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

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Abstract

This paper analyzes youth-adult unionization differences by uniquely using the NLSY79 to follow a single group of individuals from age 15/16 to 40/41. Youth-adult differences are shown to be largest for individuals aged 15-17, and largely disappear by age 23. Research shows that workers are most likely to be unionized in their forties, but this paper also shows that most individuals are first unionized at a much younger age, and that younger workers have a greater opportunity and/or propensity to be unionized than adults. Important contrasts between the stock and flow of youth and adult unionized workers are therefore uncovered.

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. But cross-sectional comparisons cannot separate life-cycle effects from cohort effects (Clark 2007). In other words, are 40-year-olds 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 raises this question and finds that the inverted-U age-unionization profiles for both the United States and Britain are 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 from age 15 or 16 in 1979 to age 40 or 41 in 2004, and uncover important results for this literature.

By tracking individuals from when they initially enter the labor force, we can identify the age at which an individual first becomes unionized, and analyze the relative probability of 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 very unique approach to analyzing individuals' unionization decisions, and generates novel results for enhancing our understanding of youth-adult differences in unionization across the life cycle.¹ Furthermore, the popular impression of unionization as the domain of middle-aged and older workers needs to be tempered by our results showing that most workers first experience unionization at a much younger age. 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 related to completing one's education. These results uncover new areas of research that can help us better understand unionization trends, and have important practical implications for how companies and labor unions can devise strategies for shaping individuals' attitudes toward unions.

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). While 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

¹ Fullagar, McCoy, and Shull (1992), Clark et al. (1993), and Fullagar et al. (1994) analyze the socialization of new union members in one union, but these 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, and 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.

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 when they have jobs that are represented by unions and covered by collective bargaining agreements. Hence, an individual can be unionized without actually being a union member, and union membership is a separate decision. Due to a lack of data on union membership, we concentrate on whether workers are unionized, not whether they are union members. Moreover, the focus here is on the outcome (that is, whether a worker has a unionized job or not), not on the underlying process of job finding, 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 higher levels of opportunity for obtaining a unionized job. Individuals qualified to work in industries and occupations with higher levels of union density similarly have higher levels of opportunity. 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 can alternatively 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 the demand for union representation is an important aspect of propensity.

Equation (1) captures a simple age/time-invariant model of union coverage in that 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 of obtaining 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 obtaining a teaching license 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 up as a worker ages.

Propensity can be hypothesized to vary across the life cycle as well. Attitudes towards 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) argue that it is not until an individual is a union member that s/he can form an accurate opinion as to 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 that is satisfied with union representation would want to be represented by a

union in the future. Complementary research in psychology shows that new union members that 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). On the other hand, workers who have what they believe to be a poor experience with union representation are likely inclined 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 a unique 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 (NLSY79).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,

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

but our analyses focus on the select group of individuals that were aged 15 or 16 when first surveyed.³ This 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 each sampled individual in our cohort of 15 and 16 year olds from 1979 to 2004 across all five jobs and identified all instances at which the individual reported being covered by a collective bargaining agreement on at least one job (“unionized”). From this, we then created variables for each individual indicating for each survey year (equivalently, age) whether they are unionized and whether they had ever been unionized. The first instance of ever being unionized captures a worker’s 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 is common in individual-level research on U.S. unionization.

Of the 3,130 individuals in the NLSY79 that were aged 15 or 16 in 1979, we eliminated 1,534 because they did not participate in each of the 21 waves of the survey, and we are therefore unable to fully track their unionized status over time; missing values further reduced the final sample size to 1,507 individuals for whom unionization status can be followed from age 15 or 16

³ Some waves of the NLSY79 occur in different months so not everyone ages 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 two percent, compared to a rate between 5 and 10 percent for 17 and 18 year olds. This shows that the possibility of missing pre-survey unionization is nontrivial for those over the age of 16. We additionally 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.

to age 40 or 41.⁵ To create a consistent series, individuals are retained in the sample when they are 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 one to identify the importance of a cohort-specific effect. Using our sample from the NLSY79, we can trace the unionization rate for the same set 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 shows 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 shown in column 1 of Table 2, the average

⁵ To maintain a decent sample size, we imputed values for variables where there were missing values and 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.

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 pool the 1,507 individuals across the 21 survey waves and estimate probit models on these 31,647 observations with the dependent variable defined as an indicator for whether the individual was 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, consistent with Blanchflower’s (2007) results that also use narrower age categories that distinguish between teenagers and those in their early 20s.⁷

To further analyze these youth-adult differences, column 3 of Table 2 presents the results of adding demographic controls to the simple probit model from column 2. In particular, this model 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),

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.

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

Lastly, column 6 of Table 2 reports the results of a random effects probit model which 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. As in the other specifications, the differences among 23-41 year olds are slight. It should be noted that the break point between 22 and 23 years

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.

olds is not an artifact of our categorizations. Alternative specifications of the age categories were explored, and the categories shown 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 while 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 show that youth-adult differences in unionization are strongest for the very youngest workers (up to age 17), and largely disappear by age 23. These results 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

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.

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. And 71.8 percent of the early unionized jobs are these workers' first unionized job 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 have unionized jobs in manufacturing, transportation, communication, and public utilities, and professional services, and are much more likely to experience unionization in wholesale and retail trade, 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. While 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, 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 affect future labor market outcomes.

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.

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 uniquely allows us to examine a previously-overlooked issue in the literature on youth-adult unionization differences: when 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 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 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 $\text{ever-unionized} = \beta_0 + \beta_1 * \beta_2^{\text{age}}$ on the data plotted in Figure 1 using nonlinear least squares. All of the parameters are highly significant with p-values less than 0.0001, and the adjusted R^2 value is 0.996. Using the resulting 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

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.

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, over 96 percent have their first unionized job by age 40, and over 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

This latter statistic indirectly suggests that younger workers are quite open to unionization. In fact, Gomez, Gunderson, and Meltz (2002) find 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. For each artificial individual at each age, we randomly determined their union status 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 then repeated this simulation 100 times for the same probability level and constructed the average age/ever-unionized profile. We 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. But none of the resulting 20 simulated profiles 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 lack sufficient curvature to accurately replicate the actual profile. Each of the other fixed-probability simulations overpredict or underpredict to a greater extent. These results are not supportive of an age/time-invariant model of unionization.

To replicate the actual NLSY79 profile, we instead need to adjust the probability of unionization at different age levels consistent with a life-cycle model of unionization. In panel c, we show 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 of Figure 2, we 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. Note carefully that we are able to replicate the actual profile only by significantly lessening the probability of unionization as workers become older. This 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 as 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 move from teenagers into their adult years. 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 suggests 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 look more explicitly at the flow into union jobs, we identified all instances of new jobs reported by the workers in our sample. Between the ages of 16 and 25, on average there are

0.063 new unionized jobs per worker per year. 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 adult workers. This might seem like a common sense result—workers are more likely to move into unionized jobs when they are younger because they are more likely to move into new jobs more generally—but it is not obvious a priori whether the flow rates into unionized and nonunion jobs are similar. Our sample suggests that these flow rates are quite similar—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 understanding of 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 are 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 analyzes 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 everyone else, 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/or continue their education beyond high school, a significant portion of the flows into the unionized sector, therefore, appear related to the transition from school to the full-time, career-oriented labor force. This result is suggestive of a unionized sector characterized by ports of entry in which schooling is tied to qualifications for unionized jobs.

To analyze this further, we ask whether we can predict when someone who is unionized at some point between age 15/16 and 40/41 becomes unionized for the first time. This can be thought of as 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 therefore presents the results of estimating the widely-used Cox proportional hazard 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.

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).

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 the individual is within one year of completing his or her schooling. In all three specifications, the completed schooling variables are less than one which indicates that individuals are most likely to become first unionized 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 it has not received much attention in the literature. As a result, valuable topics for future research are analyzing points of entry into the unionized sector and 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 which suggests that there is little relationship between when someone drops out of school and enters the unionized sector. This imprecision could also reflect the very small sample size, and 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. This paper uniquely analyzes 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 definition of youth when examining youth-adult unionization differences. In their research on youth-adult union membership differences in Britain and New Zealand, Freeman and Diamond (2003) and Haynes, Vowles, and Boxall (2005) use age 30 as the dividing line between youths and adults. In the United States, our results show that this grouping would mask the differences between workers over and under age 22, and therefore would 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 be unintentionally covering up important contrasts between the younger and older youths.

By tracking a young cohort of individuals for 25 years we reveal additional life cycle features of how U.S. workers experience unionization. While 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. While we are unable to directly measure individuals' attitudes towards unions, these results indirectly reinforce others' findings that younger workers are not less receptive to unions than older workers (Freeman and Diamond 2003; Gomez, Gunderson, Meltz 2002).

One seemingly sensible hypothesis is that in high school, everyone essentially has the opportunity for a unionized job as an adult—just become a teacher or a nurse. 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 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

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).

further analyze 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 uncovers important research issues for better understanding how workers experience unionization over the life cycle, but 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, companies and unions should both understand that many workers first experience unionization at a young age, and this 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 a 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 like the Current Population Survey. But with similar survey methods there is little basis for assuming that the unionization rates reported in other surveys are any more or less accurate than the NLSY79. So we take a different approach and ask the question what would the true age/ever-unionized profile look like if the observed NLSY79 profile reflects 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 five 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 one under-reports 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-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.

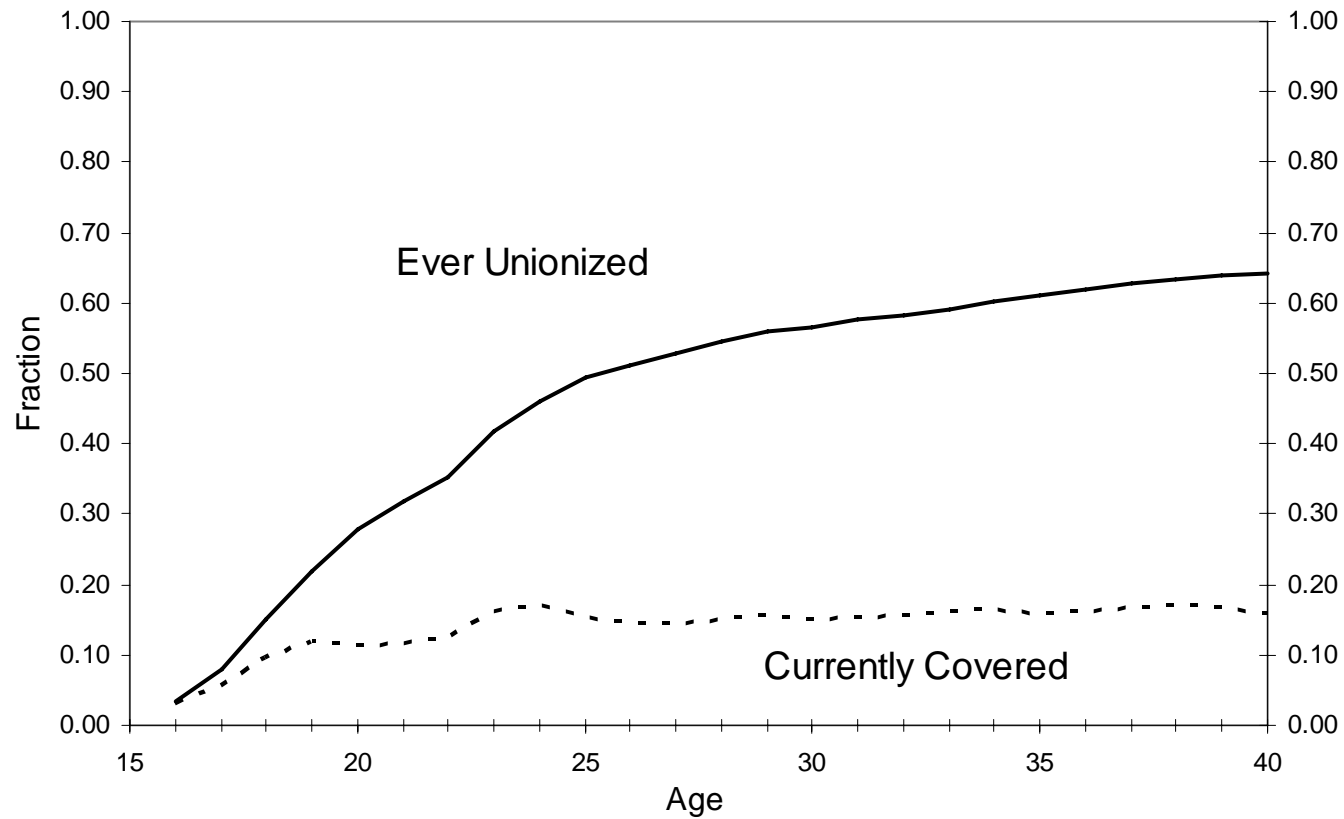
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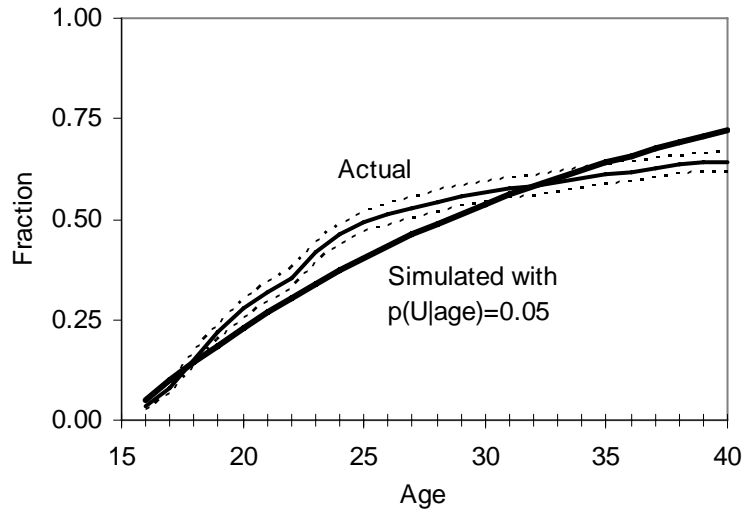
Figure 1
The U.S. Age Profile of Current Union Coverage and First Unionized Experience in a Single Cohort



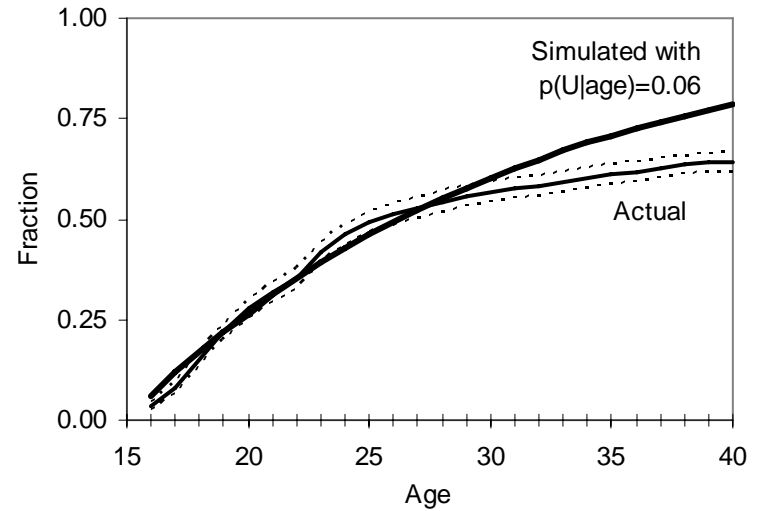
Source: NLSY79 data for 1979-2004 of individuals who were 15 or 16 years old in 1979.

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

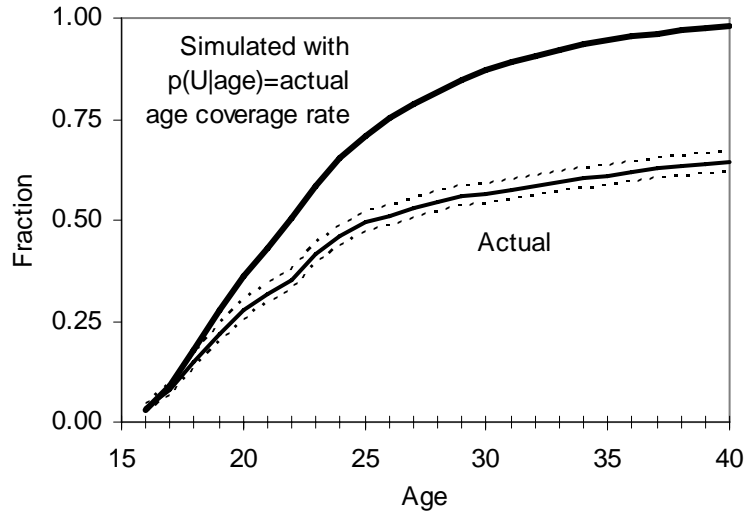
a)



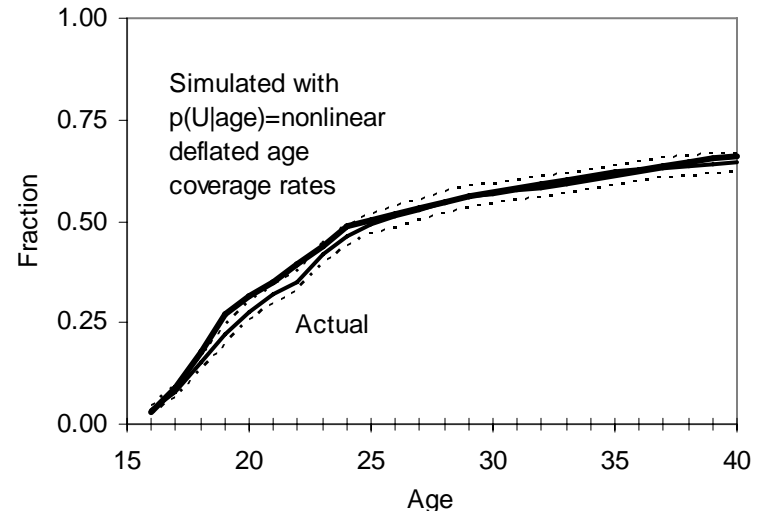
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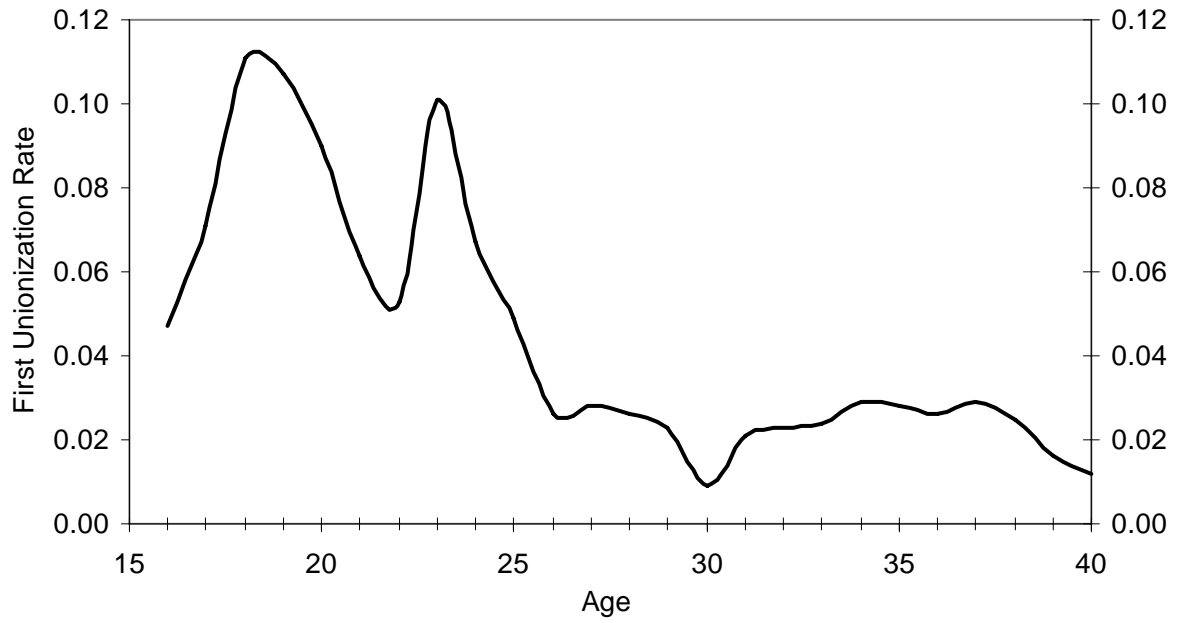
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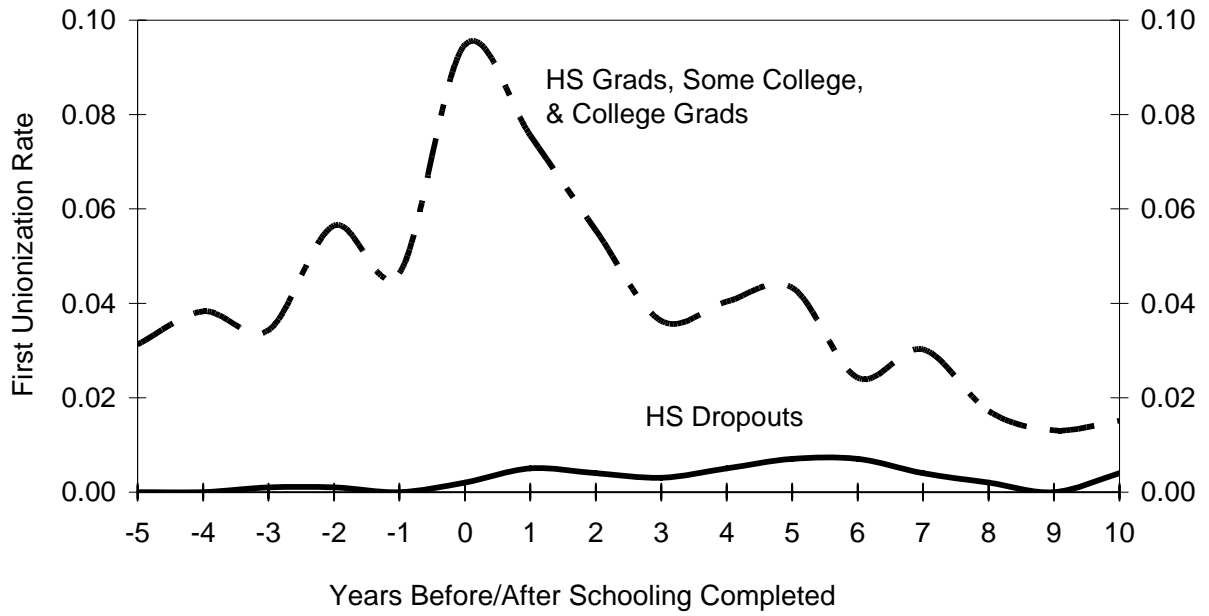
Source: NLSY79 data for 1979-2004 of individuals who were 15 or 16 years old in 1979. Each simulated profile is constructed from 100 simulations of 1,500 individuals facing probability $p(U|age)$ of being unionized at each age value.

Figure 3
The Flow Into First Unionized Jobs

a)



b)



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.

Table 1
Selected Summary Statistics for NLSY79 1979/2004^a

| | <u>1979</u> | <u>2004</u> |
|--|-------------------|-------------------|
| | (1) | (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) |

Table 1 (continued)

| | | |
|--|--------------------|--------------------|
| 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 |

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

Notes: ^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 only includes 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.

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** (0.004) | -0.096** (0.006) | -0.043** (0.006) | -0.056** (0.006) | -0.025** (0.004) |
| Age 18-22 | 0.115 | -0.041** (0.006) | -0.040** (0.006) | -0.024** (0.005) | -0.035** (0.005) | -0.015** (0.003) |
| Age 23-26 | 0.157 | -0.004 (0.007) | -0.007 (0.007) | 0.0003 (0.005) | -0.008 (0.005) | -0.002 (0.002) |
| Age 27-30 | 0.151 | -0.010 (0.006) | -0.013** (0.006) | -0.007 (0.005) | -0.011** (0.005) | -0.007** (0.002) |
| Age 31-34 | 0.160 | -0.002 (0.008) | -0.003 (0.008) | -0.003 (0.005) | -0.007 (0.005) | -0.004 (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 |

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

Notes: ^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.

Table 3
Youth-Adult Differences in Unionized Jobs: Summary Statistics^a

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

Table 3 (continued)

| | | |
|---|--------------------|----------------------|
| Professional and Related Services | 0.108 (0.352) | 0.361** (0.485) |
| Other Services (Business, Repair, Personal, Entertainment, or Recreation) | 0.106 (0.313) | 0.037** (0.224) |
| <u>Occupation</u> | | |
| Professional, Technical, and Kindred | 0.022 (0.179) | 0.313** (0.452) |
| Clerical and Kindred | 0.211 (0.418) | 0.142** (0.366) |
| Operatives (Not Transport) | 0.114 (0.319) | 0.063** (0.251) |
| Laborers (Not Farm) | 0.185 (0.370) | 0.074** (0.259) |
| Service Workers (Including Private Household) | 0.248 (0.435) | 0.109** (0.352) |
| Public Sector | 0.129 (0.369) | 0.322** (0.480) |
| Average Hours Worked per Week | 33.661 (12.938) | 38.688** (11.051) |
| Hourly Wages (2004 dollars) ^b | 9.611 (4.828) | 18.068** (12.534) |
| Sample Size | 575 | 208 |

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

Notes: ^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.

Table 4: Hazard Analysis of Becoming Unionized for the First Time

| | Excluding High School Dropouts | | | High School Dropouts | | |
|--|--------------------------------|--------------------|------------------|---------------------------|--------------------|------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <u>Omitted Reference Category: ± 1 Year of Completing Schooling</u> | | | | | | |
| More Than 3 Years Before Completing Schooling | 0.773** (0.077) | 0.782** (0.084) | 0.889 (0.097) | 0.366 (0.417) | 0.295 (0.350) | 0.351 (0.452) |
| 2-3 Years Before Completing Schooling | 0.754** (0.104) | 0.749** (0.103) | 0.829 (0.115) | 0.443 (0.605) | 0.333 (0.464) | 0.394 (0.596) |
| 2-4 Years After Completing Schooling | 0.898 (0.114) | 0.897 (0.115) | 0.960 (0.122) | 2.134 (1.342) | 2.170 (1.310) | 1.317 (0.787) |
| 5-7 Years After Completing Schooling | 0.935 (0.132) | 0.963 (0.140) | 0.970 (0.140) | 3.978* (2.940) | 3.647** (2.320) | 1.602 (1.006) |
| More Than 7 Years After Completing Schooling | 0.910 (0.152) | 0.913 (0.160) | 0.912 (0.162) | 1.352 (1.078) | 1.465 (1.183) | 1.147 (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. | | |

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.

Notes: ^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 nonunion, 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.

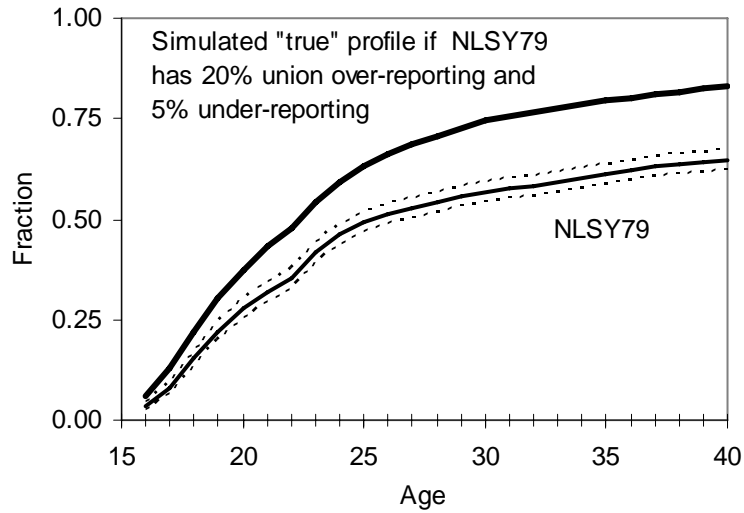
^c Aggregate trends controls: the local unemployment rate and the state unionization rate.

^d Job controls: major industry (13 categories), major occupation (9 categories), public sector, and average hours worked per week.

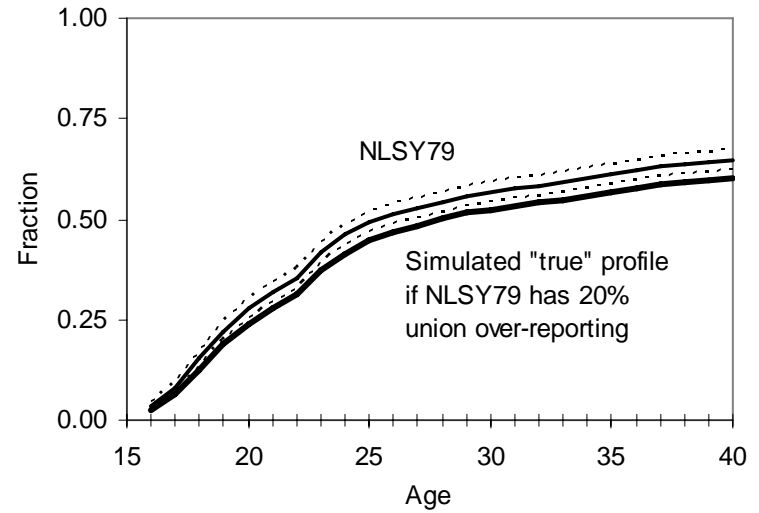
** Statistically significant at the 0.05 level, * at the 0.10 level.

Appendix Figure A: Age/Ever-Unionized Profiles With Measurement Error

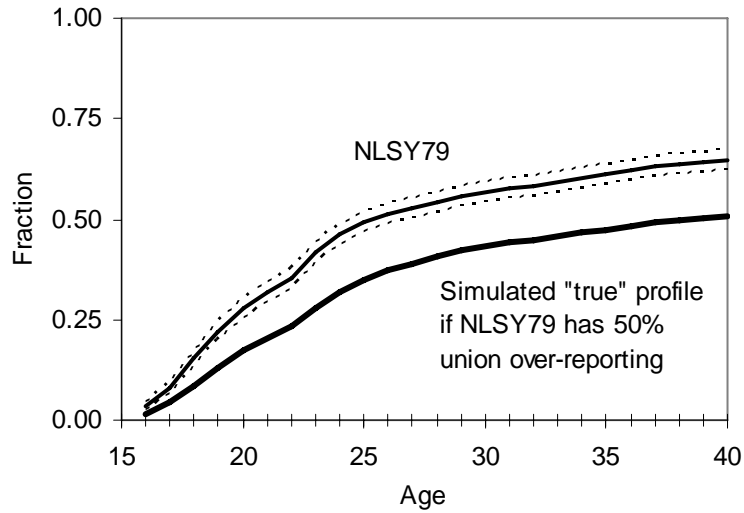
a)



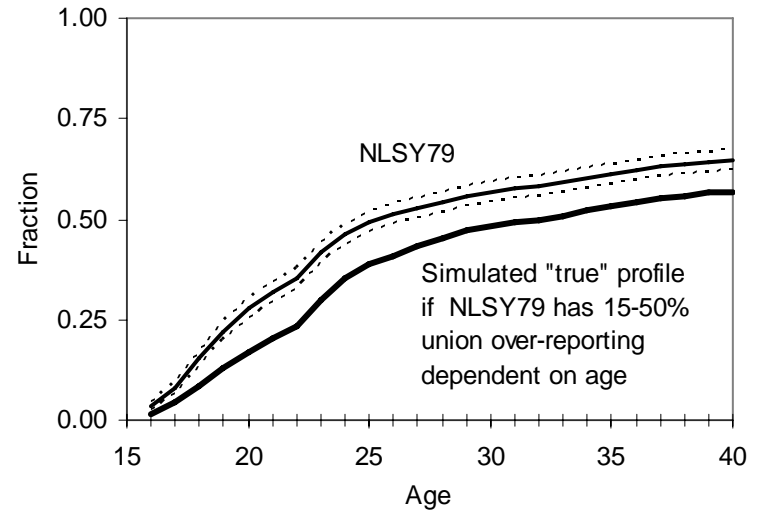
b)



c)



d)



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.