ONLINE APPENDIX

Schultz, Michael A. 2019. "The Wage Mobility of Low-Wage Workers in a Changing Economy, 1968-2014." *RSF: The Russell Sage Foundation Journal of the Social Sciences* 5(4): 159–89.

METHODOLOGICAL APPENDIX

The analytic sample for the primary analysis, using the low-wage threshold that is two-thirds of the median for full-time workers, consists of 9,022 persons with 15,978 employment spells in low-wage work, corresponding to 10,365 spells seeking higher wages, and 60,331 person-year observations between 1968 and 2014. The presented results utilize listwise deletion, as research has advised caution with standard multiple imputation approaches for event history models (Young and Johnson 2015). A total of 7,167 person-year observations and 825 people with missing data on independent variables were lost due to temporary sample attrition or nonresponse in the primary analysis.

In order to determine my approach for age-period-cohort effects, I follow Harding and Jencks (2003) and plot the percent of workers in low-wages in the analytic sample by age and period, and age and birth cohort. I observe age and period effects, but not a birth cohort effect. Consequently, I include variables for age and year at the start of the employment spell and exclude birth cohort.

I test the robustness of my results by testing a number of competing specifications. I find consistent results when switching to a bi-annual study design of consistent two years gaps between observations and use only heads and spouses with current jobs. An analysis restricted to bi-annual years from 1981-2015 using the hourly wages with reference to current job finds the same decline in mobility in the late 1990s. I test excluding low-wage workers working less than 15 hours a week, excluding workers in Survey of Economic Opportunity (SEO) sample (see Shin and Solon 2011; Brown 1996), and capping observations of hourly wage jumps of more than 30 percent that fall back to low-wages in the subsequent year. In all of these cases the main findings are the same. In the main analysis I exclude non-sample heads and spouses with a sample weight of zero. Using the sample weights with the survey cluster and strata design elements leads to similar results. A discrete-time event history model without the person random effects produces a consistent finding of declining mobility for low-wage workers starting in the late 1990s.

Employment Spell Structure

To visualize the employment spell structure, I have created an example of the data structure in Table O1. Person A is only observed with one employment spell in low-wages and enters the sample from unemployed. They achieve mobility to better wages four years after entering (1995) without moving to unemployment (four months out of calendar year). Person A is consistently employed all year. The count of low-wage work experience increases by 1 every year. Person B has two employment spells in low-wage work separated by two years unemployed. The first employment spell count continues through the two years of unemployment and restarts when the worker re-enters employment. Person B has already been observed once in low-wage work, so the second employment spell count starts at time 1. Person B achieved mobility in the next year (year 2 of spell 2) and the employment spell ends. Person B only works 9 months out of the year in 1983 and 1984. Consequently, the count of low-wage work experience increases by .75 in 1984 and 1985 instead of by 1. In 1985 and 1986, Person B works for 3 months of the year. This is less than the 8 months needed to be counted as employed. As a result, they accrue a full year in the count of years unemployed since entering low-wage work. The quarter of a year they were employed in low-wages does accrue in the years of low-wage work experience.

Table O1. Example of Employment Spell Data Structure

Person ID	Year	Employed	In Low Wages	Achieved mobiliity	Employment Spell Count	Years in Employment Spell	Years in Low Wages	Years Unemployed
A	1991	0	.	.	.	.	.	.
A	1992	1	1	0	1	0	0	0
A	1993	1	1	0	1	1	1	0
A	1994	1	1	0	1	2	2	0
A	1995	1	0	1	1	3	3	0
A	1996	1	0	.	.	.	.	.
B	1981	0	.	.	.	.	.	.
B	1982	1	1	0	1	0	0	0
B	1983	1	1	0	1	1	0.75	0
B	1984	1	1	0	1	2	1.5	0
B	1985	0	1	0	1	3	1.75	1
B	1986	0	1	0	1	4	2	2
B	1987	1	1	0	2	1	3	2
B	1988	1	0	1	2	2	4	2
B	1989	1	0	.	.	.	.	.

Source: Author.

Matching Jobs to Annual Hourly Wages

The PSID collects information on the current or last job (if unemployed) of the head and spouse (wife in PSID parlance) at the time of the interview. Major changes to the occupational variables have occurred in 1979, 1988, and 2003. From 1979 onwards, questions for hourly wages, self-employment, government job, union job, and firm tenure are added for spouses. In 1988, the occupational variables expanded to include questions about the household head and spouses' previous job, or the job prior to their current or last job, defined by employer changes. Additional questions from 1988 to 2001 collected information of the starting position (occupation) at the current and previous firm, as well as work hours from concurrent jobs. Staring in 2003, the PSID collects information on up to four jobs, including a worker's current job.

The consistently available labor income category for both heads and spouses is total labor income from all sources for the year prior to the survey year. Staring with the 1999 survey, income variables are also collected for two years prior. Annual work hours are derived from the calendar variables that ask about employment in every month multiplied by average weekly hours from all reported jobs. Hourly wages are calculated from the annual labor income divided by annual work hours.

I match current, last, and previous job characteristics to the corresponding calendar year and corresponding annual hourly wages. Most of the matches come from matching a current job in survey year (e.g. 1985) to the annual wage information collected in the next survey (1986) about the prior year (1985). The main benefit of matching last and previous jobs comes after the switch to bi-annual survey in 1997. In removing duplicate job-year observations, I keep the job-year observations with the shortest time between survey year and observation year, followed by jobs reported as current jobs over previous jobs, and previous jobs over third or fourth jobs.

The Four Large, Aggregate Occupations

The analysis differentiates between four large, aggregate occupations: low-end service, manual, clerical & mid-tier service, and professional & technical, using characteristics from O*Net (onetonline.org). Highly skilled occupations with an O*Net job zone score of four or five indicating considerable and extensive preparation required are designated as professional & technical

occupations. For practical purposes, this means jobs that require a college degree or equivalent or more education and training. The remaining occupation are divided into service and manual occupations using the knowledge category "customer and personal service," the skill category "service orientation," the physical abilities of "dynamic strength" and "physical strength," and the work activity "controlling machines and processes." Finally, this group of service occupations is divided into low-end service from mid-tier service & clerical using measures of work context. Clerical workers score highly on spending time sitting and using email, while low-end service workers score more highly on spending time standing and dealing with external customers.

Occupational Experience

Workers employed in the same or similar occupation (occupational skill similarity greater than .95) accrue the number of weeks employed in that occupation during the calendar year as occupational experience. Workers who were unemployed all year acquire zero occupational experience. When workers change occupations, the amount of occupational experience that transfers is estimated to be proportional to the similarity between occupations. For example, a worker with 4 years of occupational experience who moves to an occupation with .5 skill similarity, transfers 2 years of occupational experience along with the move. The intention of this model is to combine the occupation-specific and task-specific human capital approaches (e.g. Yamaguchi 2012; Gathmann and Schönberg 2010). Workers accrue occupational experience by remaining in the same occupation. Since occupations are groups of tasks, the more similar the skills of the occupation, the greater the transference of skills.

Following Mouw and Kalleberg (2018), the measure of occupational skill similarity is derived from the Current Population Survey using workers who move between 3-digit occupations in consecutive months. They find that the measure of skill similarity derived from the actual behavior of workers (occupational moves) is a significantly better predictor of wage mobility than a measure of occupational skill similarity based derived from O*Net's skill profiles. Occupational skill similarity is calculated as the probability of moving from detailed occupation a to detailed occupation b, divided by the probability of moving from occupation a to occupation b plus the probability of moving to occupation b from all other occupations besides occupation a. Occupations with no observed mobility are set to zero skill similarity. The skill similarity measure ranges from 0 to 1 with .5 representing aver-age mobility between detailed occupations a and b.

References

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ADDITONAL TABLES AND FIGURES

Table O2. Low-Wage Thresholds

	Two-Thirds of the Median		Two-Thirds of the Mean	
	All	Full-Time	All	Full-Time
1967	11.48	12.40	13.53	14.07
1968	11.96	12.91	13.86	14.47
1969	11.92	12.99	13.78	14.81
1970	11.87	13.12	13.84	14.85
1971	11.87	13.11	13.85	14.87
1972	12.20	13.33	14.45	15.49
1973	12.20	13.60	14.51	15.60
1974	11.85	13.03	14.04	15.04
1975	11.50	12.95	13.70	14.75
1976	11.50	12.99	13.65	14.72
1977	11.47	12.72	13.70	14.76
1978	11.54	12.83	13.69	14.77
1979	11.22	12.84	13.51	14.59
1980	10.82	12.17	12.95	14.06
1981	10.65	12.10	12.89	14.04
1982	10.51	11.93	12.81	14.01
1983	10.71	12.33	12.86	14.13
1984	10.71	12.27	13.00	14.27
1985	10.77	12.47	13.18	14.45
1986	11.20	12.60	13.42	14.70
1987	11.16	12.64	13.51	14.72
1988	11.04	12.66	13.40	14.61
1989	11.13	12.36	13.48	14.59
1990	11.06	12.37	13.31	14.42
1991	10.98	12.26	13.15	14.23
1992	10.94	12.37	13.21	14.38
1993	10.83	12.19	13.30	14.34
1994	10.93	12.43	13.53	14.56
1995	10.84	12.05	13.67	14.63
1996	10.85	12.20	13.76	14.74
1997	11.16	12.40	14.08	15.11
1998	11.61	12.68	14.72	15.69
1999	11.51	12.89	14.72	15.66
2000	11.88	13.37	15.37	16.48
2001	12.07	13.07	15.74	16.89
2002	12.24	13.37	15.81	16.92
2003	12.40	13.35	15.83	16.97
2004	12.17	13.39	15.59	16.70
2005	11.99	13.41	15.69	16.84
2006	12.14	13.28	15.94	17.03
2007	12.31	13.43	15.94	16.99
2008	12.15	13.47	15.72	16.92
2009	12.52	13.99	16.22	17.59
2010	12.30	14.06	15.78	17.08
2011	12.13	13.61	15.71	16.99
2012	12.01	13.35	15.68	16.97
2013	12.17	13.16	15.80	17.01
2014	12.07	13.10	15.81	16.93
2015	12.56	13.53	16.33	17.49

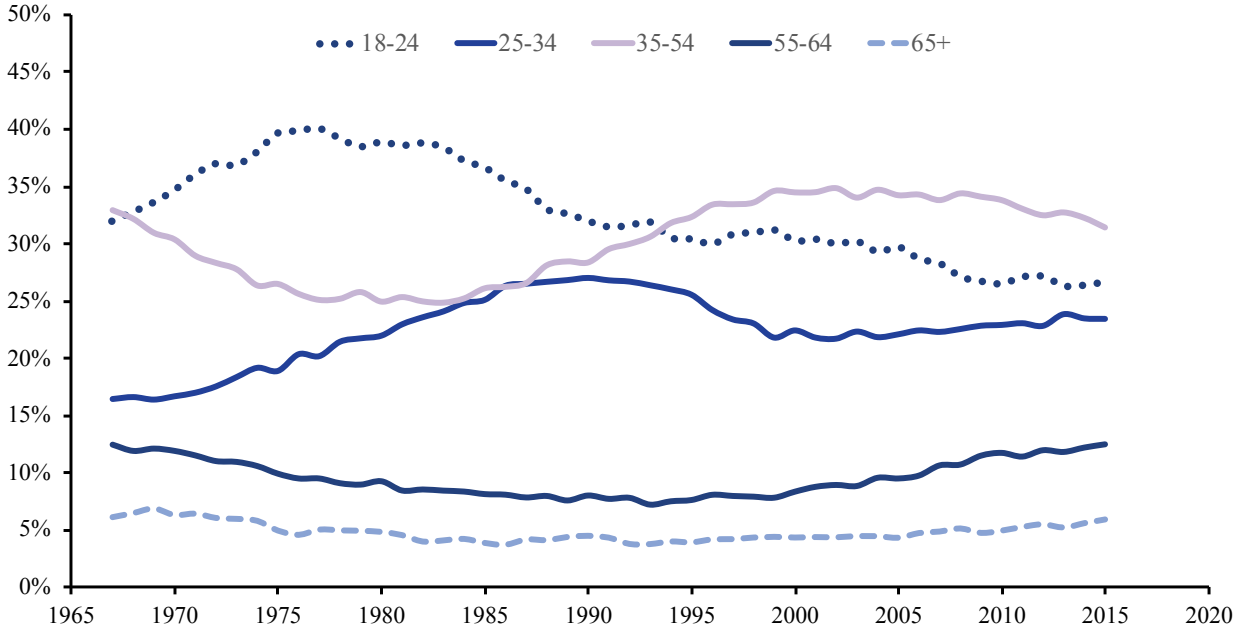
Source: Author's calculations based on the CPS (Flood et al. 2018).
Note: 2015 U.S. Dollars.

Table O3: Unemployment Rate by Year and Entry Period

Entry Period	Year	Percent Unemployed
Period 1	1968	3.5
	1969	3.4
	1970	4.4
	1971	6
Period 2	1972	5.8
	1973	4.9
	1974	5.1
Period 3	1975	8.6
	1976	7.6
	1977	7.4
	1978	6.3
Period 4	1979	5.8
	1980	6.3
	1981	7.4
	1982	9
Period 5	1983	10.3
	1984	7.8
	1985	7.2
Period 6	1986	7.2
	1987	6.6
	1988	5.7
	1989	5
Period 7	1990	5.2
	1991	6.8
	1992	7.4
Period 8	1993	7
	1994	6.5
	1995	5.4
	1996	5.5
Period 9	1997	5.2
	1998	4.7
	1999	4.2
	2000	4
Period 10	2001	4.3
	2002	5.7
	2003	5.9
Period 11	2004	5.8
	2005	5.2
	2006	4.7
Period 12	2007	4.4
	2008	5.1
	2009	8.7
Period 13	2010	9.9
	2011	9
	2012	8.2
	2013	7.5

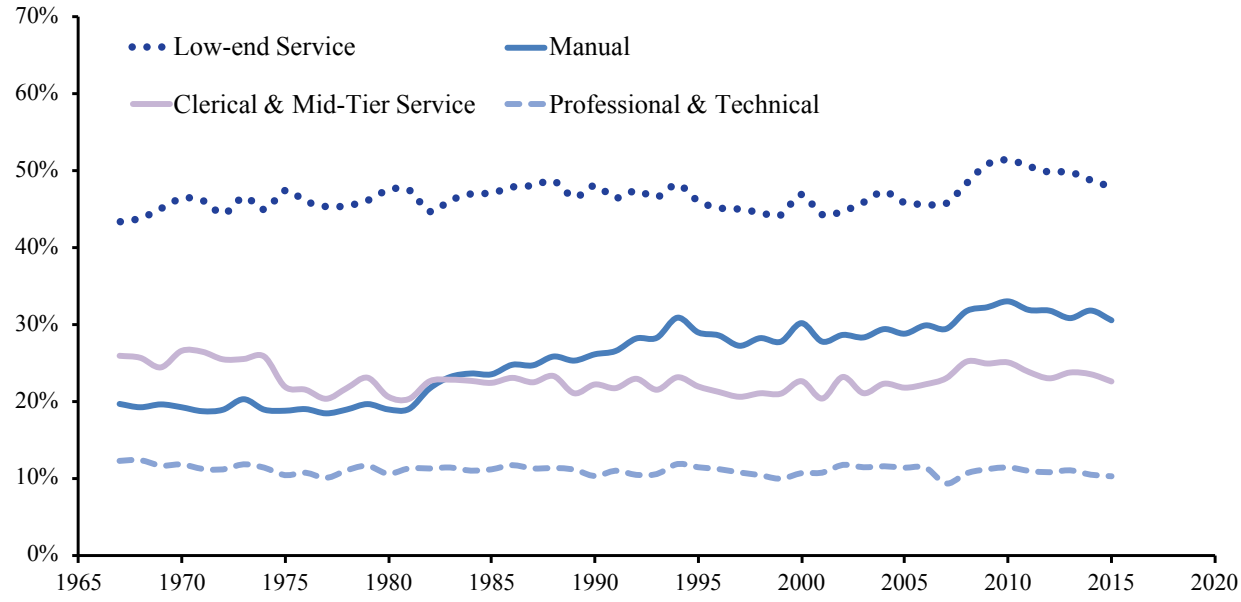
Source: Bureau of Labor Statistics, Series Id: LNS14000000

Figure O1: The Age Composition of the U.S.'s Low-Wage Labor Market, 1967-2015



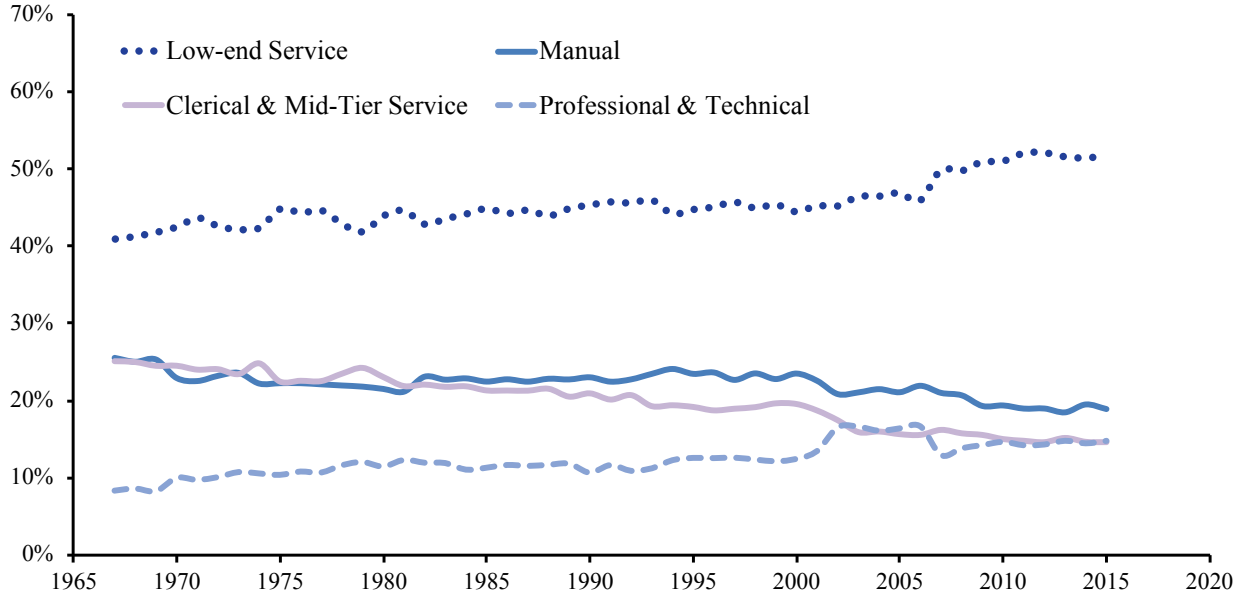
Source: Author's calculations based on the CPS (Flood et al. 2018).
Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

Figure O2: The Occupational Composition of the U.S.'s Low-Wage Labor Market, 1967-2015



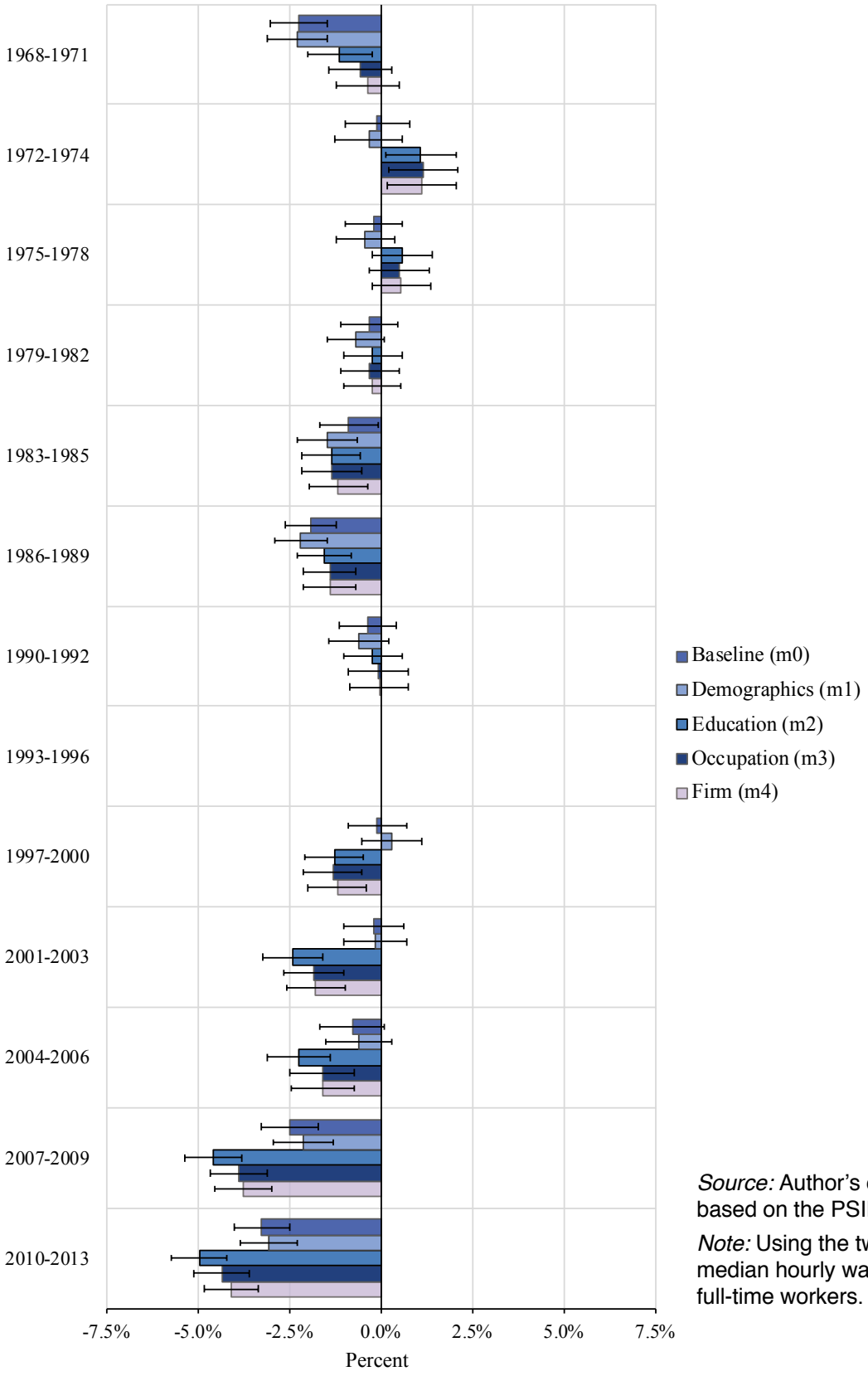
Source: Author's calculations based on the CPS (Flood et al. 2018).
Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

Figure O3: The Proportion of Each Large Occupation in Low-Wages, 1967-2015



Source: Author's calculations based on the CPS (Flood et al. 2018).
Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

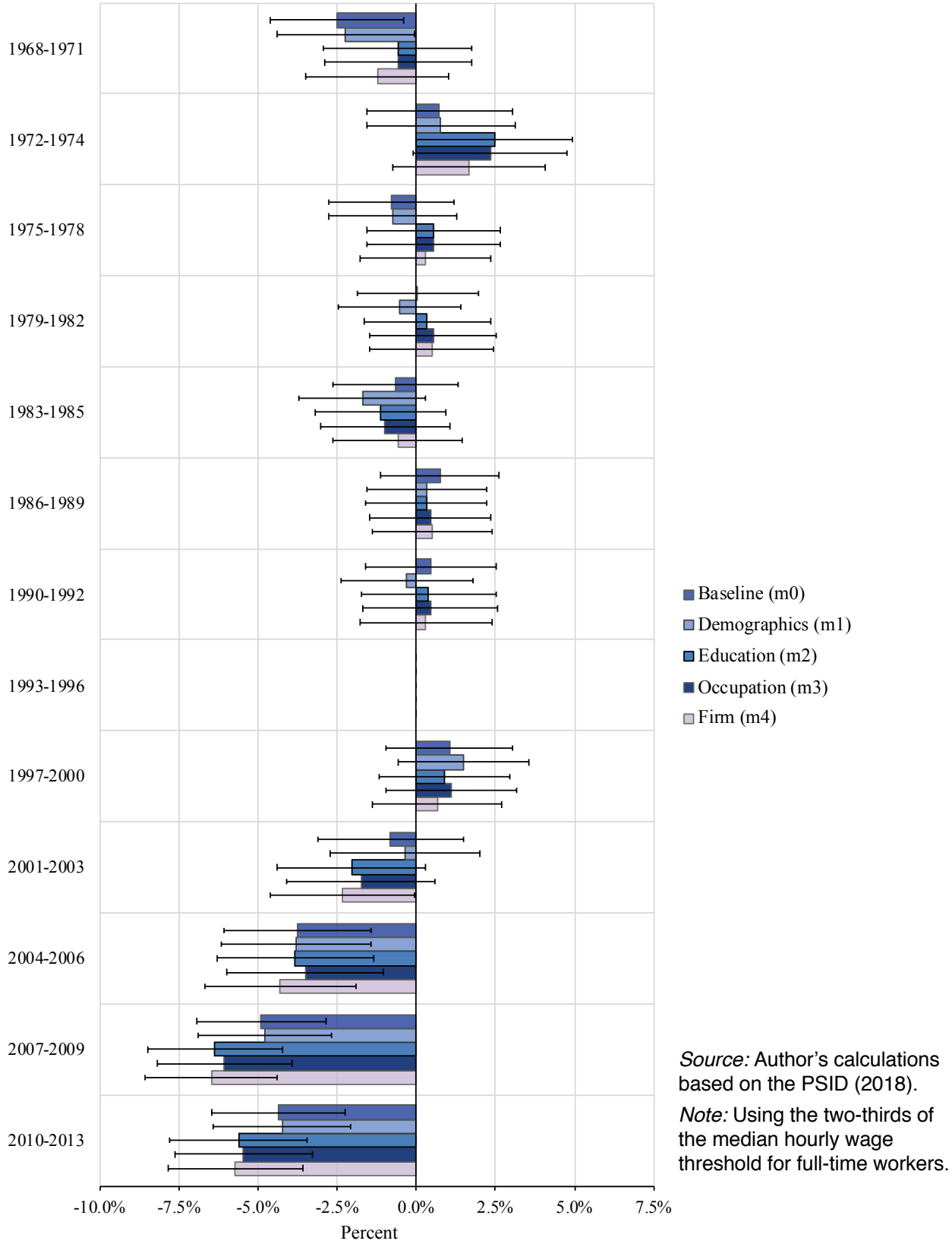
Figures O4: Average Marginal Effects of Entry Period on Mobility, All Low-Wage Workers



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

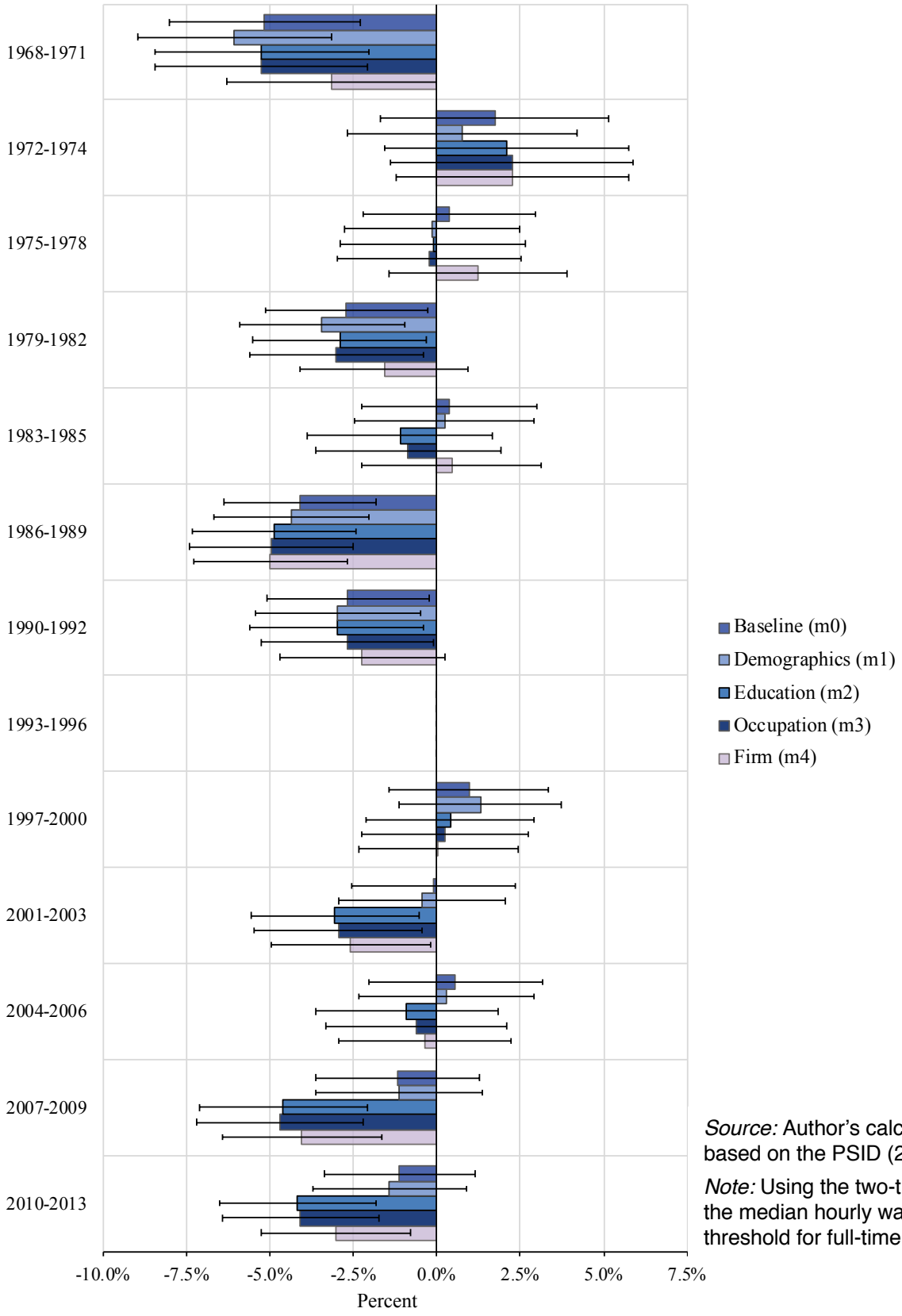
Figures O5: Average Marginal Effects of Entry Period on Mobility, Clerical & Mid-Tier Entrants



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

Figures O6: Average Marginal Effects of Entry Period on Mobility, Prof. & Technical Entrants



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the median hourly wage threshold for full-time workers.

Table O4: Average Marginal Effects of Covariates on Mobility, All Low-Wage Workers

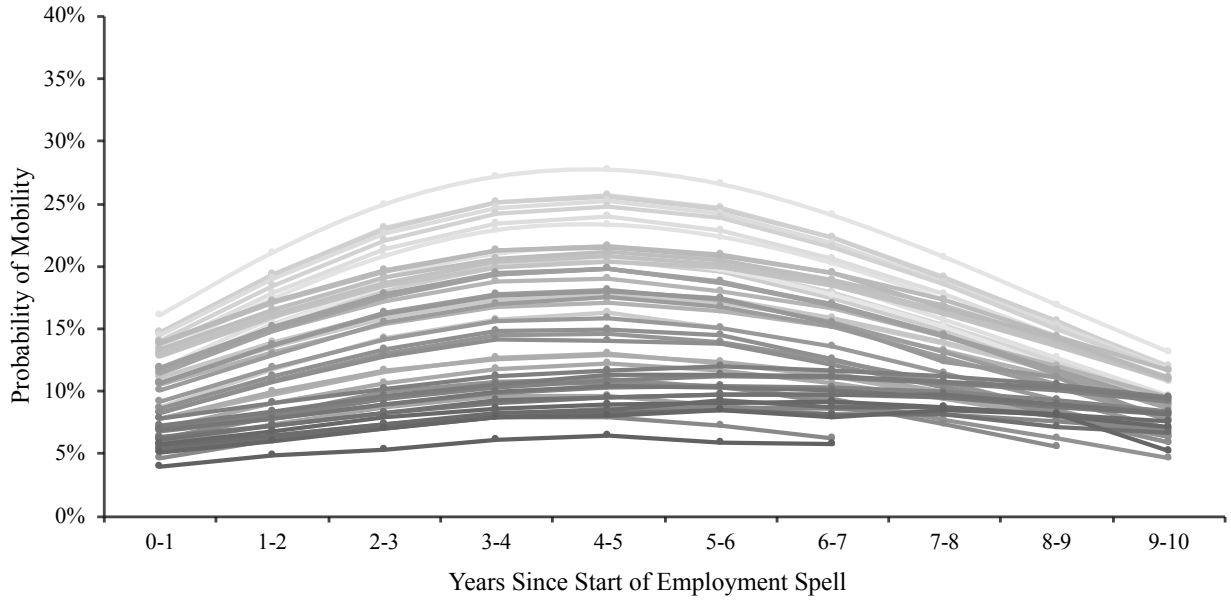
	All		Young Adults		Prime Age		Low-End Service		Manual		Clerical & Mid-Tier		Prof. & Tech.	
Person-Year Observations	60,331		28,021		32,310		28,800		13,891		10,689		6,951	
Demographic														
Woman	-0.045	***	-0.055	***	-0.032	***	-0.048	***	-0.065	***	-0.004		-0.041	**
Prime Age at Employment Spell Start	0.001						0.005		-0.006		-0.005		0.002	
Nonwhite	-0.015	***	-0.008		-0.023	***	-0.010	*	-0.026	***	-0.017		-0.021	
Marital Status														
Never Married	*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*	
Married	0.011	*	0.016	*	0.015		0.011		0.024	*	-0.007		0.002	
Previously Married	0.022	***	0.024	**	0.023	**	0.013	*	0.020		0.034	*	0.007	
Child(ren) in the Household														
Yes	0.005		-0.012		0.015	**	0.010	*	0.013		-0.002		0.005	
Under age six	-0.006		0.001		-0.002		-0.002		-0.013		-0.014		-0.010	
Woman w/ a child under age six	-0.019	***	-0.012		-0.008		-0.012	*	-0.025	**	-0.021		-0.033	*
Education														
Less Than High School	-0.042	***	-0.055	***	-0.040	***	-0.028	***	-0.041	***	-0.135	***	-0.036	
High School	*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*	
Some College	0.026	***	0.033	***	0.019	**	0.017	**	0.026	*	0.014		0.055	***
BA +	0.054	***	0.064	***	0.031	***	0.042	***	-0.005		0.021		0.091	***
Employment Staus Before Entry														
Unemployed	*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*	
Working, Better Wages	0.044	***	0.020	**	0.058	***	0.052	***	0.042	***	0.035	**	0.024	
Young Entry	-0.009		-0.032	***			0.004		0.001		-0.038	*	-0.039	*
Experience and Work Hours														
Times Achieved Mobility	-0.008	***	-0.017	**	-0.004		0.003		-0.009		-0.016	**	-0.017	*
Years Unemployed (Across Spells)	-0.029	***	-0.066	***	-0.020	***	-0.020	***	-0.036	***	-0.041	***	-0.032	***
Years in Low Wages (Across Spells)	0.018	***	0.046	***	0.010	***	0.013	***	0.014	***	0.030	***	0.020	***
Occupational Experience (Across Spells)	0.005	***	0.008	***	0.004	***	0.004	***	0.008	***	0.005	*	0.005	
Skill-Dissimilar Occupatonal Move	0.035	***	0.026	***	0.042	***	0.008		0.060	***	0.036	*	0.051	**
Part-Time Hours (<35 Hrs)	0.001		0.005		0.003		0.003		0.018		-0.013		-0.014	
Woman and Part-Time Hours	-0.005		-0.003		-0.003		0.001		0.029	*	-0.016		-0.041	**
Occupation at Employment Spell Start														
Professional & Tehnical	*ref.*		*ref.*		*ref.*									
Clerical & Mid-Tier Service	0.003		0.000		0.009									
Manual	-0.004		-0.004		0.002									
Low-End Service	-0.021	**	-0.033	**	-0.010									
Current Occupation														
Professional & Tehnical	*ref.*		*ref.*		*ref.*									
Clerical & Mid-Tier Service	-0.005		0.005		-0.013		-0.007		0.029		-0.030		-0.011	
Manual	-0.027	**	-0.014		-0.036	**	-0.056	***	0.009		-0.036		-0.026	
Low-End Service	-0.052	***	-0.056	***	-0.047	***	-0.066	***	-0.044		-0.083	***	-0.045	*
Industry														
Agriculture & Mining	*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*		*ref.*	
Manufacturing & Utilities	0.075	***	0.079	***	0.075	***	0.069	***	0.038	***	0.105	***	0.173	***
Wholesale & Retail Trade	0.024	***	0.039	***	0.020	*	0.035	**	-0.004		0.012		0.092	***
Finance, Insurance, & Business Services	0.049	***	0.066	***	0.044	***	0.054	***	-0.024		0.076	***	0.124	***
Personal Services & Entertainment	-0.001		0.014		-0.008		0.013		-0.026		0.008		0.025	
Health Care & Social Assistance	0.077	***	0.090	***	0.070	***	0.059	***	0.047		0.090	***	0.204	***
Education & Public Admin.	0.067	***	0.072	***	0.069	***	0.066	***	0.051	**	0.061	**	0.130	***
Other Prof., Scientific, & Techical	0.035	***	0.039	**	0.040	**	0.029		-0.050		0.055	*	0.103	***
1981-2014 Supplemental Analysis														
Person-Year Observations	32,188		15,986		16,202		15,058		7,600		5,829		3,701	
Union Job	0.082	***	0.074	***	0.072	***	0.066	***	0.077	***	0.082	***	0.061	**
Government Job	0.024	**	0.028	*	0.020		0.020	*	0.015		0.022		0.027	
Firm Experience	0.001	**	0.002		0.001	*	0.002	*	0.001		0.003	*	0.000	
Count of Firm Changes (Across Spells)	0.006	***	0.016	***	0.002		0.002		0.007	**	0.009	**	0.006	
Firm Change	-0.064	***	-0.072	***	-0.059	***	-0.055	***	-0.084	***	-0.067	***	-0.048	**

Source: Author's calculations based on PSID (2018). *Note:* *** p<0.001, ** p<0.01, * p<0.05; Low-wage threshold is two-thirds of the median for full-time workers

Figure O7: Mobility Rate Across Employment Spell by Entry Period and Occupation, Mean Threshold

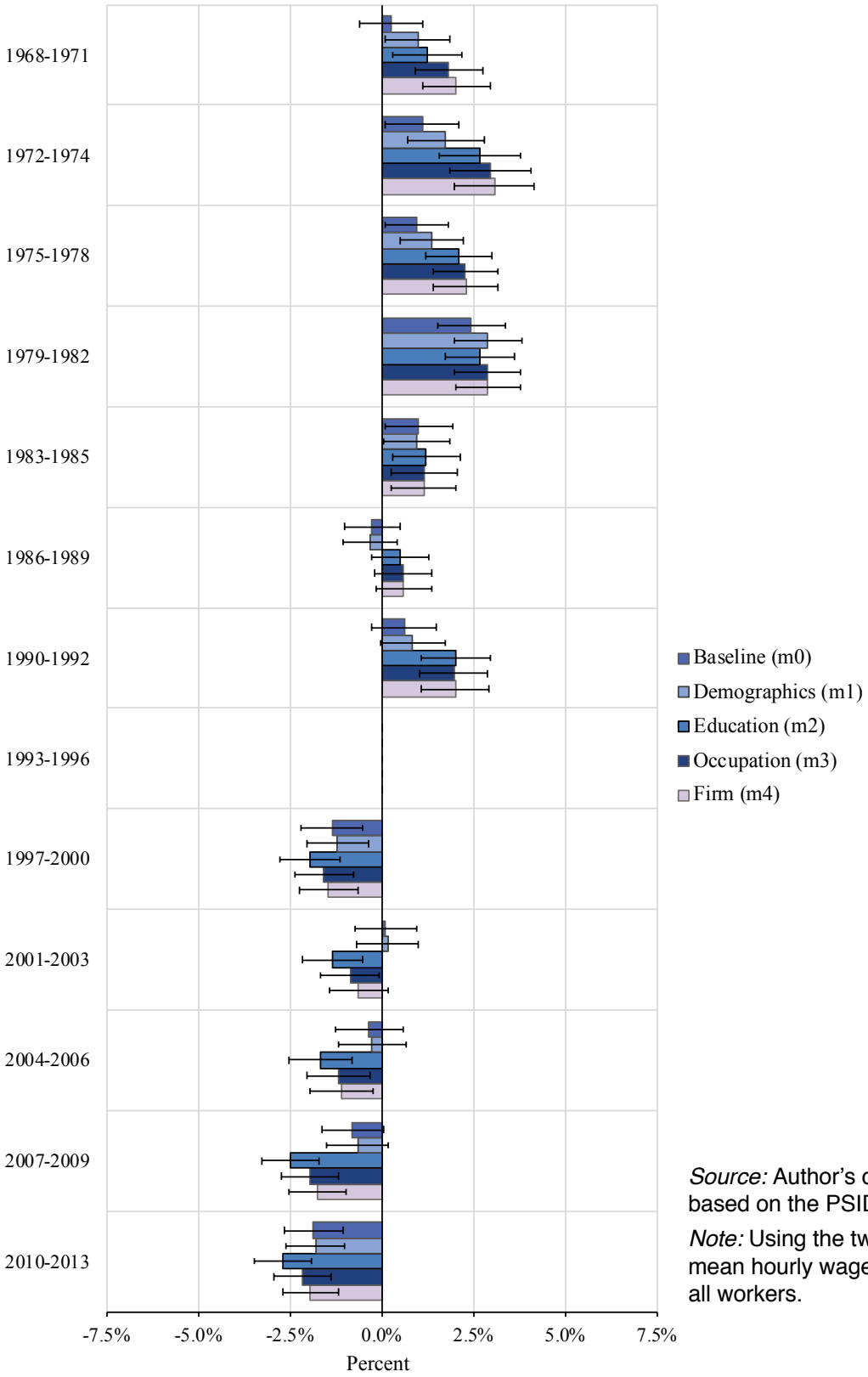
Source: Author's calculations based on the PSID (2018).
Note: Using the two-thirds of the mean hourly wage threshold for all workers.

Figure O8: Mobility Rate Across Employment Spell by Entry Period and Occupation, Entrants Starting Below the Median Threshold to Above the Mean Threshold



Source: Author's calculations based on the PSID (2018).
Note: Using the two-thirds of the median hourly wage threshold for full-time workers to select the sample and two-thirds of the mean hourly wage threshold for all workers for mobility.

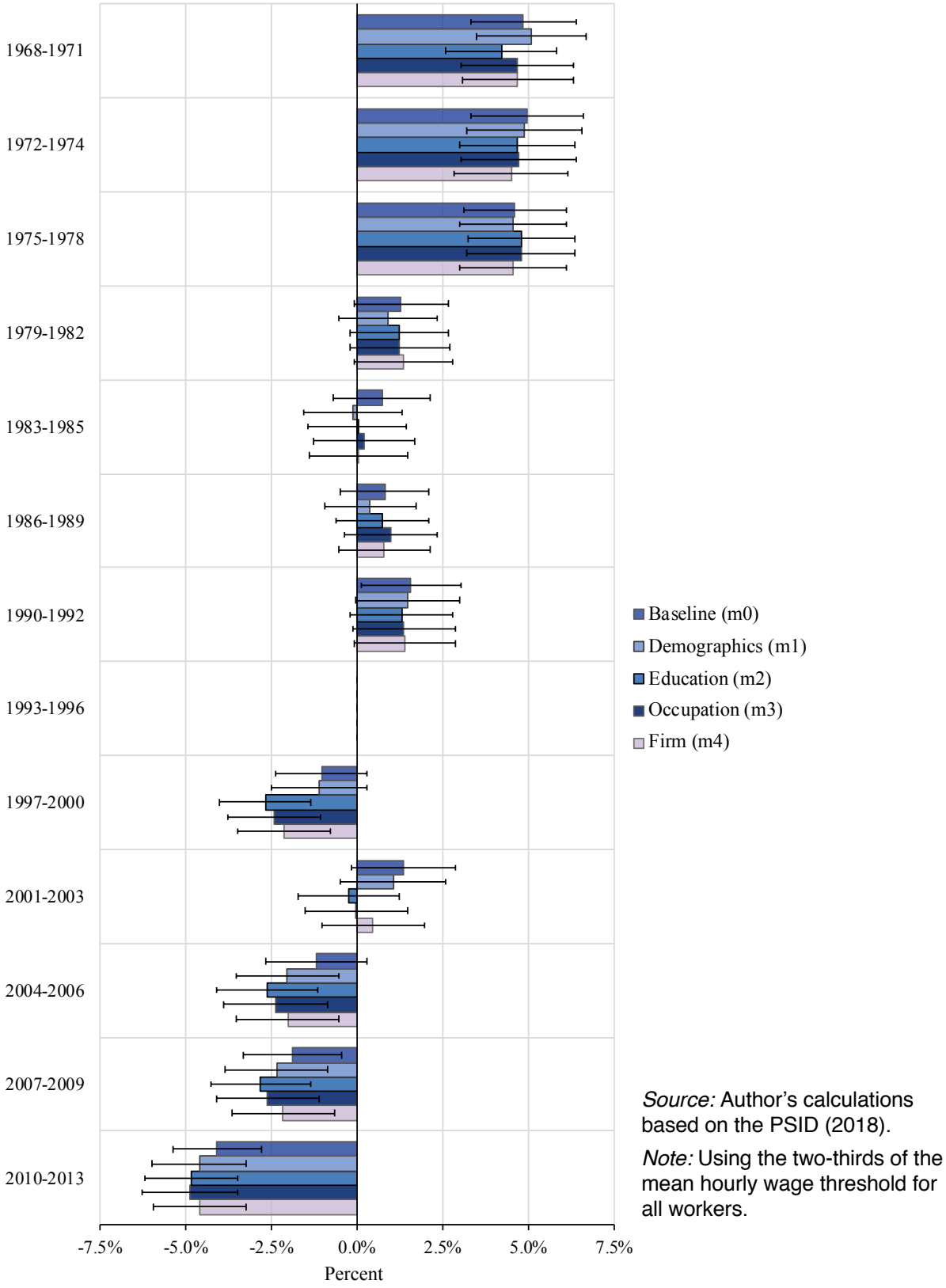
Figures O9: Average Marginal Effects of Entry Period on Mobility, Low-End Service Entrants, Mean Threshold



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the mean hourly wage threshold for all workers.

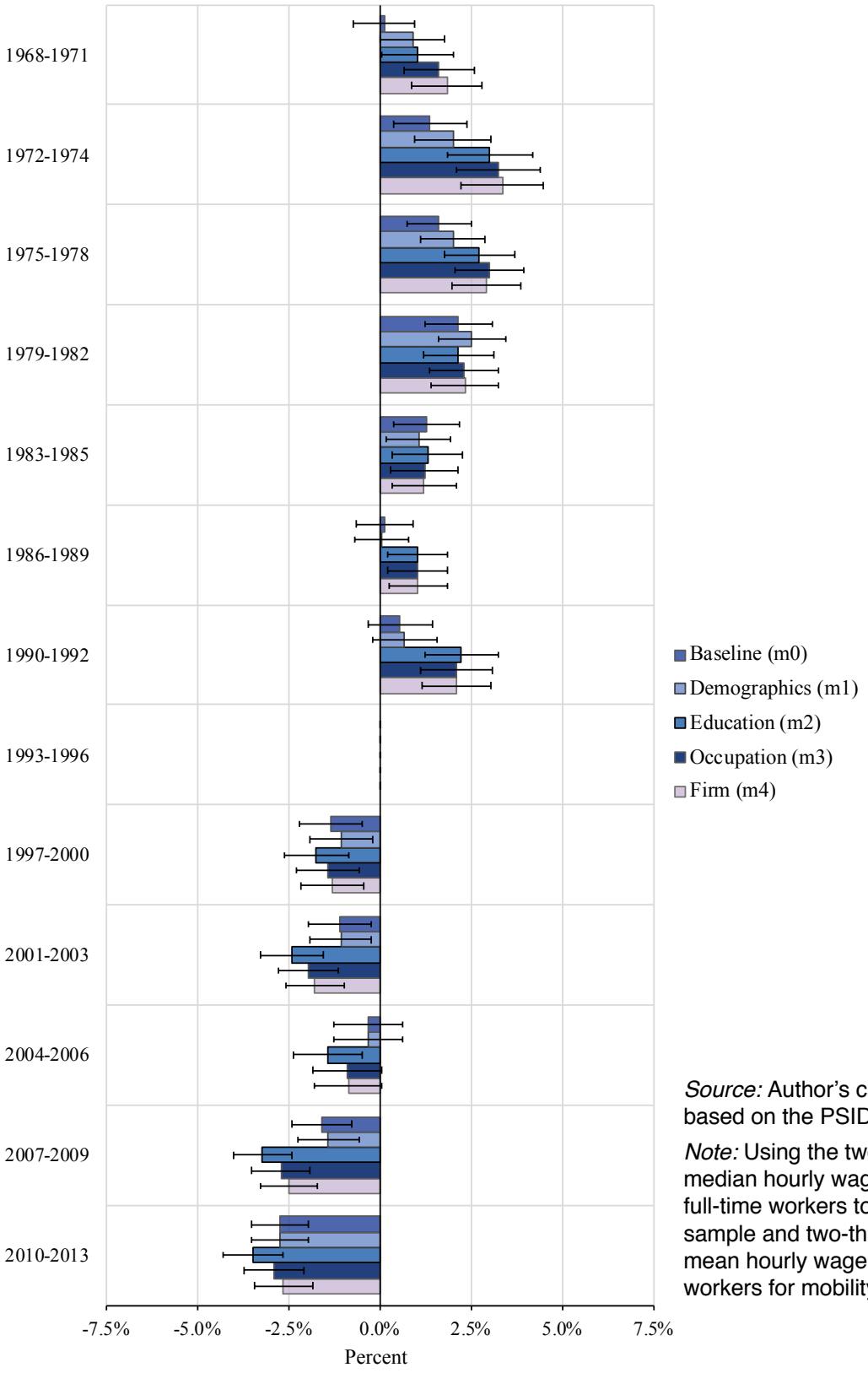
Figures O10: Average Marginal Effects of Entry Period on Mobility, Manual Entrants, Mean Threshold



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the mean hourly wage threshold for all workers.

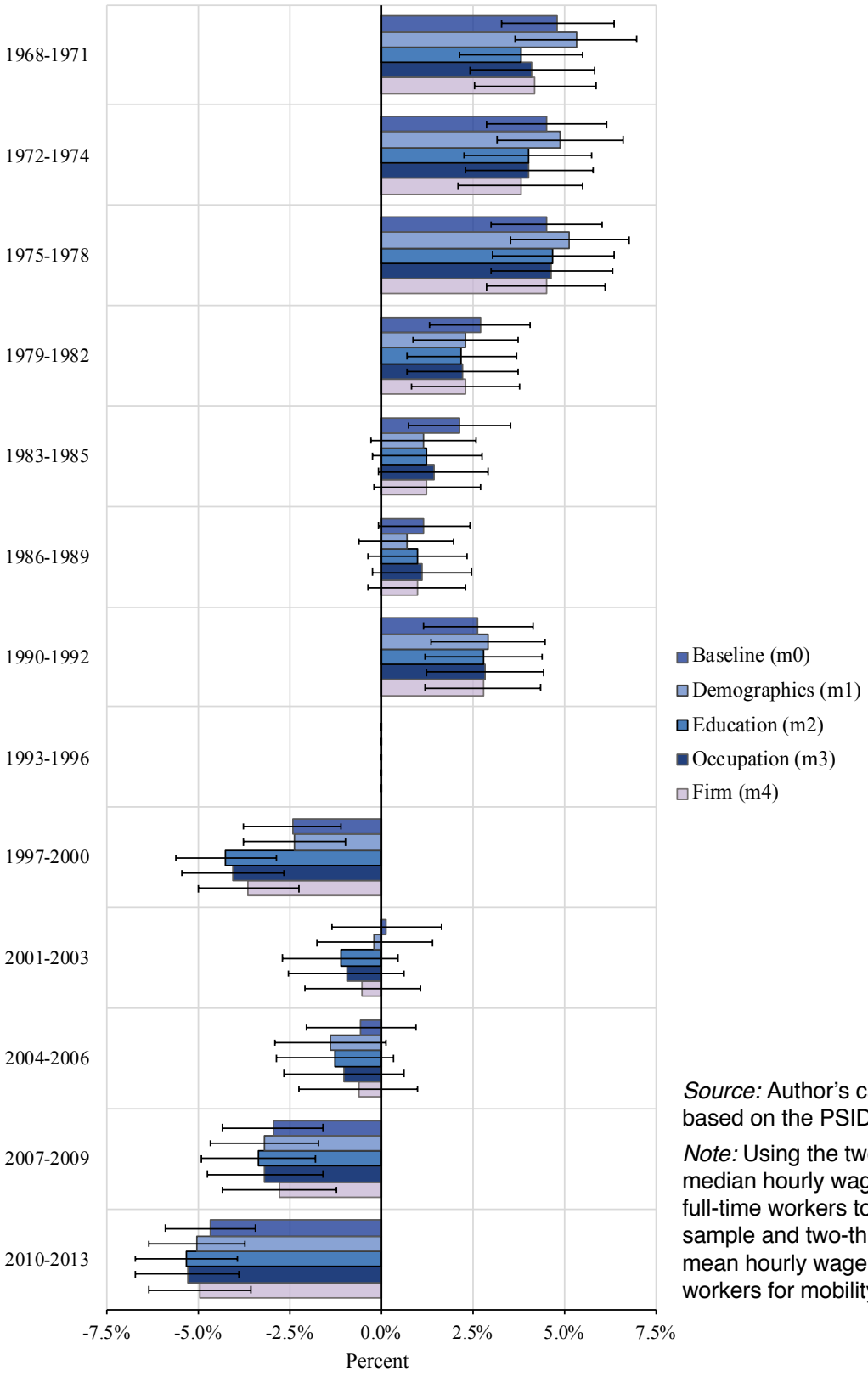
Figures O11: Average Marginal Effects of Entry Period on Mobility, Low-End Service Entrants, Entrants Starting Below the Median Threshold to Above the Mean Threshold



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the median hourly wage threshold for full-time workers to select the sample and two-thirds of the mean hourly wage threshold for all workers for mobility.

Figures O12: Average Marginal Effects of Entry Period on Mobility, Manual Entrants, Entrants Starting Below the Median Threshold to Above the Mean Threshold



Source: Author's calculations based on the PSID (2018).

Note: Using the two-thirds of the median hourly wage threshold for full-time workers to select the sample and two-thirds of the mean hourly wage threshold for all workers for mobility.