Cornell University
ILR School

ILRReview

Volume 64 | Number 1 Article 3

7-2-2008

First-Timers and Late-Bloomers: Youth-Adult Unionization Differences in a Cohort of the U.S. Labor Force

Jonathan E. Booth
London School of Economics, j.booth@lse.ac.uk

John W. Budd
Center for Human Resources and Labor Studies, University of Minnesota, jbudd@umn.edu

Kristen M. Munday
Center for Human Resources and Labor Studies, University of Minnesota, mund0051@umn.edu

Follow this and additional works at: http://digitalcommons.ilr.cornell.edu/ilrreview

First-Timers and Late-Bloomers: Youth-Adult Unionization Differences in a Cohort of the U.S. Labor Force

Abstract
The authors analyze youth–adult unionization differences by using the National Longitudinal Survey of Youth 1979 (NLSY79) to follow a single cohort of individuals from the ages of 15/16 to 40/41. They find that the differences between youth and adults are greatest at ages 15 to 17 and largely disappear by the age of 23. Though currently unionized workers are most likely to be in their forties or fifties, research also demonstrates that younger workers have a greater opportunity or are more inclined to be unionized than adults and that many individuals report having had a unionized job by the age of 25. The authors also find that whereas the stock of unionized workers is largest at middle age, the flow of workers into unionized jobs is greatest between the ages of 16 and 25.

This article is available in ILRReview: http://digitalcommons.ilr.cornell.edu/ilrreview/vol64/iss1/3

FIRST-TIMERS AND LATE-BLOOMERS: YOUTH–ADULT UNIONIZATION DIFFERENCES IN A COHORT OF THE U.S. LABOR FORCE

JONATHAN E. BOOTH, JOHN W. BUDD, AND KRISTEN M. MUNDAY*

The authors analyze youth–adult unionization differences by using the National Longitudinal Survey of Youth 1979 (NLSY79) to follow a single group of individuals from age 15/16 to 40/41. They find that the differences between youth and adults are greatest at ages 15 to 17 and largely disappear by age 23. Though currently unionized workers are most likely to be in their forties or fifties, the authors find that younger workers have a greater opportunity or are more inclined to be unionized than adults and that many individuals report having had a unionized job by the age of 25. The authors also find that whereas the stock of unionized workers is largest at middle age, the flow of workers into unionized jobs is greatest between the ages of 16 and 25.

Unionization patterns for adult workers are believed to differ significantly from those for younger workers. Bryson et al. (2005), for example, motivate their study of youth–adult differences in unionization by showing that unionization rates for workers aged 25–65 are three times higher than for those aged 15–24 in the United States and Canada, and two times higher in Britain. A similar pattern is evident in New Zealand and other countries (Haynes, Vowles, and Boxall 2005). Consequently, a number of studies specifically examine younger workers' attitudes towards unions (e.g., Blanden and Machin 2003; Freeman and Diamond 2003; Gallagher 1999; Gomez, Gunderson, and Meltz 2002; Lowe and Rastin 2000; Spilsbury et al. 1987).

In comparing youths with adult workers, however, most studies analyze across rather than within cohorts. The statistics just noted from Bryson et al. (2005), for example, compare the unionization rates for youths and adults for 1990, 1995, and 2000. Cross-sectional comparisons, however, cannot separate life-cycle effects from cohort effects (Clark 2007). Unlike those studies, ours asks whether 40-year-olds were more likely than 20-year-olds to be represented by unions in 2005 because of their age, or because of characteristics, attitudes, and experiences specific to the cohort of workers who entered the labor force beginning in the 1980s that can be different from the characteristics, attitudes, and experiences of those who entered 20 years later. Blanchflower (2007) specifically raised this question and found that the inverted-U age–unionization profiles for both the United States and Britain are

* Jonathan E. Booth is a lecturer in the Department of Management, Employment Relations and Organisational Behaviour Group at the London School of Economics and Political Science; John W. Budd is the Industrial Relations Land Grant Chair and Director of the Center of Human Resources and Labor Studies in the Carlson School of Management at the University of Minnesota. Kristen M. Munday is a PhD candidate in the Carlson School of Management at the University of Minnesota.

Industrial and Labor Relations Review, Vol. 64, No. 1 (October 2010). © by Cornell University.
0019-7939/00/6401 $05.00

significantly flatter when controlling for cohort effects. In this paper, we investigate this issue further for the United States by tracking a single cohort of individuals in the National Longitudinal Survey of Youth 1979 (NLSY79) from age 15 or 16 in 1979 to age 40 or 41 in 2004, uncovering important results for this literature.

By tracking individuals from the point when they initially enter the labor force, we can identify the age at which they first become unionized and analyze the relative probability of their unionization over the first half of their working lives. This focus on a single cohort from the beginning of their entrance into the labor market into middle age is a unique approach to analyzing individuals' unionization decisions and generates new results that enhance our understanding of youth–adult differences in unionization across the life cycle.[1] Furthermore, our results, which demonstrate that most workers first experience unionization at a much younger age, may temper the popular impression that unionization is the domain of middle-aged and older workers. Specifically, for the cohort of U.S. individuals who had been represented by a union by the time they were around 40 years old in 2004, three-quarters were first represented by age 25. The stock of unionized workers is largest at middle age, but the flow into unionized jobs is largest at younger ages, and this flow appears to be related to completing one's education. These results uncover new areas of research that can help us better understand unionization trends, and they have important practical implications for how companies and labor unions can devise strategies for shaping individuals' attitudes toward unions.

[1] Fullagar, McCoy, and Shull (1992), Clark et al. (1993), and Fullagar et al. (1994) analyzed the socialization of new union members in one union, but the experiences analyzed are not necessarily these workers' first unionized jobs. The mean age in the sample used in Clark et al. (1993) and Fullagar et al. (1994) is 35 years old; it is 25 years old in Fullagar, McCoy, and Shull (1992). Our sample starts tracking individuals at age 15/16 to identify workers' first and subsequent unionized jobs.

A Life-Cycle Theory of Individual Unionization

Many industrial relations scholars model whether workers are unionized as a function of opportunity and propensity (Bain and Elsheikh 1976; Spilsbury et al. 1987; Blanden and Machin 2003). Though this model was initially used as a theoretical foundation for studying aggregate unionization trends (Bain and Elsheikh 1976) and has more recently been applied to union-joining decisions in an open shop environment (Blanden and Machin 2003), the logic of this model can be extended to the issue of union coverage in the U.S. context. Specifically, we model whether an individual holds a unionized job, not whether an individual joins a labor union. In the United States, workers are "unionized" in a meaningful sense when they have jobs that are represented by unions and are covered by collective bargaining agreements. Hence, an individual can be unionized without actually being a union member; union membership is a separate decision. Due to a lack of available data on union membership, we concentrate on whether workers are unionized, not whether they are union members. Moreover, our focus here is on the outcome (that is, whether a worker has a unionized job or not), not on the underlying process of job-seeking, so it is not necessary to distinguish between those who intentionally choose a unionized job and those who obtain a job that happens to be unionized. This is consistent with the literature on U.S. unionization patterns (e.g., Blanchflower 2007).

Consider first a simple model of whether an individual i is covered by a union contract (or equivalently, represented by a union) at age a and time t (C_{iat}) as a function of the worker's opportunity of being covered (O_i) and the worker's propensity to be covered (P_i):

$$C_{iat} = f(O_i, P_i) + \varepsilon_{iat} \quad (1)$$

where ε_{iat} is a random error term that captures other factors. Opportunity captures the availability of unionized jobs. Individuals living in areas where union density is higher, such as in urban areas

or non-right-to-work states, have more opportunities to obtain unionized jobs. Likewise, for individuals qualified to work in industries and occupations with higher levels of union density, the prospects for securing unionized jobs are greater. Propensity reflects an individual's desire for union representation. Pro-union attitudes and union instrumentality positively affect propensity (Barling, Kelloway, and Bremermann 1991; Blanden and Machin 2003); perceived costs of being represented by a union negatively affect propensity. Union coverage, alternatively, can be modeled as a function of the supply of and demand for unionized jobs (e.g., Farber 1983), but these terms frequently focus one's attention on utility-maximizing, pecuniary factors. We therefore prefer to model unionization as a function of opportunity and propensity while recognizing that the supply of unionized jobs is an important aspect of opportunity, and that the demand for union representation is an important aspect of propensity.

Equation (1) captures a simple age/time-invariant model of union coverage insofar as opportunity and propensity are assumed to be fixed for each individual (or each cohort). Implicit in the literature on youth–adult unionization differences, however, is a richer life-cycle model of union coverage that incorporates age-varying opportunities of coverage and propensities to be covered. Also, if aggregate economic, legal, and political changes affect opportunity or propensity, then a richer model also includes time-varying components. The life-cycle model is therefore:

$$C_{iat} = f(O_{iat}(L_{ia}, T_{it}), P_{iat}(L_{ia}, T_{it})) + \varepsilon_{iat} \quad (2)$$

in which opportunity and propensity are functions of sets of life-cycle age-varying characteristics (L_{ia}), such as educational attainment or changing attitudes towards labor unions, and time-varying aggregate trends (T_{it}).

There are a number of reasons to hypothesize that opportunity and propensity vary across a worker's life cycle. The opportunity to obtain a unionized job—again, either intentionally or unintentionally—can vary over time as workers relocate across geographical areas with differing levels of union density. In the 1990s, employment growth was higher in right-to-work states where union density was lower than in non-right-to-work states (Wilson 2002), which might have pulled individuals into these areas where the chances of having a unionized job were lower. A movement across industries and occupations by individuals as they age can also affect the opportunity to find a unionized job over time. To formalize this, we borrow a concept from the literature on internal labor markets and posit that there are ports of entry into unionized sectors of the labor market (Kerr 1954; Doeringer and Piore 1971). Opportunity can increase as workers age if they complete additional training or schooling and therefore become qualified for unionized jobs. Completing an apprenticeship program and earning teacher certification are two examples. In such cases, ports of entry into unionized jobs open up over part of a worker's life cycle. Alternatively, opportunity can decrease if work experience leads a worker up a career ladder away from traditionally-unionized jobs; in other words, the ports of entry into unionized jobs might close as a worker ages.

Propensity can be hypothesized to vary across the life cycle as well. Attitudes toward unions can vary across the life cycle as the context of work changes, such as the costs of quitting, expected job duration, and preferences for cash compensation or benefits (Gallagher 1999). How workers first experience unionization can also potentially shape later attitudes towards unionization (Lowe and Rastin 2000). Bryson and Gomez (2003) and Gomez and Gunderson (2004) argued, for example, that it is not until an individual is a union member that he or she can form an accurate opinion about whether the benefits of union membership outweigh the costs. The complete understanding of what being a union member entails is only held by those individuals who are union members. Grievance procedures, just cause protections, and requirements for negotiating rather than imposing work rule changes are some examples of benefits that

union members receive but which might be difficult for non-unionized workers to fully observe and appreciate. Extending this logic to union representation, this "experience good" model of unionism predicts that an individual who is satisfied with union representation would want to be represented by a union in the future. Complementary research in psychology reveals that new union members who participate in formal and informal socialization activities will exhibit greater levels of union commitment (Fullagar, McCoy, and Shull 1992; Clark et al. 1993; Fullagar et al. 1994). Similarly, workers who have what they believe to be a poor experience with union representation are more likely to avoid union representation in future jobs (Prowse and Prowse 2006).

The contrast between these age/time-invariant and life-cycle models of union coverage guides our empirical analyses. The age/time-invariant model predicts that cohort effects explain observed differences in unionization rates between youths and adults. In contrast, youth–adult differences that reflect life-cycle changes in work and attitudes require a richer model in which opportunity and propensity to unionize vary over the life cycle. At the same time, the life-cycle model reveals the need to distinguish between age and time effects. As such, the remainder of this paper analyzes the empirical support for the two models, including what we believe is the first analysis of workers' first experiences with union representation, while also trying to separate age from time effects.

Data

To follow a single cohort of employees as they enter the labor force through to middle age, we use data from the nationally representative National Longitudinal Survey of Youth 1979.[2] The NLSY79 collected longitudinal demographic and labor market information from the same set of individuals every year from 1979 to 1994, and every other year thereafter. All of the NLSY79 respondents were between the ages of 14 and 22 when first surveyed in 1979, but our analyses focus on the select group of individuals who were aged 15 or 16 when first surveyed.[3] This methodology enables us to be confident that we are adequately capturing the experiences individuals have with unionization when they first enter the labor force.[4]

Each NLSY79 wave includes information on up to five jobs for each respondent. We examined the individuals in our cohort of 15- and 16-year-olds from 1979 to 2004 across all five jobs and identified all instances at which each reported being covered by a collective bargaining agreement on at least one job ("unionized"). We then created variables for them, indicating for each survey year (equivalently, age) whether they are and whether they had ever been unionized. The first instance of ever being unionized captures workers' first experience with unionization, that is, their first unionized job. Some waves of the NLSY79 do not contain information on union membership, so we only analyze unionization as measured by collective bargaining coverage. This focus on coverage rather than membership is common in individual-level research on U.S. unionization.

Of the 3,130 individuals in the NLSY79 aged 15 or 16 in 1979, we eliminated 1,534 because we were unable to fully track their

[2] To correct for intentional over-sampling of demographic groups such as minorities and low-income households in the NLSY79, the results throughout this article are computed using sampling weights. For more details on the sampling methods and data elements of the NLSY79, see Bureau of Labor Statistics (2005).

[3] Some waves of the NLSY79 occur in different months, so not everyone ages exactly one year in the reported data. We recode everyone to age one year for each survey year based on their age in the initial 1979 survey.

[4] Because parts of our analyses rely on identifying an individual's first unionized experience, we cannot be confident that we adequately capture this information for those individuals that begin the survey between the ages of 17 and 22. The unionization rate for 15-year-olds in 1979 is less than 2 percent, compared to a rate of between 5 and 10 percent for 17- and 18-year-olds. This increase demonstrates that the possibility of missing pre-survey unionization is nontrivial for those over the age of 16. Additionally, we exclude 14-year-olds because they represent a smaller group in comparison to 15- and 16 year-olds (the number of individuals in each group is 948, 1,566, and 1,564 respectively). Limiting the sample to 15 and 16 year-olds enables us to maintain balanced cohort sizes.

unionized status over time due to a lack of participation in one or more of the 21 waves of the survey. Missing values further reduced the final sample size to 1,507 individuals for whom unionization status can be followed from age 15 or 16 to age 40 or 41.[5] To create a consistent series, individuals were retained in the sample when they were not working. Table 1 provides summary statistics for the demographic, labor market, and job history variables used in the analyses. Only the first and last waves are summarized in Table 1, but for all 1,507 individuals we have 21 waves of data spanning 26 years.

The Cohort Effect in Youth–Adult Unionization Differences

Youth–adult differences in unionization are frequently analyzed using cross-sectional data samples, which do not allow for the identification of a cohort-specific effect. Using our sample from the NLSY79, however, we can trace the unionization rate for one cohort of individuals as they age from 15/16 to 40/41. The resulting age profile of the fraction covered by a union contract is indicated by the dashed line in Figure 1.[6] This profile reveals a steady increase in the coverage rate during the teen years and early 20s, and then a relatively flat profile for the remainder of the sample period up to age 40. As column 1 of Table 2 illustrates, the average coverage rate for age 15–17 is only 23 percent of the level of the coverage rate for these same individuals when they are 20 years older (that is, 3.7 percent compared to 16.2 percent), but this difference is short-lived and largely disappears by the time the individuals are 23 years old.

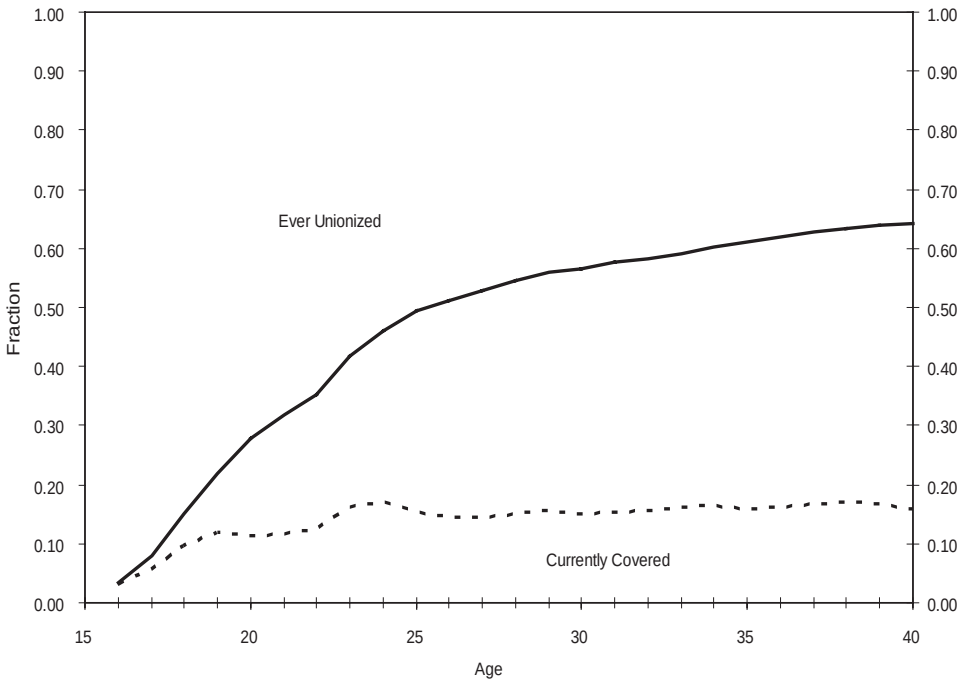
To explore these differences more formally, we pooled the 1,507 individuals across the 21 survey waves and estimated probit models on these 31,647 observations with the dependent variable defined as an indicator for whether the individuals were unionized at a specific age. The probit results reported in column 2 of Table 2 do not include any control variables and show that the average (raw) unionization rate for the two youngest age groups are indeed statistically different from the oldest age group. The union density trend for our single cohort of individuals, then, uncovers a significant youth–adult unionization difference, but compared to the cross-sectional results from Bryson et al. (2005), in which the unionization rate for workers aged 15–24 is only one-third as high as the unionization rate for those aged 25–65 in the United States, the age-profile in the single NLSY79 cohort flattens out more quickly. Our results are consistent with Blanchflower's (2007) results that also used narrower age categories distinguishing between teenagers and those in their early 20s.[7]

[5] To maintain a decent sample size, we imputed values for variables where there were missing values and where we felt confident we could make the imputations. However, 84 individuals were excluded because missing information existed for which no value could be determined; five others were excluded because their starting wage value was less than one dollar. The largest set of imputations were made for a survey error that occurred in 1994, which caused 621 employed individuals in our final sample to not be asked whether or not they were covered by a collective bargaining agreement on the job. We utilized information reported for other variables to fill in the missing information—89 of these individuals reported being self-employed and were thus coded as not covered, another 487 were able to be matched based on their employer identification code to a previous or subsequent year in which the value for their covered status provided in that year was utilized, 26 individuals were matched in a similar fashion using industry and occupation codes, and 19 individuals were coded as not covered because of job tenure of a month or less.

[6] We exclude the ages of 15 and 41 from our figures because we are only able to observe half our sample for these ages. The age of 15 is only observable for the cohort that began the NLSY79 at age 15. Likewise, the age of 41 is only observable for the cohort that began the survey at the age of 16. Additionally, because the survey is only given every other year after 1994, each age between 31 and 41 alternates between the 15-year-old and 16-year-old cohorts. To construct the figures, we therefore calculated the unionization rates of interest for each age within each cohort, replaced each missing value with the average of the previous and subsequent values within each cohort, and then calculated the weighted average of the two rates for each age.

[7] To maintain a balanced panel, the results in Table 2 include all individuals, not just those who are employed. Excluding those who are not working increases the average union coverage rate by around 1.8 percentage points in a fairly uniform fashion across the age categories. Consequently, the youth–adult unionization differences among the employed are quite similar to those reported in Table 2.

Figure 1. The U.S. Age Profile of Current Union Coverage and First Unionized Experience in a Single Cohort



Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979.

Column 3 of Table 2 presents the results of a further analysis of these youth–adult differences. This model adds demographic controls to the simple probit model from column 2 and therefore accounts for the changing marital status, educational levels, and geographical locations of individuals as they age. These changes explain a portion of the difference in unionization between the youngest and oldest ages (compare –0.096 to –0.114 for the age 15–19 coefficient), but the overall profile remains similar. The addition of variables that capture the changing industry, occupation, and hours of work for individuals' jobs as they age (column 4) further reduces the unionization differences between teenagers and those aged 35–41 years old.

As noted in the model in equation (2), however, aggregate trends can also be important determinants of unionization rates. The NLSY79 cohort studied here ages from 15/16 to 40/41, from 1979 to 2004. This time period includes three recessions (early 1980s, early 1990s, and early 2000s) and a 50-percent decline in overall union density from 27 percent to less than 14 percent (Hirsch and Macpherson 2008). As a result, the workers in this cohort might have fewer opportunities for unionized jobs when they are older, and the youth–adult differences estimated in column 4 of Table 2 might be misleadingly small. The probit model in column 5, therefore, includes the local unemployment rate, the annual growth in real GDP, and the

Table 1. Selected Summary Statistics for NLSY79 1979/2004[a]

	1979 *(1)*	*2004* *(2)*
Covered by a Union Contract (Unionized)	0.019 (0.120)	0.149 (0.373)
Ever Unionized	0.019 (0.120)	0.644 (0.474)
Age	15.495 (0.500)	40.495 (0.500)
Female	0.492 (0.498)	0.492 (0.498)
Nonwhite	0.290 (0.500)	0.290 (0.500)
Married	0.008 (0.096)	0.651 (0.492)
Highest Education: High School Not Complete	1.000 (0.000)	0.065 (0.267)
Highest Education: High School Graduate	0.000 (0.000)	0.419 (0.496)
Highest Education: Some College	0.000 (0.000)	0.222 (0.427)
Highest Education: College Graduate	0.000 (0.000)	0.293 (0.433)
Lived in an Urban Area	0.755 (0.424)	0.684 (0.446)
Lived in a Right-to-Work State	0.269 (0.456)	0.385 (0.496)
Local Unemployment Rate	6.263 (2.013)	5.663 (1.500)
Number of Prior Jobs	0.165 (0.484)	10.967 (6.174)
Worked in Professional and Related Services	0.025 (0.159)	0.230 (0.432)
Worked in Manufacturing	0.033 (0.151)	0.124 (0.320)
Worked in Wholesale and Retail Trade	0.127 (0.316)	0.147 (0.344)
Worked in a Blue-Collar Job	0.073 (0.236)	0.208 (0.410)
Worked in the Public Sector	0.012 (0.130)	0.137 (0.365)
Average Hours Worked per Week[b]	15.417 (11.400)	40.126 (11.208)
Hourly Wages (2004 dollars)[c]	6.705 (8.126)	20.544 (15.996)
Sample Size	1,507	1,507

[a] The table contains weighted sample means and standard deviations for the years 1979 and 2004. All job variables reflect the value reported for the job that the individual held as a "current or most recent job."
[b] Hours worked includes only those individuals that reported being employed in that year. This reduces the number of usable observations to 434 in 1979 and 1,328 in 2004.
[c] The hourly wages variable excludes individuals who are not working and also individuals reporting a value less than $1 or greater than $200. This reduces the number of usable observations to 429 in 1979 and 1,277 in 2004.
Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979.

Table 2. Youth–Adult Differences in Union Coverage in a Single Cohort

	Union Coverage Sample Mean	*Probit Analysis*[a] *Dependent Variable: 1 if Covered by a Union Contract*				
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Age 15–17	0.037	–0.114**	–0.096**	–0.043**	–0.056**	–0.025**
		(0.004)	(0.006)	(0.006)	(0.006)	(0.004)
Age 18–22	0.115	–0.041**	–0.040**	–0.024**	–0.035**	–0.015**
		(0.006)	(0.006)	(0.005)	(0.005)	(0.003)
Age 23–26	0.157	–0.004	–0.007	0.0003	–0.008	–0.002
		(0.007)	(0.007)	(0.005)	(0.005)	(0.002)
Age 27–30	0.151	–0.010	–0.013**	–0.007	–0.011**	–0.007**
		(0.006)	(0.006)	(0.005)	(0.005)	(0.002)
Age 31–34	0.160	–0.002	–0.003	–0.003	–0.007	–0.004
		(0.008)	(0.008)	(0.005)	(0.005)	(0.003)
Age 35–41	0.162	— omitted reference category —				
Demographic Controls[b]	—	No	Yes	Yes	Yes	Yes
Job Controls[c]	—	No	No	Yes	Yes	Yes
Aggregate Trends Controls[d]		No	No	No	Yes	Yes
Individual Random Effect	—	No	No	No	No	Yes
Model χ^2 p-value	—	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

[a] Each entry in columns 2–6 contains the marginal effect and standard error in parentheses from a probit model. The sample size in each column is 31,647. The results are weighted using individual sampling weights except in column 6.
[b] Demographic controls: female, nonwhite, married, three educational categories, urban area, and right-to-work state.
[c] Job controls: major industry (13 categories), major occupation (9 categories), public sector, and average hours worked per week.
[d] Aggregate trends controls: the local unemployment rate, annual real GDP growth, and state unionization rate.
** Statistically significant at the 0.05 level; * at the 0.10 level.
Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979.

state unionization rate.[8] As expected, when we account for reduced unionization opportunities at older ages, the youth–adult unionization gap widens. The differences between columns 4 and 5 are modest, however, and even with the inclusion of the controls for aggregate trends, youth–adult unionization differences mostly disappear by age 23.

Finally, column 6 of Table 2 reports the results of a random effects probit model that controls for an individual-specific effect, such as unchanging attitudes toward unionization, in addition to the controls for demographic, job, and aggregate trends. The predicted unionization difference between the youngest and oldest age groups is estimated to be –0.025, and –0.015 between 18–22 year-olds and 35–41 year-olds. Just as it is in the other specifications, the differences among those who are between 23 and 41 years old are slight.

It should be noted that the break point between 22- and 23-year-olds is not an artifact of our categorizations. We explored alternative specifications of the age categories, and the categories displayed in Table 2 seem to best reflect the unionization differences in the data. For example, changing the endpoint of the 18–22 year-old category to 23 weakens the magnitude of this coefficient while leaving the next older category unchanged in each of the specifications in Table 2.[9]

The results reported in Table 2 imply that though a cohort effect cannot fully explain the youth–adult unionization differences previously uncovered in cross-sectional analyses, a combination of person-specific heterogeneity, aggregate trends, and demographic and especially job-related changes over the life cycle can explain approximately 65–75 percent of these youth–adult differences (compare columns 2 and 6). Moreover, these results demonstrate that youth–adult differences in unionization are strongest for the very youngest workers (up to age 17), and largely disappear by age 23. These findings are important because the previous literature has tended to group all youths together (e.g., Bryson et al. 2005; Gomez, Gunderson, and Meltz 2002), and, in some cases, to use an age cut-off for youths of 30 years old (Freeman and Diamond 2003; Haynes, Vowles, and Boxall 2005). We can now see that both approaches mask important aspects of youth–adult differences in U.S. union coverage rates.

Youth–Adult Differences in Unionized Jobs

The 1,507 individuals in our sample began 599 unionized jobs between the ages of 15 and 22 and began 223 unionized jobs between the ages of 35 and 41. Table 3 compares the characteristics of these jobs, excluding those with missing values. These summary statistics complement what we have uncovered about youth–adult differences in unionization rates by revealing how the nature of unionization changes over workers' life cycles. Unionized jobs held by younger workers are more likely to be held by males, whereas unionized jobs among adults are gender neutral (the fraction female in column 2 mimics the overall sample fraction of 0.492). More than half of the early unionized jobs occur before workers complete their education, while this is rarely the case for later unionized jobs. Moreover, 71.8 percent of the early unionized jobs are these workers' first unionized jobs, compared to only 26 percent of the later ones. These last two comparisons are unsurprising, but it is useful to document the magnitude of the differences. These contrasts are vivid reminders that youths and adults experience unionization in very different ways.

Younger workers are less likely to hold unionized jobs in manufacturing, transportation, communication, public utilities, and professional services; rather, they are much more likely to experience

[8] State-level unionization rates are from Hirsch, Macpherson, and Vroman (2001), as updated by those authors on www.unionstats.com. To further control for state-level economic conditions, we also estimated a model that included state-level probabilities of a recession graciously provided by James Hamilton, but these did not change the results.

[9] Using dummy variables for each age yields similar results. Lastly, a simple switching probit model analogous to Quandt's (1958) regression switching model indicates a breakpoint around 22-23 years old.

Table 3. Youth–Adult Differences in Unionized Jobs: Summary Statistics[a]

	Ages 15-22 *(1)*	*Ages 35-41* *(2)*
Age	19.278	37.586**
	(1.820)	(1.866)
Female	0.390	0.487**
	(0.496)	(0.497)
Nonwhite	0.326	0.354
	(0.499)	(0.492)
Married	0.130	0.602**
	(0.335)	(0.501)
High School Not Complete	0.333	0.068**
	(0.461)	(0.251)
High School Graduate	0.463	0.454
	(0.500)	(0.497)
Some College	0.186	0.193
	(0.400)	(0.419)
College Graduate	0.018	0.285**
	(0.143)	(0.445)
Schooling Completed at the Time of the Job	0.415	0.968**
	(0.497)	(0.204)
Lived in an Urban Area	0.832	0.754
	(0.357)	(0.399)
Lived in a Right-to-Work State	0.265	0.318**
	(0.451)	(0.489)
Number of Prior Jobs	3.641	13.855**
	(2.766)	(6.306)
First Unionized Job	0.718	0.260**
	(0.458)	(0.422)
Industry		
Manufacturing	0.195	0.143*
	(0.387)	(0.342)
Transportation, Communication, and Public Utilities	0.052	0.125**
	(0.223)	(0.331)
Wholesale and Retail Trade	0.367	0.147**
	(0.470)	(0.337)
Professional and Related Services	0.108	0.361**
	(0.352)	(0.485)
Other Services (Business, Repair, Personal, Entertainment, or Recreation)	0.106	0.037**
	(0.313)	(0.224)

Continued

unionization in the wholesale and retail trades, and to a lesser extent, in non-professional services. Younger workers' unionized jobs are also significantly more likely to be in blue collar, clerical, and service occupations. A significantly higher fraction of older workers' unionized jobs are in professional occupations and in the public sector. Though these differences are predictable, they have been overlooked in the literature on youth–adult unionization differences. Unfortunately, we are unable to observe attitudinal measures such as job satisfaction, organizational commitment,

Table 3. Youth–Adult Differences in Unionized Jobs: Summary Statistics, Continued[a]

	Ages 15–22 *(1)*	*Ages 35–41* *(2)*
Occupation		
Professional, Technical, and Kindred	0.022	0.313**
	(0.179)	(0.452)
Clerical and Kindred	0.211	0.142**
	(0.418)	(0.366)
Operatives (Not Transport)	0.114	0.063**
	(0.319)	(0.251)
Laborers (Not Farm)	0.185	0.074**
	(0.370)	(0.259)
Service Workers (Including Private Household)	0.248	0.109**
	(0.435)	(0.352)
Public Sector	0.129	0.322**
	(0.369)	(0.480)
Average Hours Worked per Week	33.661	38.688**
	(12.938)	(11.051)
Hourly Wages (2004 dollars)[b]	9.611	18.068**
	(4.828)	(12.534)
Sample Size	575	208

[a] The table contains weighted sample means and standard deviations for the unionized jobs held by individuals aged 15–22 and 35-41. Each variable is measured at the start of the job.
[b] The hourly wages variable excludes individuals with missing values and also individuals reporting a value less than $1 or greater than $200. This reduces the number of usable observations to 570 for ages 15-22 and 202 for ages 35-41.
** Statistically different from column 1 at the 0.05 level, * at the 0.10 level.
Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979.

satisfaction with the union, or union commitment.[10] A valuable subject for future research is whether the differences in how youths and adults experience unionism affect these attitudes, and in turn how they affect future labor market outcomes.

The Age/Ever-Unionized Profile Over the Life-Cycle

Tracking a single cohort of individuals from when they first enter the labor market until age 40/41 allows us to examine a previously overlooked issue in the literature on youth–adult unionization differences: the point at which workers experience unionization for the first time in their working lives. To this end, we calculate, on an age-by-age basis, the aggregate fraction of the individuals in our sample who are or were covered by a collective bargaining agreement and were therefore represented by a labor union. The resulting series reveals the likelihood of having experienced unionization by a specific age. This age/ever-unionized profile for ages 16 to 40 is shown by the solid line in Figure 1. The nonlinear shape of the age/ever-unionized profile underscores the life-cycle dynamics of unionization, and Figure 1 clearly reveals that workers first experience unionization largely when they are young.[11] More than one-third (35.3 percent) of the sample had at least one unionized job by age 22, and nearly half (49.3 percent) experienced unionization by age 25. Among those who were unionized by age 40, 76.5 percent first

[10] While the NLSY79 contains a measure of job satisfaction, it is not consistently asked for all jobs until 1994, which means that it is unavailable for many of the unionized jobs analyzed here.

[11] Figure 1 also shows that 64 percent of the individuals in this cohort are unionized at least once in their working lives by age 40. Across the life cycle, then, U.S. labor unions represent many more workers than is suggested by the conventional union density statistic of less than 15 percent.

experienced unionization by age 25.

The flattening of the age/ever-unionized profile after age 35 in Figure 1 further suggests that if a worker has not been represented by a union by age 40, it is very unlikely that the worker will ever be unionized. To investigate this further, we estimated a three-parameter exponential model of the form ever-unionized = $\beta_0 + \beta_1 * \beta_2^{age}$ on the data plotted in Figure 1 using nonlinear least squares. The resulting model has an adjusted R^2 value of 0.996, and all of the parameters are highly significant with p-values of less than 0.0001. Using this model to predict (out of sample) the ever-unionized rate at age 65 indicates that no more than another 2.5 percent of workers are likely to experience unionization for the first time between age 40 and 65. In other words, of those workers who experience unionization between ages 15 and 65, more than 96 percent have their first unionized job by age 40, and more than 70 percent are first unionized by age 25. Late bloomers are likely rare in the U.S. labor movement.

The Openness of Younger Workers to Unionization

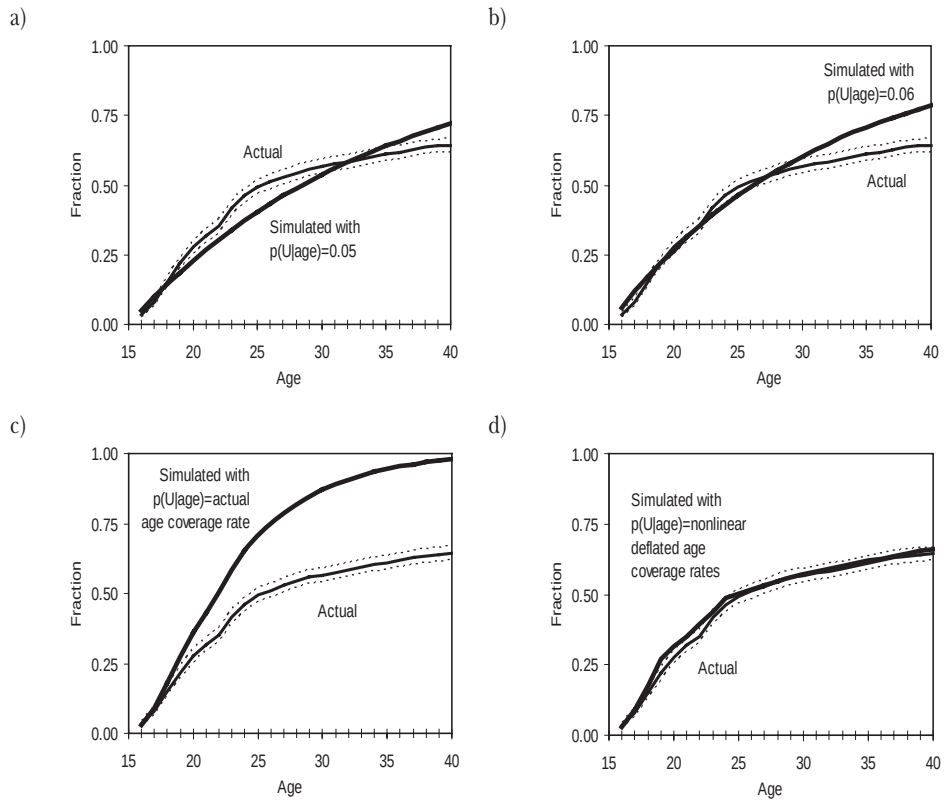
That more than 70 percent are first unionized by age 25 implies that younger workers are quite open to unionization. In fact, Gomez, Gunderson, and Meltz (2002) found in survey data for Canada that younger workers have a greater preference for unionization than do adult workers. To explore this further, consider again the age/time-invariant and life-cycle models of unionization. Specifically, the age/time-invariant model implies that each worker faces a fixed probability of being unionized at each age. If this model is accurate, then we should be able to generate an age/ever-unionized profile that matches the actual profile in Figure 1 by using simulated data and a fixed probability of being unionized. Moreover, we can assess youth–adult differences in the receptivity to unionization by analyzing the extent to which the baseline model of a fixed probability of being unionized over time needs to be modified to fit the actual data.

We therefore constructed an artificial data set of 1,500 individuals spanning ages 16 to 40, analogous to the actual sample used in Figure 1. We randomly determined each artificial individual's union status at each age, based on a fixed probability. From this, we calculated each individual's age of first unionization and generated the aggregate age/ever-unionized profile across the 1,500 individuals. We repeated this simulation 100 times for the same probability level and constructed the average age/ever-unionized profile. We also repeated this simulation method for each fixed probability level from 0.01 to 0.20 in 0.01 increments. Recall that we are looking for a fixed probability level that replicates the actual age/ever-unionized profile. None of the resulting 20 simulated profiles, however, match the actual NLSY79 profile from Figure 1.

Panels (a) and (b) of Figure 2 compare the actual profile from Figure 1 and the simulated profiles using a 0.05 and 0.06 probability level of unionization at each age. To promote comparison, the 95 percent confidence interval for the observed NLSY79 profile from Figure 1 is shown as dashed lines. The simulated age/ever-unionized profiles generated from these two probability levels come closest to matching the actual age/ever-unionized profiles, but they lack sufficient curvature to accurately replicate the actual profile. Each of the other fixed-probability simulations over-predict or underpredict to a greater extent. These results, therefore, do not support an age/time-invariant model of unionization.

To replicate the actual NLSY79 profile, we need instead to adjust the probability of unionization at different age levels consistent with a life-cycle model of unionization. In Panel (c), we illustrate the simulated profile using the actual age-by-age union coverage rates from the NLSY79 (that is, the dashed line in Figure 1). This simulation grossly overstates the actual pattern of first unionization. So, it is clearly not the case that the decision to unionize mimics a random draw from the pool of unionized and non-union jobs at each age. In Panel (d) d of Figure 2, we

Figure 2. Comparing Actual and Simulated Age/Ever-Unionized Profiles



Source. NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979. Each simulated profile is constructed from 100 simulations of 1,500 individuals facing probability p(U|age) of being unionized at each age value.

are able to create a simulated profile that largely matches the actual NLSY79 profile by deflating the actual age-by-age coverage rates by a factor of two for ages 20–24, a factor of five for ages 25–30, and a factor of seven for ages 31–40. We stress here that we are able to replicate the actual profile only by significantly decreasing the probability of unionization as workers become older. Doing so provides empirical support for a life-cycle model of unionization in which the combined effects of opportunity and propensity *decrease* as workers age. This is an intriguing result since the literature on youth–adult differences is often motivated by an observation that younger workers are less likely to be unionized than older workers.

One can question whether these results are being driven by measurement error. Younger workers, in particular, might not pay attention to whether their job is unionized or not and might, therefore, not accurately report their true union status when surveyed. However, under-reporting of unionization increases the number of workers truly exposed to unionization at an early age, and only very high levels of over-reporting of union coverage with no offsetting under-reporting significantly reduces the ever-unionized rate over the life cycle (see the Appendix). The age/

ever-unionized profile results therefore appear to be robust to reasonable levels of measurement error. The results from Table 2 further suggest that changing aggregate trends are not driving the results; rather, it appears that the interaction of opportunity and propensity for unionized employment declines as workers age.

Youth–Adult Flows into Unionized Jobs

The results presented here portray an interesting contrast. On the one hand, age-by-age union coverage rates reinforce what other research has found: the probability of being unionized increases as workers grow from teenagers into adulthood. On the other hand, the shape of the age/ever-unionized profile suggests that the combined effect of opportunity and propensity *decreases* as workers transition from youth to adulthood. This contrast indicates that it is important to distinguish between the stock and flow of unionized workers. Coverage rates reflect the stock of unionized workers at a certain age whereas the age/ever-unionized profile captures the flow of workers into unionized jobs for the first time.

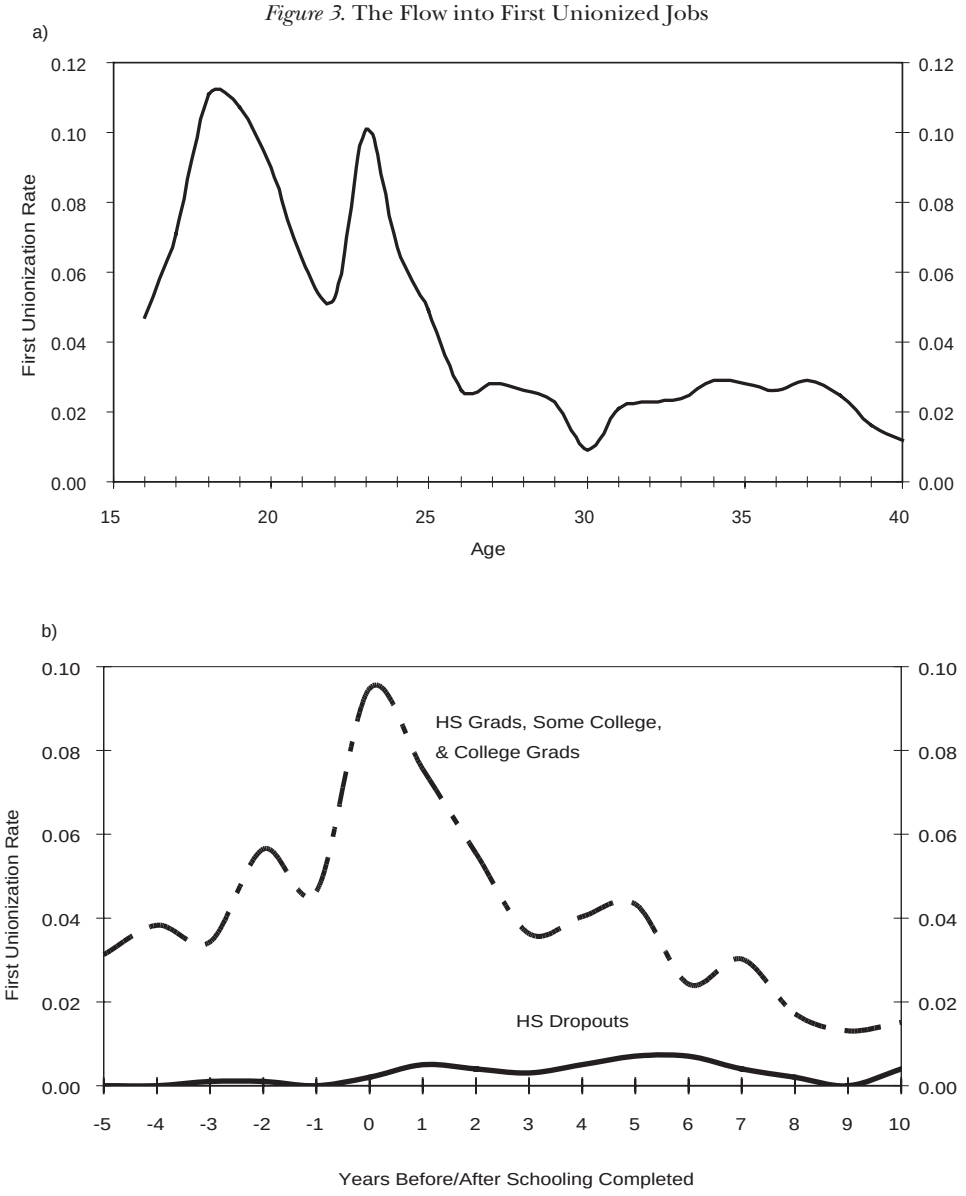
To explicitly analyze the flow into union jobs, we identified all instances of new jobs reported by the workers in our sample. For workers between the ages of 16 and 25, there are on average 0.063 new unionized jobs per worker per year. For workers between the ages of 32 and 41, this average falls to 0.022. In other words, the flow into new union jobs is three times greater for younger workers than it is for adult workers. This result might seem obvious—workers are ostensibly more likely to move into unionized jobs when they are younger because they are more likely to move into new jobs generally—but consider a comparison between the flow rates into unionized and nonunion jobs. Our sample suggests that these flow rates are quite similar for workers of the same age—the flow into new nonunion jobs is also three times greater for ages 16–25 compared to 32–41 (0.636 versus 0.209). In other words, the ratio of new union to nonunion jobs is relatively stable across these age ranges—there are 10.2 new nonunion jobs for each new unionized job when the individuals are aged 16–25, and 9.6 new nonunion jobs for each new unionized job when the individuals are aged 32–41.

The contrast between the stock and flow of unionized workers across the life cycle implies that researchers should seek to supplement our understanding of the youth–adult differences in the stock of unionized workers with a greater insight into the flow process into unionized jobs over the life cycle. Part of this should be an understanding of the flow into workers' first unionized jobs. To this end, Figure 3 presents the age-by-age first unionization rates for the sample of 992 individuals, for which we identified an instance of unionization by age 40/41. Panel (a) shows that the highest rates of first unionization occur in the age range of 16 to 25 years old. First unionization rates for workers 30 years old and older are significantly lower and are always less than three percent. The two peaks in Panel (a) coincide with the typical age of graduation from high school and college, and therefore beg questions about the extent to which flows into first unionization experiences are related to completing one's education and entering the workforce on a full-time basis.

Panel (b) of Figure 3 addresses this issue by presenting the first experience rates for the five years prior to the completion of schooling and the 10 years after. This figure distinguishes between high school dropouts and all others and uses each individual's final education level at age 40/41. High school dropouts are likely to first experience unionization at any time. But for all others, the first unionization rate peaks when they finish their schooling and remains relatively high for a few more years. In other words, for those who graduate from high school and possibly continue their education beyond high school, a significant portion of the flows into the unionized sector, therefore, appears related to the transition from school to the full-time, career-oriented labor force. This result suggests a unionized sector characterized by ports of entry in which schooling is tied to qualifications for unionized jobs.

To analyze this result further, we ask whether we can predict when someone who is unionized at some point between age

Figure 3. The Flow into First Unionized Jobs



Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979 and who were unionized at some point between age 15/16 and 40/41.

15/16 and 40/41 becomes unionized for the first time. One can consider this a duration model: we start tracking individuals at age 15/16 and observe how many years it takes them to begin their first unionized job. Table 4 presents the results of estimating the widely-used Cox proportional hazards model.[12] Consistent with Figure 3b, we present separate estimates for high school dropouts and non-dropouts. In Table 4, hazard ratios above one indicate that increases in the relevant independent variable are associated with an increased likelihood of becoming first unionized in the next time period; ratios below one indicate the opposite.

The results for those who have, at a minimum, completed high school are presented in columns 1–3 of Table 4. For the completed schooling variables, the omitted reference category consists of the ages when individuals are within one year of completing their schooling. In all three specifications, the completed schooling variables are less than one, indicating that individuals are most likely to become unionized first around the time they complete their schooling. When controlling for demographic characteristics and aggregate trends (column 2), the post-completed schooling estimates are not statistically significant, and none of the estimates are significant when job characteristics are included in the model (column 3). These results suggest that entering the unionized sector is related to completing one's schooling, but is also part of a more complex process related to changing job characteristics. Intuitively, this seems sensible—individuals complete their schooling, enter their careers in new industries and occupations, and possibly become unionized for the first time. Yet, the relationship between beginning full-time careers and becoming unionized for the first time has not received much attention in the literature. As a result, valuable topics for future research include analyzing ports of entry into the unionized sector and investigating how they shape youth–adult differences in unionization.

The results in columns 4–6 of Table 4 reinforce the results from Figure 3b in portraying a very different situation for high school dropouts. Specifically, the peak likelihood of becoming unionized for the first time occurs 5–7 years after dropping out of school. For the most part, the estimates in columns 4–6 are quite imprecisely estimated, indicating that there is little relationship between the time when someone drops out of school and when one enters the unionized sector. This imprecision could also reflect the very small sample size; firmer conclusions require additional research.

Conclusions

Youth–adult differences in unionization is an important research topic for understanding individual unionization decisions, labor market and career issues over the life cycle, the composition of the labor movement, and prospects for the labor movement's future. We have analyzed youth–adult differences by tracking a single, nationally representative cohort of 1,507 individuals in the NLSY79 from when they enter the labor market at age 15/16 until they reach age 40/41. Even within a single cohort, there are significant differences in unionization rates between youths and adults, so a cohort effect cannot fully explain the youth–adult unionization differences found in cross-sectional analyses in the existing research literature. A mixture of person-specific heterogeneity, aggregate trends, and demographic and job-related changes over the first half of workers' life cycles can explain more than three-quarters of the raw differential in union coverage between those aged 15–17 and 35–41, and nearly two-thirds of the difference for those aged 18–22.

More importantly, we find that these differences are strongest for the very youngest workers (ages 15–17) and largely disappear by age 23. Researchers therefore need to pay careful attention to the

[12] A Cox proportional hazards model estimates the parameters β of a hazard function $h(t) = h_0(t)e^{x\beta}$ such that the independent variables x proportionally shift an unspecified baseline hazard $h_0(t)$. This is a popular, widely-used duration model because it does not require constraining the baseline hazard to a specific parametric distribution. Table 4 reports hazard ratios (the exponentiated coefficients β).

Table 4. Hazard Analysis of Becoming Unionized for the First Time[a]

	Excluding High School Dropouts			*High School Dropouts*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Omitted Reference Category: ±1 Year of Completing Schooling						
More Than 3 Years Before Completing Schooling	0.773**	0.782**	0.889	0.366	0.295	0.351
	(0.077)	(0.084)	(0.097)	(0.417)	(0.350)	(0.452)
2–3 Years Before Completing Schooling	0.754**	0.749**	0.829	0.443	0.333	0.394
	(0.104)	(0.103)	(0.115)	(0.605)	(0.464)	(0.596)
2–4 Years After Completing Schooling	0.898	0.897	0.960	2.134	2.170	1.317
	(0.114)	(0.115)	(0.122)	(1.342)	(1.310)	(0.787)
5–7 Years After Completing Schooling	0.935	0.963	0.970	3.978*	3.647**	1.602
	(0.132)	(0.140)	(0.140)	(2.940)	(2.320)	(1.006)
More Than 7 Years After Completing Schooling	0.910	0.913	0.912	1.352	1.465	1.147
	(0.152)	(0.160)	(0.162)	(1.078)	(1.183)	(0.758)
Demographic Controls[b]	No	Yes	Yes	No	Yes	Yes
Aggregate Trends Controls[c]	No	Yes	Yes	No	Yes	Yes
Job Controls[d]	No	No	Yes	No	No	Yes
Model χ^2 p-value	0.123	0.075	< 0.001	0.016	0.007	< 0.001
Sample Size	916 individuals / 6,721 obs.			54 individuals / 429 obs.		

[a] Each entry contains the exponentiated hazard coefficient and standard error (in parentheses) from a weighted Cox proportional hazard model where the initial state is non-union, and exit is defined to occur when an individual becomes unionized for the first time.
[b] Demographic controls: female, nonwhite, married, three educational categories, urban area, and right-to-work state.
[c] Aggregate trends controls: the local unemployment rate and the state unionization rate.
[d] Job controls: major industry (13 categories), major occupation (9 categories), public sector, and average hours worked per week.
** Statistically significant at the 0.05 level; * at the 0.10 level.
Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979 and unionized by age 40 or 41 in 2004.

definition of youth when examining youth–adult unionization differences. In their research on youth–adult union membership differences in Britain and New Zealand, for example, Freeman and Diamond (2003) and Haynes, Vowles, and Boxall (2005) use age 30 as the dividing line between youths and adults. Our results show that in the United States this grouping would mask the differences between workers who are under age 22 and those who are older, and would therefore not be appropriate for research on U.S. unionization. Even the research that groups all youths together up to age 24 (e.g., Bryson et al. 2005; Gomez, Gunderson, and Meltz 2002) might unintentionally be masking important contrasts between the younger and older youths.

By tracking a young cohort of individuals for 25 years, we have uncovered additional life cycle features of how U.S. workers experience unionization. Whereas currently unionized workers are likely to be in their 40s or 50s, individuals' first unionized jobs occur much earlier. In the cohort analyzed here, nearly half report having had a unionized job by age 25. This translates to three-quarters of all individuals who are unionized at least once by age 40/41. In other words, there are probably few late bloomers in the U.S. labor movement. Our simulation results further imply that the combined effect of opportunity and propensity for unionized jobs is lower, not higher, among older workers. Even though we cannot directly measure individuals' attitudes towards unions, these results implicitly reinforce others' findings that younger workers are not less receptive to unions than older workers (Freeman and Diamond 2003; Gomez, Gunderson, and Meltz 2002).

One seemingly sensible hypothesis about younger workers' attitudes toward unions is that in high school, everyone ostensibly has the opportunity to obtain a unionized job as an adult by choosing a career path that leads to being a teacher, a nurse, or some other highly unionized occupation. But these opportunities apparently decline as workers age, perhaps because ports of entry into unionized jobs are most readily accessible when workers complete their schooling and begin their full-time careers. Reconciling these declining opportunities with the fact that union coverage rates are higher among older workers requires distinguishing between the stock and flow of unionized workers. Part of this is a measurement issue: older workers have longer job durations, so a cross-sectional estimate of union density at a point in time will capture a higher fraction of unionized workers among older rather than younger workers.[13] But it might be more than a measurement issue: in the cohort analyzed here, the flow into both union and nonunion jobs among workers aged 32–41 is only one-third that of workers aged 16–25. So while the stock of unionized workers is largest at middle age, the flow into unionized jobs is largest at younger ages. Future research should investigate further how and why the flow of workers into and out of unionized employment varies over the life cycle.

Our study of youth–adult differences in unionization not only brings to light important research issues for understanding better how workers experience unionization over the life cycle, but it also has significant practical implications. Managers in nonunion companies use preventive labor relations tactics to try to remain "union-free." At the same time, union organizers use various strategies for recruiting new members. In the political arena, business groups and labor federations frequently vie for the public's support. Based on an aggregate union density rate of less than 15 percent, all of these strategies might frequently be premised on the assumption that the targeted individuals have not had any direct experience with unionization. But our results suggest that a majority of individuals are in a unionized job at some point in their working lives, and thus, strategies to affect workers' support for or against labor unions should be developed accordingly.

Moreover, both companies and unions should understand that many workers first experience unionization at a young age,

[13] This is analogous to the fact that a survey of the unemployed is more likely to sample individuals with longer spells of unemployment (Salant 1977).

which provides these organizations with the opportunity to shape individuals' attitudes toward unions—attitudes that might persist even after they are no longer in unionized jobs. Labor unions, for example, should guard against creating negative attitudes among young workers who might feel neglected by their unions because this might affect their support for union or union-endorsed political causes later on in their lives. In other words, unions should devise life-cycle rather than membership-centric models of representation (Kochan 2005). Our results also suggest that lower unionization rates among youths as compared to adult workers are largely a function of their job characteristics. Therefore, unions should not assume that youths are unreceptive to unionization and should make special efforts to reach out to them in their workplaces (Johnson and Jarley 2005). Lastly, to the extent that workers become unionized as part of the process of completing their education, unions would benefit from being an explicit part of this process. Academics and industrial relations practitioners alike, then, can benefit from a deeper understanding of workers' experiences with unionization over their life cycles.

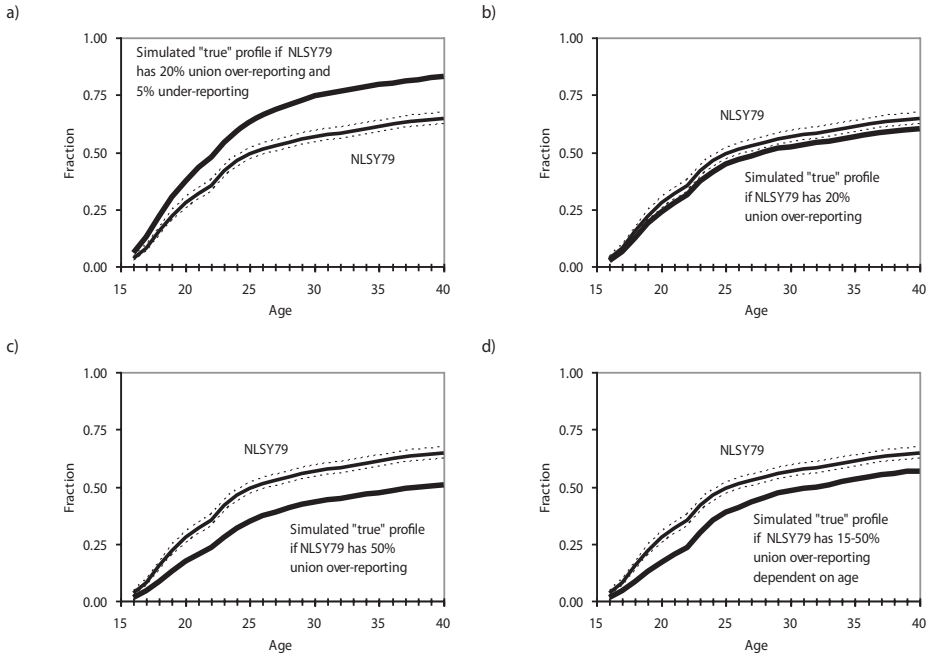
Appendix: Measurement Error

To investigate measurement error in the union coverage variable, the NLSY79 unionization rates could be compared to those in another data source such as the Current Population Survey. But the NLSY79 and these other data sources use similar survey methods, so there is little basis for assuming that the unionization rates reported in other surveys are any more or less accurate than the NLSY79. And so we take a different approach and ask what the true age/ever-unionized profile would look like if the observed NLSY79 profile reflected a certain level of misclassification of workers' true union status at each age. Simulations can answer this question. Specifically, we start with the reported union status values for each individual at each age in our data set and then assume that a percentage of individuals over- or under-reported their true union status at that age. We then simulate the true union status by randomly re-coding the relevant percentage of individuals and then generate the resulting age/ever-unionized profile. Note that we do not simulate the age/ever-unionized profile directly; we simulate age-by-age union coverage status and then derive the implied age/ever-unionized profile.

Appendix Figure A presents the results of some of our simulations. As in Figure 2, Appendix Figure A includes the NLSY79 age/ever-unionized profile (with the 95 percent confidence interval as dashed lines) and the average simulated profiles from 100 simulations. Note first that with many more nonunion than unionized workers at any given age, if there are symmetrical error rates (that is, roughly equal rates of over- and under-reporting) then many more workers are misclassified as nonunion than as union, so the NLSY79 age/ever-unionized profile in Figure 1 is biased downwards (that is, more individuals actually experience unionization earlier than suggested in Figure 1). This is illustrated in Panel (a) of Appendix Figure A in which the simulated "true" profile is significantly above the actual profile even when we assume that only 5 percent of workers coded as nonunion are actually working in unionized jobs compared to 20 percent of reportedly-unionized workers erroneously stating that they are unionized when they are actually nonunion.

Panels (b)–(d) in Appendix Figure A assume that no workers under-report their true union status (that is, all nonunion responses are accurate) and vary the rates of union over-reporting. In Panel (b), we assume that 20 percent of union responses are inaccurate at each age, and the resulting "true" profile is slightly below the 95 percent confidence interval for the profile estimated in our data. Panel (c) shows the results of what we think is an extreme scenario—50 percent over-reporting of union status (and again, no under-reporting). Even in this scenario, the general shape of the profile is preserved, 51 percent of workers are unionized at least once by age 40, and the average age of first unionization is 24 years. In Panel (d), ignorance is assumed to decrease with age with the following over-

Appendix Figure A
Age/Ever-Unionized Profiles with Measurement Error



Source: NLSY79 data for 1979–2004 of individuals who were 15 or 16 years old in 1979. Each simulated profile is constructed from 100 simulations of 1,500 individuals with various rates of under- and over-reporting of union coverage.

reporting rates for union status: 50 percent for ages 15–22, 25 percent for ages 23–26, and 15 percent for ages 27 and above. The level of the first exposure rates at each age is reduced, but the general trajectory of the profile is unchanged. Based on these results, including other simulations with different values for the over-reporting rate that yield similar results, we do not believe that the shape of the age/ever-union profile is an artifact of measurement error.

REFERENCES

Bain, George S., and Farouk Elsheikh. 1976. *Union Growth and the Business Cycle: An Econometric Analysis.* Oxford: Basil Blackwell.

Barling, Julian, E. Kevin Kelloway, and Eric H. Bremermann. 1991. "Preemployment Predictors of Union Attitudes: The Role of Family Socialization and Work Beliefs." *Journal of Applied Psychology*, Vol. 76, No. 5, pp. 725–31.

Blanchflower, David G. 2007. "International Patterns of Union Membership." *British Journal of Industrial Relations*, Vol. 45, No. 1, pp. 1–28.

Blanden, Jo, and Stephen Machin. 2003. "Cross-Generation Correlations of Union Status for Young People in Britain." *British Journal of Industrial Relations*, Vol. 41, No. 3, pp. 391–415.

Bryson, Alex, and Rafael Gomez. 2003. "Buying Into Union Membership." In Howard Gospel and Stephen Woods, eds., *Representing Workers: Trade Union Recognition and Membership in Britain*, pp. 72–91. London: Routledge.

Bryson, Alex, Rafael Gomez, Morley Gunderson, and Noah Meltz. 2005. "Youth–Adult Differences in the Demand for Unionization: Are American, British, and Canadian Workers All That Different?" *Journal of Labor Research*, Vol. 26, No. 1, pp. 155–67.

Bureau of Labor Statistics. 2005. *NLS Handbook, 2005.* Washington, DC: U.S. Department of Labor. Available at http://www.bls.gov/nls/handbook/nlshndbk.htm.

Clark, Andrew. 2007. "Born to Be Mild? Cohort Effects Don't (Fully) Explain Why Well-Being is U-Shaped in Age." IZA Discussion Paper No. 3170.

Clark, Paul F., Clive Fullagar, Daniel G. Gallagher, and Michael E. Gordon. 1993. "Building Union Commitment Among New Members: The Role of Formal and Informal Socialization." *Labor Studies Journal*, Vol. 18, No. 3, pp. 3–16.

Doeringer, Peter B., and Michael J. Piore. 1971. *Internal Labor Markets and Manpower Analysis.* Lexington, MA: D.C. Heath and Company.

Farber, Henry S. 1983. "The Determination of the Union Status of Workers." *Econometrica*, Vol. 51, No. 5, pp. 1417–37.

Freeman, Richard, and Wayne Diamond. 2003. "Young Workers and Trade Unions." In Howard Gospel and Stephen Woods, eds., *Representing Workers: Trade Union Recognition and Membership in Britain*, pp. 29–50. London: Routledge.

Fullagar, Clive, Paul Clark, Daniel Gallagher, and Michael E. Gordon. 1994. "A Model of the Antecedents of Early Union Commitment: The Role of Socialization Experiences and Steward Characteristics." *Journal of Organizational Behavior*, Vol. 15, No. 6, pp. 517–33.

____, Don McCoy, and Carla Shull. 1992. "The Socialization of Union Loyalty." *Journal of Organizational Behavior*, Vol. 13, No. 1, pp. 13–26.

Gallagher, Daniel G. 1999. "Youth and Labor Representation." In Julian Barling and E. Kevin Kelloway, eds., *Young Workers: Varieties of Experience*, pp. 234–58. Washington, DC: American Psychological Association.

Gomez, Rafael, and Morley Gunderson. 2004. "The Experience Good Model of Trade Union Membership." In Phanindra V. Wunnava, ed. *The Changing Role of Unions: New Forms of Representation*, pp. 92–112. Armonk, NY: M.E. Sharpe.

____, Morley Gunderson, and Noah Meltz. 2002. "Comparing Youth and Adult Desire for Unionization in Canada." *British Journal of Industrial Relations*, Vol. 40, No. 3, pp. 521–42.

Haynes, Peter, Jack Vowles, and Peter Boxall. 2005. "Explaining the Younger–Older Worker Union Density Gap: Evidence from New Zealand." *British Journal of Industrial Relations*, Vol. 43, No. 1, pp. 93–116.

Hirsch, Barry T., and David A. Macpherson. 2008. "Union Membership and Coverage Database from the CPS." Available at http://www.unionstats.com/.

____, David A. Macpherson, and Wayne G. Vroman. 2001. "Estimates of Union Density by State." *Monthly Labor Review*, Vol. 124, No. 7, pp. 51–55.

Johnson, Nancy Brown, and Paul Jarley. 2005. "Unions as Social Capital: The Impact of Trade Union Youth Programmes on Young Workers' Political and Community Engagement." *Transfer*, Vol. 11, No. 4, pp. 605–16.

Kerr, Clark. 1954. "The Balkanization of Labor Markets." In E. Wight Bakke, et al., *Labor Mobility and Economic Opportunity*, pp. 92–110. Cambridge, MA: Technology Press of MIT.

Kochan, Thomas A. 2005. *Restoring the American Dream: A Working Families' Agenda for America.* Cambridge, MA: MIT Press.

Lowe, Graham, and Sandra Rastin. 2000. "Organizing the Next Generation: Influences on Young Workers' Willingness to Join Unions in Canada." *British Journal of Industrial Relations*, Vol. 38, No. 2, pp. 203–22.

Prowse, Peter J., and Julie M. Prowse. 2006. "Are Non-Union Workers Different to Their Union Colleagues? Evidence from the Public Services." *Industrial Relations Journal*, Vol. 37, No. 3, pp. 222–41.

Quandt, Richard E. 1958. "The Estimation of the Parameters of a Linear Regression System Obeying Two Separate Regimes." *Journal of the American Statistical Association*, Vol. 53, No. 284, pp. 873–80.

Salant, Stephen W. 1977. "Search Theory and Duration Data: A Theory of Sorts." *Quarterly Journal of Economics*, Vol. 91, No. 1, pp. 39–57.

Spilsbury, M., M. Hoskins, D.N. Ashton, and M.J. Maguire. 1987. "A Note on the Trade Union Membership Patterns of Young Adults." *British Journal of Industrial Relations*, Vol. 25, No. 2, pp. 267–74.

Wilson, William T. 2002. "The Effect of Right-to-Work Laws on Economic Development." Midland, MI: Mackinac Center for Public Policy.