3.9	9.8	1.6
Change	-0.2	-0.4	-4.9	-0.3	-4.7	-3.0
Percent of change attributable to changes in age-gender distribution:						
Regression-based approach (Figure 5)	47	62	12	8	55	11
Shift-share, fixing shares at avg. from 1981-2014	116	52	11	51	42	16
				B. Change from 1991-1995 to 2010-2014		
Average (in percent), 1981-1985	2.5	1.5	25.2	4.2	15.2	2.9
Average (in percent), 2010-2014	2.7	1.4	18.2	3.9	9.8	1.6
Change	0.2	-0.1	-7.0	-0.3	-5.4	-1.3
Percent of change attributable to changes in age-gender distribution:						
Regression-based approach (Figure 5)	81	114	6	-26	26	-15
Shift-share, fixing shares at avg. from 1981-2014	21	124	5	-24	17	16

Note: Table displays the change in measures of labor market fluidity from 1981-1985 (average) or 1991-1995 (average) to 2010-2014 (average), and the counterfactual change calculated by fixing age-sex shares at their average for the 1981-2014 period. All measures are listed as percents. **Source:** Authors' calculations from CPS microdata.

Table A.2: Correlation of low frequency components (Christiano and Fitzgerald [17] filter extracted).

	EU	**UE**	**EN**	**NE**	**JtJ**	**IM**	**JD**	**JC**
EU	1							
UE	.02 [0.88]	1						
EN	-.18 [0.20]	.87 [0.00]	1					
NE	.23 [0.11]	.40 [0.00]	-.08 [0.57]	1				
JtJ	.96 [0.00]	.89 [0.00]	.50 [0.00]	.43 [0.00]	1			
IM	.84 [0.00]	.88 [0.00]	.80 [0.00]	.08 [0.62]	.91 [0.00]	1		
JD	.96 [0.00]	.93 [0.00]	.43 [0.01]	.49 [0.00]	.99 [0.00]	.87 [0.00]	1	
JC	.87 [0.00]	.89 [0.00]	.82 [0.00]	.04 [0.79]	.91 [0.00]	.99 [0.00]	.86 [0.00]	1

Note: The table shows the pairwise correlations of the low frequency components extracted using the lowpass version of the Christiano and Fitzgerald [17] filter (set to retrieve cycles longer than 30 years). Significance levels are reported in squared brackets. All series are recorded at annual frequency. EU stands for "employmento to unemployment", "UE" stands for "unemployment to employment", "EN" stands for "employment to out of labor force, "NE" stands for out of the labor force to employment, "JtJ" stands for joj-to-job flow, "IM" stands for interstate migration, "JD" stands for job destruction, and "JC" stands for job creation. **Source:** authors' own calculation. **Raw data source:** see main text for raw data source.

Table A.3: Correlation of low frequency components (cosine projections method).

	EU	**UE**	**EN**	**NE**	**JtJ**	**IM**	**JD**	**JC**
EU	1							
UE	.82 [0.88]	1						
EN	.05 [0.74]	.61 [0.00]	1					
NE	.99 [0.00]	.73 [0.00]	-.10 [0.49]	1				
JtJ	.99 [0.00]	.96 [0.00]	.34 [0.31]	.97 [0.00]	1			
IM	.76 [0.00]	.95 [0.00]	.79 [0.00]	.68 [0.00]	.84 [0.00]	1		
JD	.96 [0.00]	.99 [0.00]	.49 [0.00]	.93 [0.00]	.98 [0.00]	.93 [0.00]	1	
JC	.91 [0.00]	.99 [0.00]	.62 [0.00]	.87 [0.00]	.94 [0.00]	.97 [0.00]	.99 [0.00]	1

Note: The table shows the pairwise correlations of the low frequency components extracted using the cosines projetion method suggested by Müller and Watson [61] (on 2 cosine functions). Significance levels are reported in squared brackets. All series are recorded at annual frequency. EU stands for "employmento to unemployment", "UE" stands for "unemployment to employment", "EN" stands for "employment to out of labor force, "NE" stands for out of the labor force to employment, "JtJ" stands for joj-to-job flow, "IM" stands for interstate migration, "JD" stands for job destruction, and "JC" stands for job creation. **Source:** authors' own calculation. **Raw data source:** for EU, UN, EN, and NE data since 2012 are taken from Department of Labor, Bureau of Labor Statisticss (BLS); data through 2012 are from Elsby et al. [29]. Their data is derived from three sources. From June 1967 to December 1975 the data are from Hoyt Bleakley (tabulations from Joe Ritter). From January 1976 through January 1990 the data are provided by Shimer [67]. From February 1990 onwards, the data are available from the BLS gross flow statistics. Raw data source for JtJ and IM: microdata for the Current Population Survey Annual Social and Economic Supplement (CPS-ANES), as provided by the Unicon Research Corporation. Migration data come from the IRS Migration Data (https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data). Methodological changes make the post-2010 data not comparable to earlier years, so for years after 2010 we extend the IRS series with the growth rate of the migration rate from the American Community Survey. For the years that the IRS and ACS data overlap, the level and changes in aggregate migration are quite similar (Molloy et al. [59]). JD and JC data are from Census Bureau, Business Dynamics Statistics (http://www.census.gov/ces/dataproducts/bds/index.html).

Table A.4: Principal Component Analysis (PCA) - Christiano and Fitzgerald [17] lowpass filter.

	Eigenvalues				**Eigenvector**		
	(i)	(ii)	(iii)		(i)	(ii)	(iii)
Comp 1	2.24	3.25	6.08	EU	0.31	0.50	0.38
	[0.56]	[0.65]	[0.76]				
Comp 2	1.50	1.36	1.63	UE	0.58	0.53	0.38
	[0.37]	[0.27]	[0.20]				
Comp 3	0.24	0.37	0.27	EN	0.59	0.32	0.27
	[0.06]	[0.07]	[0.03]				
Comp 4	0.00	0.00	0.00	NE	0.45	0.24	0.10
	[0.00]	[0.00]	[0.00]				
Comp 5	-	0.00	0.00	JtJ	-	0.54	0.39
	-	[0.00]	[0.00]				
Comp 6	-	-	0.00	IM	-	-	0.39
	-	-	[0.00]				
Comp 7	-	-	0.00	JD	-	-	0.39
	-	-	[0.00]				
Comp 8	-	-	0.00	JC	-	-	0.39
	-	-	[0.00]				

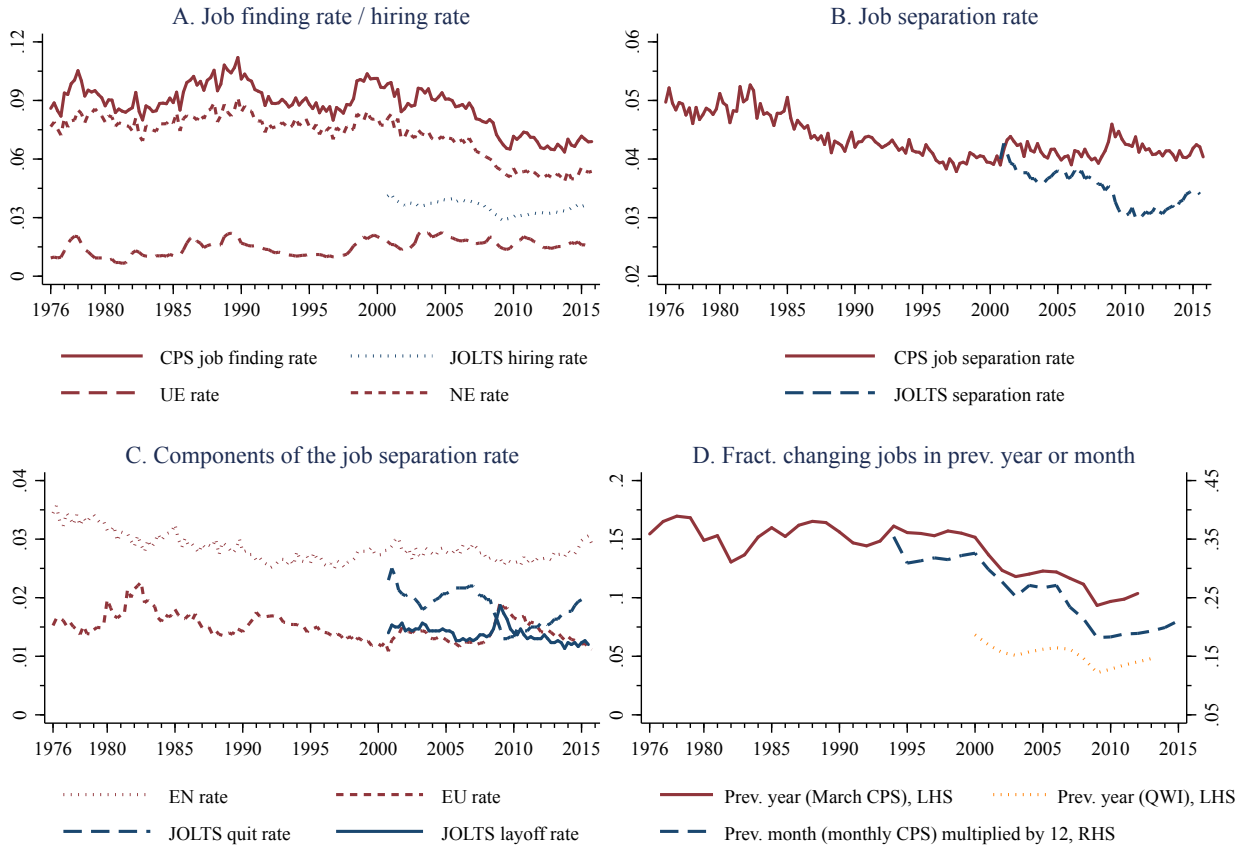
Note: The table shows the results of a Principal Component Analysis (PCA) run on the low frequency components of the series (estimated with the lowpass version of the Christiano and Fitzgerald [17] filter). The PCA has been run three times, corresponding to the three columns shown in this table. The first time (column (i)) the PCA has been run on the four series recorded at quarterly frequency: EU (employmento to unemployment), UE (unemployment to employment), EN (employment to out of labor force), and NE (out of the labor force to employment). The second time (column (ii)), the PCA has been run on the four quarterly flows annualized adding job-to-job (JtJ) transition rate. Finally, the third time (column (iii)) the PCA was run on all eight series, therefore adding interstate migration rate (IM), job destruction rate (JD), and job creation rate (JC). The table reports the eigenvalues (left panel) together with the fraction of the total variance explained by each component (in squared brackets). The right hand side of the table shows the entries of the eigenvector asociated with the first component. **Source:** authors' own calculation. **Raw data source:** for EU, UN, EN, and NE data since 2012 are taken from Department of Labor, Bureau of Labor Statistics (BLS); data through 2012 are from Elsby et al. [29]. Their data is derived from three sources. From June 1967 to December 1975 the data are from Hoyt Bleakley (tabulations from Joe Ritter). From January 1976 through January 1990 the data are provided by Shimer [67]. From February 1990 onwards, the data are available from the BLS gross flow statistics. Raw data source for JtJ and IM: microdata for the Current Population Survey Annual Social and Economic Supplement (CPS-ANES), as provided by the Unicon Research Corporation. Migration data come from the IRS Migration Data (https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data). Methodological changes make the post-2010 data not comparable to earlier years, so for years after 2010 we extend the IRS series with the growth rate of the migration rate from the American Community Survey. For the years that the IRS and ACS data overlap, the level and changes in aggregate migration are quite similar (Molloy et al. [59]). JD and JC data are from Census Bureau, Business Dynamics Statistics (http://www.census.gov/ces/dataproducts/bds/index.html).

Table A.5: Principal Component Analysis (PCA) - Müller and Watson [61] cosine projection method.

	Eigenvalues				**Eigenvector**		
	(i)	(ii)	(iii)		(i)	(ii)	(iii)
Comp 1	2.58	3.97	6.84	EU	0.58	0.49	0.36
	[0.64]	[0.79]	[0.85]				
Comp 2	1.41	1.01	1.14	UE	0.54	0.49	0.38
	[0.35]	[0.20]	[0.14]				
Comp 3	0.00	0.01	0.01	EN	0.15	0.19	0.20
	[0.00]	[0.00]	[0.00]				
Comp 4	0.00	0.00	0.00	NE	0.58	0.47	0.35
	[0.00]	[0.00]	[0.00]				
Comp 5	-	0.00	0.00	JtJ	-	0.49	0.37
	-	[0.00]	[0.00]				
Comp 6	-	-	0.00	IM	-	-	0.36
	-	-	[0.00]				
Comp 7	-	-	0.00	JD	-	-	0.38
	-	-	[0.00]				
Comp 8	-	-	0.00	JC	-	-	0.37
	-	-	[0.00]				

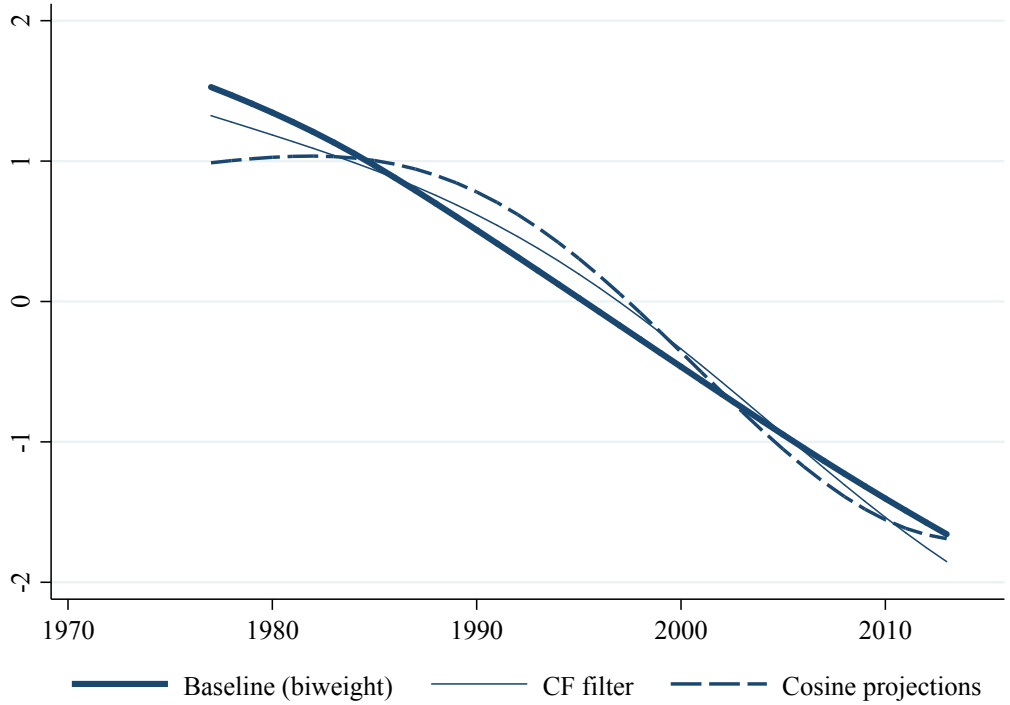
Note: The table shows the results of a Principal Component Analysis (PCA) run on the low frequency components of the series (estimated using the cosines projection method suggested by Müller and Watson [61]). The PCA has been run three times, corresponding to the three columns shown in this table. The first time (column (i)) the PCA has been run on the four series recorded at quarterly frequency: EU (employmento to unemployment), UE (unemployment to employment), EN (employment to out of labor force), and NE (out of the labor force to employment). The second time (column (ii)), the PCA has been run on the four quarterly flows annualized adding job-to-job (JtJ) transition rate. Finally, the third time (column (iii)) the PCA was run on all eight series, therefore adding interstate migration rate (IM), job destruction rate (JD), and job creation rate (JC). The table reports the eigenvalues (left panel) together with the fraction of the total variance explained by each component (in squared brackets). The right hand side of the table shows the entries of the eigenvector asociated with the first component. **Source:** authors' own calculation. **Raw data source:** for EU, UN, EN, and NE data since 2012 are taken from BLS; data through 2012 are from Elsby et al. [29]. Their data is derived from three sources. From June 1967 to December 1975 the data are from Hoyt Bleakley (tabulations from Joe Ritter). From January 1976 through January 1990 the data are provided by Shimer [67]. From February 1990 onwards, the data are available from the Department of Labor, Bureau of Labor Statistics (BLS) gross flow statistics. Raw data source for JtJ and IM: microdata for the Current Population Survey Annual Social and Economic Supplement (CPS-ANES), as provided by the Unicon Research Corporation. Migration data come from the IRS Migration Data (https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data). Methodological changes make the post-2010 data not comparable to earlier years, so for years after 2010 we extend the IRS series with the growth rate of the migration rate from the American Community Survey. For the years that the IRS and ACS data overlap, the level and changes in aggregate migration are quite similar (Molloy et al. [59]). JD and JC data are from Census Bureau, Business Dynamics Statistics (http://www.census.gov/ces/dataproducts/bds/index.html).

Figure A.1: Comparison of measures of labor market fluidity.



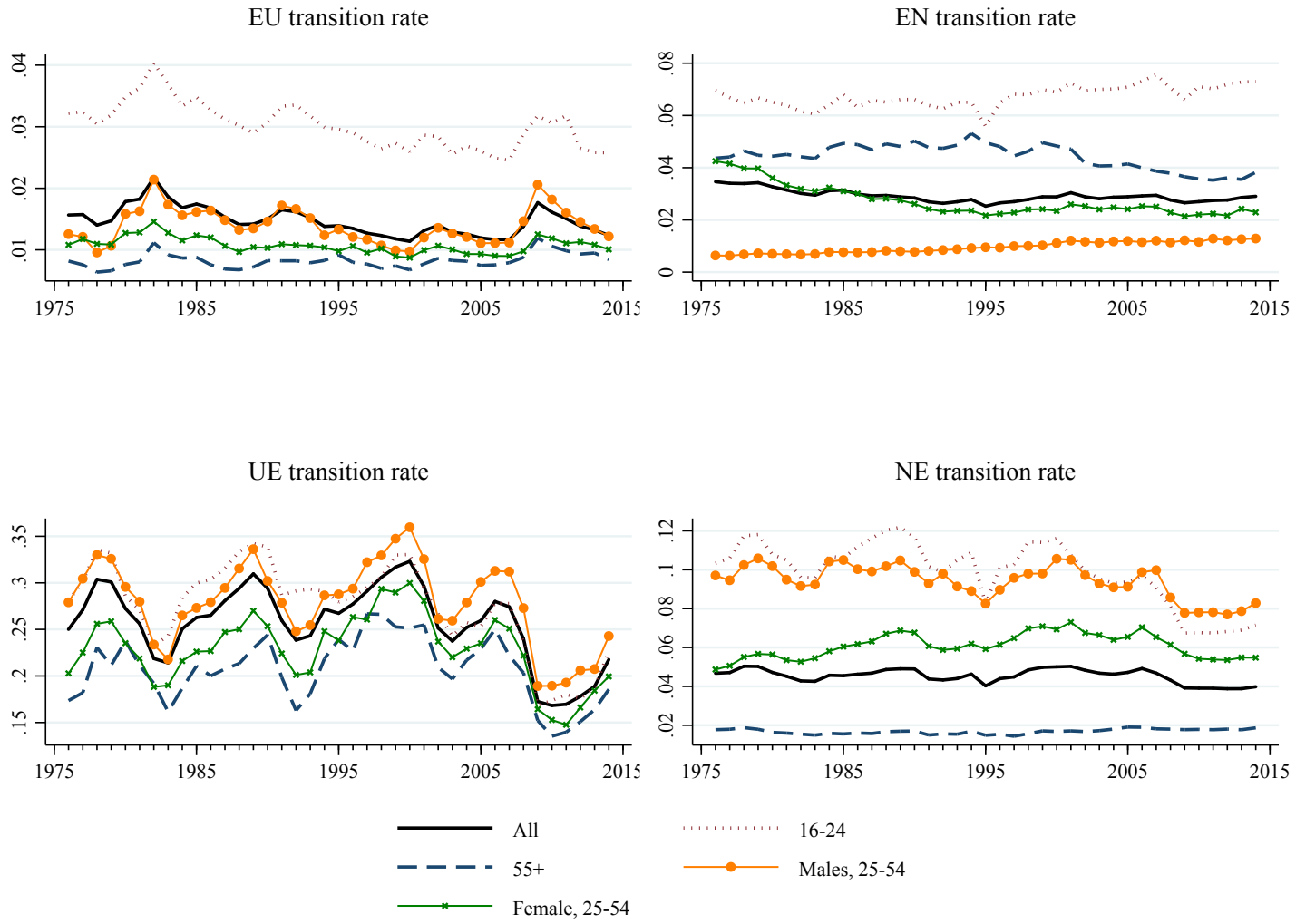
Source: JOLTS, Bureau of Labor Statistics. CPS, see note to Figure 1. For employer change (year), authors' calculations. For employer change (month), Fallick and Fleischman [30].

Figure A.2: PCA - first component - comparison.



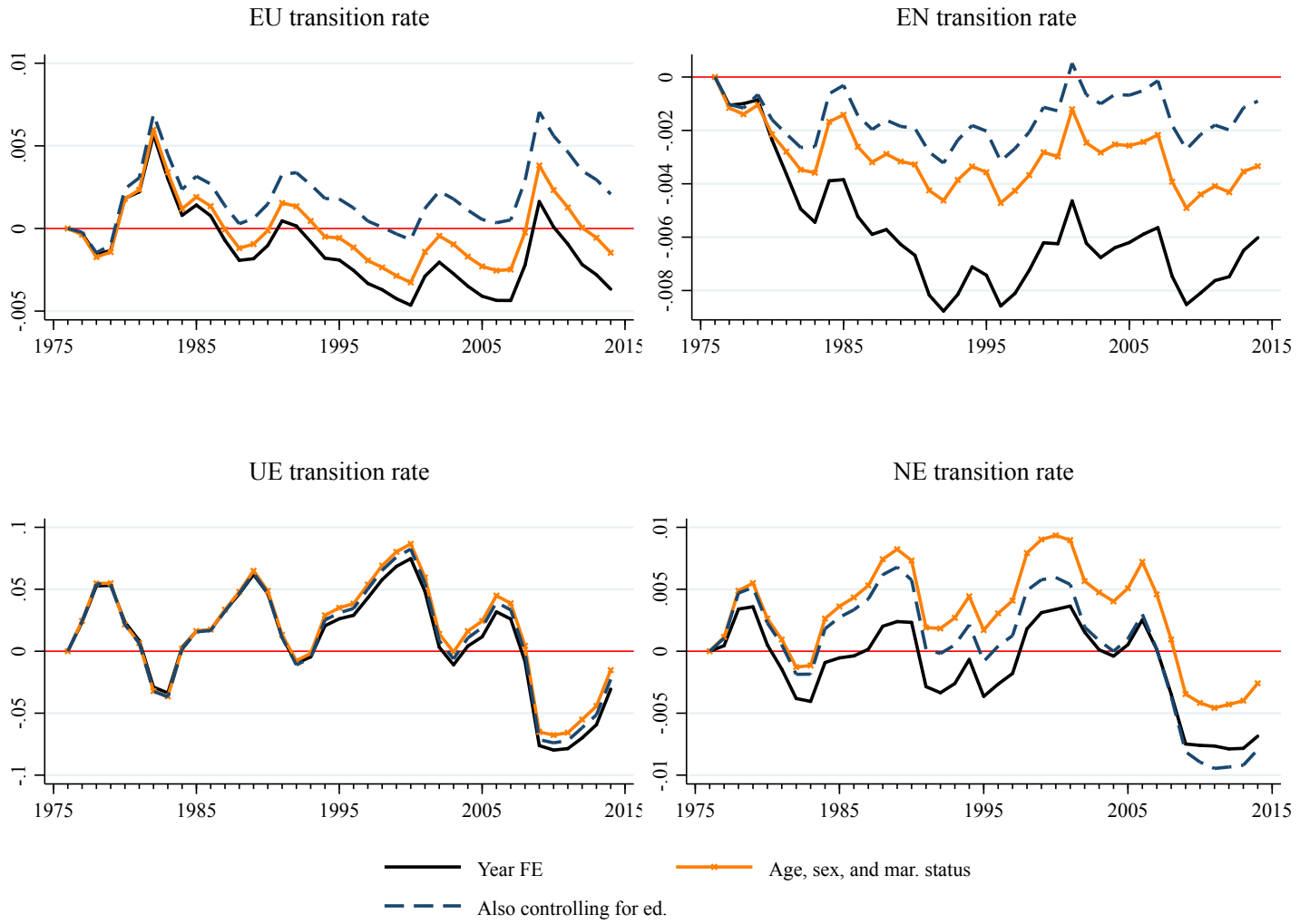
Note: The figure shows the first component(s) of a Principal Component Analysis. The PCA was run three times on the estimated low frequency component of eight labor market fluidity measures. The first time ("Baseline (biweight)"), the PCA was run on the trends estimated using a biweight filter (with a window of 30 years). The second time the PCA was run on the trends estimated using the lowpass version of the Christiano and Fitzgerald [17] filter (set to retreive cycles longer than 30 years). the third time the PCA was run on the trends estimated using the cosines projection method suggested by Müller and Watson [61]. In all cases the PCA was run on eight series recorded at annual frequency. The eight labor market fluidity measures included in the PCA are: swithcing rate from employment to unemployment (EU), from unemployment to employment (UE), from employment to out of the labor force (EN), and from out of the labor force to employment (NE), plus job-to-job transition ("JtJ") the Interstate Migration ("IM") rate, . job destruction ("JD"), and job creation ("JC") rates. EU, UE, EN, NE, JtJ and IM are recorded from 1975 to 2014 for a total of 40 observations. JDC and JC are recorded from 1977 to 2013 for a total of 37 observations. **Source:** authors' own calculation. See main text for raw data source.

Figure A.3: Labor market flows by demographics.



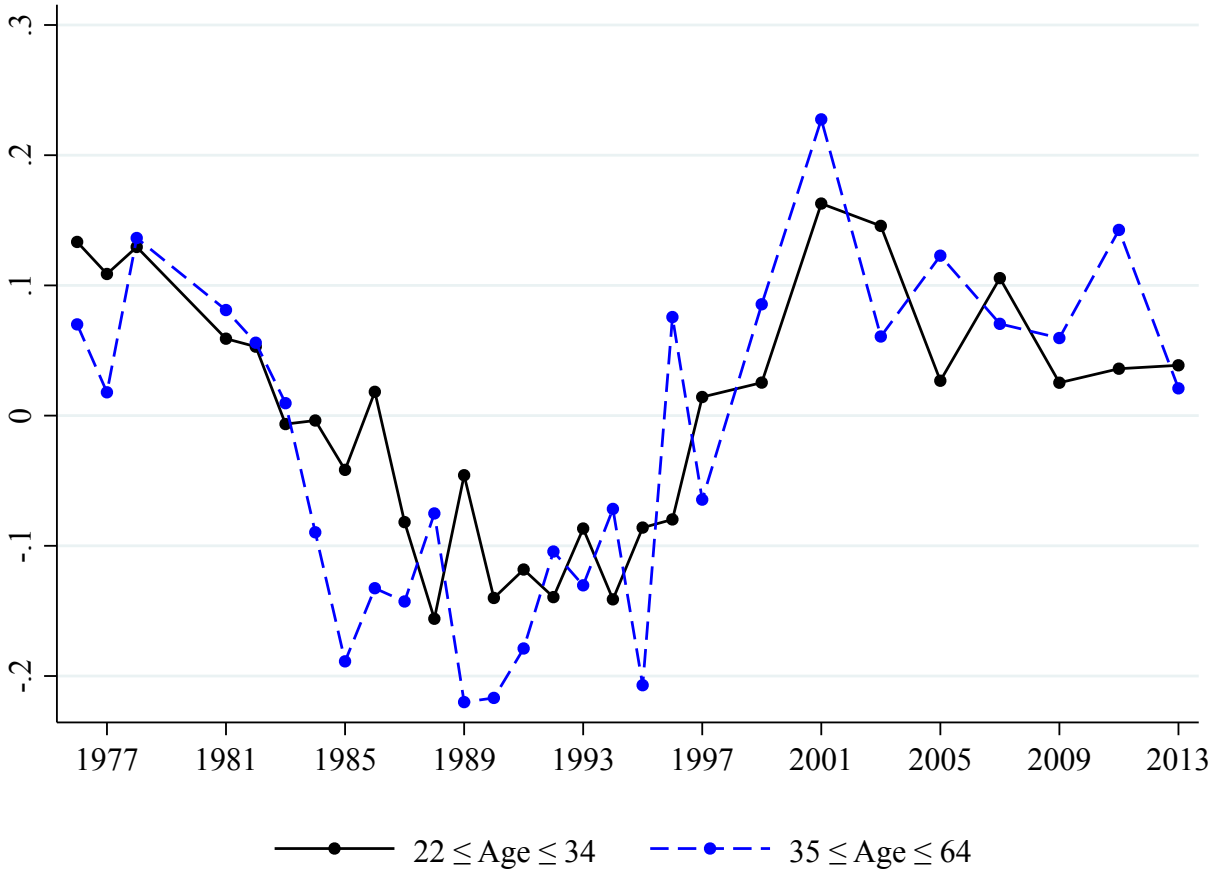
Note: Flows by demographic characteristics are estimated from matched Current Population Survey (CPS) monthly data, authors' calculations..

Figure A.4: Changes in flows after controlling for demographics.



Note: Figures plot the coefficients on year fixed effects after controlling for the listed demographic characteristics. All year fixed effects are shown relative to the 1976 estimate (or the 1981 estimate, for migration). Flows by demographic characteristics are estimated from matched Current Population Survey (CPS) data. Authors' calculations..

Figure A.5: Average Starting Wages in the PSID.



Note: Figure shows the average residual from a regression of the log of real wages among men with less than 12 months of tenure. The regression includes indicators for age group (30 -39, 40-49 and 50-64), race (black, Hispanic, other race), educational attainment (less than high school, some college, college or more) and the national unemployment rate. Regression is estimated separately for men age 22 to 34 and men age 35 to 64. Wages are the hourly wage for hourly workers and salary divided by usual hours for salaried workers, and are deflated by the price index for personal consumption expenditures. Workers earning less than half of the federal minimum wage are excluded. **Source:** author's calculations from the University of Michigan, Panel Study of Income Dynamics (PSID).

Table A.6: Correlations of State-Level Trends in Labor Market Fluidity with State Characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
% Age 18-22, 1977-79	0.28								
% Age 23-34, 1977-79	0.01								
% Age 35-44, 1977-79	0.31								
% Age 45-64, 1977-79	0.64*								
% Age 64+, 1977-79	-0.07								
% Age 18-22, trend	0.27								
% Age 23-34, trend	0.22								
% Age 35-44, trend	0.63*								
% Age 45-64, trend	0.10								
% Age 64+, trend	-0.01								
% Less than High School, 1977-79		0.31							
% Some College, 1977-79		-0.43							
% College Plus, 1977-79		-0.16							
% Less than High School, trend		0.15							
% Some College, trend		0.07							
% College Plus, trend		0.75*							
% Married, 1977-79			-0.72						
% Married, trend			0.07						
% Single (never married), 1977-79			-0.35						
% Single (never married), trend			-0.21						
% Homeowner, 1977-79				-0.06					
% Homeowner, trend				-0.09					
% Manufacturing, 1977-79					0.75*				
% Retail, 1977-79					-0.02				
% FIRE, 1977-79					0.11				
% Service, 1977-79					0.11				
% Agriculture, 1977-79					-0.51				
% Manufacturing, trend					0.31				
% Retail, trend					0.04				
% FIRE, trend					0.19				
% Service, trend					0.19				
% Agriculture, 1977-79					-0.28				

Table A.6 continues on the next page.

Table A.6 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
% Manag./prof. occ., 1977-79						-0.05			
% Technicians, 1977-79						-1.69*			
% Service occupation, 1977-79						-0.08			
% Production/craft occupation, 1977						-0.14			
% Operator occupation, 1977-79						0.76			
% Sales occupation, 1977-79						0.78*			
% Admin. support occ., 1977-79						1.82*			
% Manag./prof. occ., trend						0.38*			
% Technicians, trend						-1.10			
% Service occupation, trend						0.08			
% Production/craft occupation, trend						-0.20			
% Operator occupation, trend						0.28			
% Sales occupation, trend						0.44			
% Admin. support occ., trend						1.21			
% Union member, 1977-79							-0.17		
% Union member, trend							-0.37		
% Self Employed, 1977-79								-0.39*	
% Self Employed, trend								0.01	
% Government worker, 1977-79								-0.49*	
% Government worker, trend								-0.15	
Northeast									0.37
Middle Atlantic									1.18*
East North Central									0.91*
West North Central									0.02
South Atlantic									0.49*
East South Central									0.40
West South Central									-0.20
Mountain									-1.12*
Pacific									-1.34*
# Obs.	51	51	51	51	51	51	51	51	51
Adj. R-squared	0.54	0.47	0.09	-0.03	0.43	0.56	0.04	0.31	0.54

Note: Each column reports the results of regressing the trend in labor market fluidity in each state on the characteristics named in the rows. Trend in labor market fluidity is the first component from a Principal Component Analysis of linear trends of 8 annual variables: flows from employment to unemployment, flows from employment to out of labor force, flows from out of labor force to employment, flows from unemployment to employment, job to job changes, interstate migration, job creation and job destruction. Linear trends are estimated for each variable from a state-specific regression of the variable on a linear trend and the state unemployment rate (contemporaneous and 1 lag), estimated from 1980 to 2013. All independent variables except union share are from the CPS ASEC, as provided from the IPUMS. Union membership is from Hirsch et al. [45]. Trends in independent variables are estimated from state-specific regressions of each variable on a linear trend and the state unemployment rate (contemporaneous and 1 lag), estimated using annual data from 1980 to 2013. Standard errors are reported in parentheses. * and ** indicate significance at the 5% and 1% levels, respectively. **Source:** see text for data sources.