

**WHAT HAPPENED TO LONG TERM EMPLOYMENT? THE ROLE OF WORKER POWER
AND ENVIRONMENTAL TURBULENCE IN EXPLAINING DECLINES IN WORKER
TENURE**

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ABSTRACT

Recent declines in the average length of time that US workers spend with a given employer represent an important change in the nature of the employment relationship, yet one whose causes are poorly understood. I explore those causes using Current Population Survey data on the tenure of men aged 30-65.

I argue that long term employment relationships primarily occur when workers pressure employers to close off employment from market competition, reducing the attractiveness of external mobility relative to internal opportunities and increasing employment security. I then explore how two changes in organizations' environments might have affected workers' ability to secure such closed employment relationships: a decline in legal and normative support for unions, and increased turbulence from changes in technology and globalization.

My results support the argument that declining worker-firm attachment reflects the decreased power of workers to secure closed employment relationships. Recent declines in tenure have been concentrated in large organizations, and much of those declines are explained by controlling for the changing levels of industry unionization. I find little evidence that foreign competition or technological change affected mobility. The results are robust to measures of changing industry growth rates and within-industry reorganization. Supplementary analyses suggest that layoffs are associated with different industry pressures than tenure, and that voluntary mobility may have played an important role in declines in tenure.

The last thirty years have seen a persistent decline in the average duration of employment relationships, with experienced men, who were previously most likely to be in long term employment, most affected (Farber 2008a; Hollister 2011). Those changes in tenure have manifested as particularly marked declines in the proportion of workers who have been with their employer for more than ten years, and strong increases in the proportion who have moved jobs within the last year (Farber 2008a). Many commentators argue that these changes represent a fundamental shift in the nature of careers and the employment relationship (Arthur and Rousseau 1996; Cappelli 1999; Osterman 1999).

Certainly, long term employment was a fundamental assumption underpinning much of the behavior of workers and managers, and declines in tenure therefore have the potential to affect a wide range of outcomes. For example, long term employment has been associated with psychological and social contracts based around trust and loyalty (Osterman et al. 2001; Rousseau 1995), and research has associated short term employment with declines in such loyalty (Tsui et al. 1997). Long term employment also encouraged both firms to invest in training and workers to invest in firm specific skills; the decline in tenure has prompted both parties to pull back from such investments (Cappelli 1999, 2008). Ethnographic work also highlights the role of long term employment in providing stability in workers' lives and an opportunity for the construction of a coherent identity (Bauman 1998; Sennett 1998). The loss of that stability has made the construction of such a coherent narrative far harder (Sennett 1998).

Declines in tenure also mean that workers are increasingly moving between jobs using external labor markets rather than internal. It is possible that such a change is helping workers to find the jobs that best suit their skills and needs (Jovanovic 1979). More concretely, mobility through external labor markets affects workers' access to pay and opportunity: in high skilled populations, workers who move across firms appear to earn more than those who stay within their organizations (Bidwell 2011; Brett and Stroh 1997); among younger workers, there is evidence that declining tenure has slowed wage growth, though (Bernhardt et al. 2001), and increased mobility has also affected racial earnings disparities (Kronberg 2010); external hiring also leads different kinds of workers to be placed into jobs than does internal mobility (Baker et al. 1994; Bidwell 2011; Petersen and Saporta 2004), advantaging those with

more visible credentials while also providing more opportunities for discrimination.

These profound consequences of declining worker tenure beg an explanation for why the duration of employment relationships has declined; if we want to understand how worker tenure is likely to evolve in the future, or even the kinds of measures by workers, employers or government that might affect the development of employment relationships, we need to understand the causes of changes in the past. Yet there has been surprisingly little systematic analysis of the reasons that tenure has declined. Much effort has gone into documenting the existence of declines in worker tenure and understanding the demographic groups that have been most affected (Bernhardt et al. 2001; Farber 2008a; Hollister 2011; Neumark et al. 1999). Some scholars have also studied the related phenomenon of downsizing (Baumol et al. 2003; Budros 1999; Fligstein and Shin 2007), demonstrating a role for poor profitability and declining share prices in firms' decisions to downsize. While this literature provides valuable insights into important changes in the employment relationship, it is not clear that declines in tenure reflect an increase in downsizing: much data suggests that workers have become, if anything, less likely to suffer involuntary termination since 1980 (prior, at least, to the great recession of 2008) (Davis 2008; Davis et al. 2008; Farber 2008b). Other scholars have offered anecdotal accounts of the reasons for declining worker-firm attachment, based on technological change, global competition, and shareholder pressures (Cappelli 1999; Osterman 1999; Pfeffer and Baron 1988). However, there has been little attempt to systematically test those different explanations for declining worker-firm attachment. Hence, while we know that tenure has declined, and we have some possible explanations, we lack detailed analysis that could support or challenge any of those accounts.

In part, the lack of evidence on the causes of declining worker tenure may reflect the difficulties of exploring this question. It is likely that declines in worker tenure reflect changes in the way that the employment relationship is structured within organizations, but we lack longitudinal data that details how those relationships have changed over the last 30 years. In this paper, I seek to make some progress towards understanding declines in worker tenure by drawing on 30 years of data from the Current Population Survey (CPS). The CPS is a government labor market survey that has irregularly asked

workers about their tenure with their current employer; it therefore provides consistent, economy-wide measures of worker tenure from the end of the 1970s to the present. Although labor economists have used this data to document declines in worker tenure (Farber 2008a; Neumark et al. 1999), they have not exploited information on the nature of employing organizations to explore the causes of that decline. While the survey contains little information on the specifics of organizational practices, the identity of the employer, the nature of workers' prior jobs or why they left them, I am able to match the data to information on current employer size and industry characteristics. I show how using these basic organizational characteristics allows us to test different arguments about the causes of declining tenure.

I develop a simple theoretical framework to understand those changes in tenure. I argue that long term employment relationships primarily occur when workers persuade employers to "close off" employment, protecting workers from market competition (Sorensen 2000; Weber 1968). Such closed relationships provide current employees with higher rewards and better opportunities inside the organization, making it less attractive for them to leave. They also improve workers' job security. Yet such closure may often be costly to employers, reducing flexibility and helping workers to maintain higher wages. Whether the organization fosters long term employment relationships therefore depends on workers' ability to secure such closed employment relationships from employers.

I then draw on theories of organizational politics to explore how changes in organizations' environment might have affected that closure. I describe two sets of environmental changes that could have affected workers' power to secure closed employment relationships: declining legal and normative support for unions which reduced workers' bargaining power; and increased foreign competition and technological changes which increased the costs to employers of long-term employment relationships. I also argue that each of these changes was most likely to have affected large organizations.

I exploit variation in the way that these environmental shifts have affected different industries to test these arguments. I focus my analyses on a particular subsection of the population: men aged 30-65. It was this group that was most likely to have stable, long term employment relationships during the post-war period. It therefore makes most sense to examine this group in seeking to understand how those

relationships have changed. Focusing on men also avoids the confounding effects on tenure caused by the increasing tendency of married mothers to stay in their jobs (Hollister and Smith 2011). My results show that changes in tenure have been concentrated in large organizations, and that much of these changes can be explained by controlling for the changing levels of unionization across industries. While other work documents a relationship between unions and worker tenure (e.g. Pfeffer 1983), I provide the first evidence of a strong association between the decline of unions and the decline of long-term employment. These results demonstrate the important role that societal power has played in shaping changes to the employment relationship and workers' careers.

THEORY: TENURE, WORKER POWER AND EMPLOYER COSTS

In this paper, I examine the reasons for changes in worker tenure, defined as the length of time that workers have spent with their current employer. Ultimately, the average level of tenure in an organization reflects when the workforce was hired. Sometimes, that hiring occurs when the organization grows; at other times, hiring is used to replace existing workers following turnover (although such replacement hiring may be more likely to occur following voluntary turnover, even layoffs are often followed by hiring into other areas (Baumol et al. 2003)). Tenure distributions also reflect the rate at which long serviced workers leave the firm, and may also decline during downsizing if organizations disproportionately target long-serviced workers.

Some studies have examined how organizational growth might have affected average levels of tenure. For example, Diprete (1993) and Shin (2007) show how industrial restructuring leads workers to move from declining industries to growing ones, and argue that such processes may have contributed to declines in tenure in the 1980s and 1990s. Many other accounts, however, argue that the same period also saw substantial changes in the nature of the worker-employer relationship that might have led to higher rates of voluntary and involuntary turnover (Osterman 1999; Pfeffer and Baron 1988). I focus on testing this latter set of accounts, although I also control for the effects of reallocating workers across industries.

Long Term Employment Relationships and Closure

A central argument of this paper is that long term employment relationships were a consequence

of closed employment relationships, which insulated workers from the external labor market. Although scholars have explored many individual-level determinants of turnover (Griffeth et al. 2000; Hom and Kinicki 2001), research has also emphasized the organizational roots of turnover. Workers leave their jobs when they believe that a job in another organization will provide greater rewards than their current position (Griffeth et al. 2000; March and Simon 1958). How employers reward different jobs and regulate opportunities therefore affects worker tenure.

Sociological theories of closure (Murphy 1988; Weber 1968) offer a useful lens for understanding how organizations regulate employment. Employment relationships can be described as “open”, offering opportunities to all qualified workers, or “closed”, restricting access to a limited group of eligible workers (Sorensen and Kalleberg 1981; Weeden 2002).¹ During the post-war period, employment relationships often became closed off through a series of practices that favored existing employees in the allocation of opportunities. For example, some firms relied almost exclusively on internal promotions to fill higher level positions, restricting external hiring to a few “ports of entry” (Althausser and Kalleberg 1981; DiPrete 1987; Pfeffer and Cohen 1984). Internal job posting systems gave further advantages to internal candidates by making them more aware of opportunities. The frequent use of seniority to allocate promotions, set pay, and decide layoffs further benefited workers who stayed at the organization longer (Jacoby 1985; Kerr 1977; Slichter et al. 1960). Contemporaries argued that these practices resulted in a Balkanization of the labor market, as competition for higher level jobs in an organization became closed off to all but those few workers already working within that organization (Kerr 1977).

Those closed employment relationships promoted long term employment because of their effects on both voluntary and involuntary turnover. Closed employment relationships reduced voluntary turnover by increasing the attractiveness of staying within an organization relative to the opportunities available on the external labor market (Kerr 1977:31-32; Slichter et al. 1960:139). Once a worker had accrued

¹ My definition of closed employment differs slightly from that of Sorensen and Kalleberg (1981). They defined closed employment solely in terms of the ability of workers to be displaced from their existing job by outsiders. My definition also encompasses the preferential availability to existing employees of other jobs within the same organization, consistent with the broader use of closure in the literature (Murphy 1988; Weber 1968).

seniority within an organization, they had better rewards, access to higher level jobs and employment security. Moving meant a loss of those advantages, making workers in closed employment relationships less likely to move voluntarily. Jacoby accordingly noted that “the drop in mobility was one of the most important consequences of the system that had become widespread for manufacturing workers [during the postwar period]. Seniority rules and internal promotion policies gave workers a reason to remain with their employers” (1985:206). Closed employment relationships may also have reduced involuntary mobility, by making it more difficult for firms to discharge workers, other than as part of layoffs. Even when layoffs occurred, the use of seniority in allocating security meant that those layoffs fell largely on low tenured workers, further increasing average tenure.

Closure and Conflict

Theories of closure argue that closed relationships are an object of conflict, because of the way that they reduce competition to the detriment of customers (Murphy 1988). As a consequence, actors must often exercise power to create and maintain closure (Murphy 1988:9). Such dynamics are evident in the employment context. Because closing off employment reduced competition for many jobs, it gave existing employees enhanced access to opportunities for upwards mobility. The reduced competition could also improve workers’ ability to secure the returns to their efforts (Sorensen 2000; Weber 1968:341-342), counterbalancing the advantages that employers otherwise enjoyed. For employers, the benefits of closure were at best ambiguous. Lower turnover could benefit employers by promoting investments in firm specific skills. At the same time, the advantages given to workers constrained managerial prerogatives in allocating jobs and rewards, reduced their flexibility in responding to changes in demand or skills needs, and limited their ability to use external competition to hold down wages.

Because of these conflicting interests, much evidence suggests that workers were only able to acquire closed employment practices through the exercise of power. In general, workers can draw on two sources of power in seeking to influence employers’ behavior. First, the threat of individual exit requires employers to offer terms that are at least as good as workers could receive elsewhere. Second, the use of collective bargaining allows workers to threaten employers with strikes and other collective action. This

second, collective source of power appears to have played a particularly important role in shaping the adoption of internal labor market practices that fostered closure. Several explanations have been advanced for firms' adoption of the internal labor market practices that fostered closure, with some scholars arguing that they reflected firms' desire to drive down turnover and foster investment in firm specific skills (Cappelli 2000; Doeringer and Piore 1971), and others noting the role of government intervention (Baron et al. 1986). Much research, though, points to the role of collective worker pressure. For example, Baron et al (1986) find that the diffusion of seniority related practices was strongly related to unionization, and Slichter et al (1960:140-141) describe how unions promoted seniority provisions over the objections of management. Other studies describe how the adoption of closed practices by non-union firms was also a response to worker pressure, as employers used those closed relationships to pre-empt unionization and secure labor peace (Jacoby 1985).² More recently, Pfeffer (1983) described unionization as a principal determinant of long term employment relationships within organizations, while work in the dual labor market literature emphasized worker power as a key resource for achieving closed employment relationships (Hodson and Kaufman 1982).

Effects of Environmental Changes

If long-term employment relationships originally reflected workers' power to secure closed employment relationships, then the recent decline in long-term employment may reflect a reduction in their ability to secure such closure. If workers no longer have the capacity to secure closed employment relationships from employers, then they are likely to find that the opportunities and rewards provided by their current employers are little better than those available on the open market, increasing voluntary turnover; a weaker ability to secure employment protections may also have increased involuntary turnover. Both changes could reduce tenure. Given that the decline in long-term employment has happened across large numbers of different organizations, such a shift in the nature of worker-employer bargaining is most likely to be the result of changes in the external environment. Below, I explore two

² Radical critiques of internal labor markets offer a contrary perspective, viewing such practices as a means for managers to exert control over workers (Edwards 1979). It is difficult to find strong empirical support for those arguments in studies of internal labor market adoption, though.

sets of environmental changes that might have made it more difficult for workers to secure closure: declining legal and normative support for unions which weakened worker power; and increased foreign competition and technological change which made long term employment more costly for employers.

Deunionization and changes in tenure. Prior research suggests that actors' power within organizations is often affected by the legal and normative environment in which those organizations operate (Fligstein 1987; Thornton and Ocasio 1999). The last thirty years have seen a substantial decline in environmental support for unions. Private sector union membership has collapsed as a consequence, reducing workers' ability to exert collective power (Freeman 1988). It is possible that those changes might account for declines in tenure.

Scholars have debated the reasons behind union decline, with some arguing that increased competition, technological change, and occupational shifts have undermined the viability of the US's traditional union model (Hirsch 2008; see also Jacoby 1997:256-257). Much evidence, though, suggests that union decline has been largely rooted in legal and normative changes. Dubofsky (1994) argues that the state underpinned unions' power during the post-war period: the National Labor Relations Board (NLRB) protected workers' rights to organize and bargain collectively; courts upheld those rights against employers; and Presidents including Truman and Eisenhower pressured employers to meet reasonable demands by unions. This public protection of union power was withdrawn during the 1980s, when Reagan's dismissal of striking PATCO workers indicated that the government no longer saw unions' demands as legitimate, and his appointment of an anti-union consultant to head the NLRB marked the withdrawal of federal support for workers' right to collectively organize. At the same time, declining profitability and growing ideological and political support for shareholder power encouraged employers to contest unions' power within the workplace (Kochan et al. 1994; Levy and Temin 2007). Union attempts to organize new workplaces collapsed at the beginning of the 1980s, largely preventing the unionization of fresh organizations and industries (Tope and Jacobs 2009).

I have argued that long term employment relationships were a consequence of workers' ability to secure closed employment. Where that ability depended on workers' power to organize or credibly

threaten to organize workplaces, then declines in legal and normative support for unionization may have contributed to declines in long-term employment. As firms faced less pressure from employees, they may have been less likely to prefer established workers in the allocation of jobs, pay raises and benefits, making it less attractive for workers to stay within the organization. The reduced power of unions may also have made firms more willing to lay workers off. Where those layoffs fell on longer serviced workers or were followed by replacement hiring, such layoffs would also contribute to reduced tenure.

One way to explore how changes in legal and normative support for unions might have affected tenure is to exploit the effects of industry-level variation in unionization. Historically, industries have varied substantially in their levels of unionization, reflecting idiosyncratic factors such as the nature of the work and the era in which the industry developed (Hirsch and Berger 1984). Those unionization rates have also shown substantial effects on the behavior of all organizations in the industry, by raising the threat that non-union firms might be organized (Hirsch and Berger 1984; Podgursky 1986; Rosen 1969) and establishing industry-wide norms (Western and Rosenfeld 2011). Hence, while changes in normative and legal support for unionization will have affected all industries, we should still see substantial variation in the direct effects of that environmental change on industry-level unionization.

This inter-industry variation in unionization allows me to go beyond simply noting the coincidence of declining unionization and the reduction in tenure. Instead, I can estimate effects of unionization on tenure that largely reflect cross-sectional inter-industry variation in unionization rates. If changes in tenure reflect the declining power of unions to secure closed employment practices, then we should see a strong association, within and across different years, between unionization levels and worker tenure. If that association is large enough to explain the observed declines in tenure, then introducing measures of industry unionization into analyses of tenure should explain much of the decline in tenure over time. I hypothesize:

H1a: Industry level unionization is associated with higher tenure

H1b: Controlling for industry level unionization helps to explain the decline in worker tenure since the 1970s.

Increased foreign competition and technological change. While declining support for unionization could have reduced the power of workers to secure closed employment, other environmental changes – notably foreign competition and technological change – might have affected the willingness of employers to agree to that closure. Theories of power and bargaining suggest that parties often seek agreements that benefit the two sides equally (Skvoretz and Willer 1993; Walton and McKersie 1965): where the costs of an agreement increase for one of the parties, they are likely to seek to change that agreement. As increased environmental turbulence made closed employment relationships more costly for employers by increasing their need for flexibility and diminishing the rents available to sustain closed employment, it is possible that employers sought to roll back those relationships.

One source of increased environmental turbulence over the past 30 years has been foreign competition. The 1970s and 1980s saw increasing penetration of US markets by foreign competitors. Previously dominant domestic firms faced increasing competition from these imports, which accelerated during the 1990s (Berger 2005). Some industries, such as automobiles, saw domestic manufacturers' market share fall precipitously. Others, such as textiles and apparel, radically restructured, moving production overseas (Abernathy et al. 1999). Import competition from China had a particularly important effect on wages and employment of manufacturing workers after 1990 (Autor et al. 2012).

Another source of increased environmental turbulence over the past 30 years has been the proliferation of information technology. The 1980s and 1990s saw the rapid penetration of information technology into the workplace, as computers became cheaper and more capable. In some cases, technology replaced labor in production processes. Elsewhere, technology promoted more flexible, skill intensive production processes and led to the development of new products and services (Bresnahan et al. 2002; Brynjolfsson and Hitt 2000). Research on inequality demonstrates the disruptive effects of technological change on employment, documenting how technological diffusion was accompanied by rapid changes in the values of different skills (Autor et al. 1998).

Both foreign competition and technological change may have increased the costs to employers of long-term employment relationships, by increasing pressures for flexibility and reducing organizational

rents. Where those pressures led to downsizing of recent hires or hiring freezes, it is possible that tenure could have increased as the numbers of short-tenured employees declined disproportionately. Yet where these environmental changes led to a need for entirely new skills which current employees lacked, or threatened employer profits, they would have put pressure on closed employment relationships.

Employers may have sought to manage these pressures by increasing external hiring and reducing the preferences accorded to existing employees, increasing voluntary turnover and reducing tenure. Where they engaged in layoffs of long-service workers with older skills, tenure may also have declined.

As with declining support for unions, the declining costs of technology and growing competitiveness of foreign firms were economy-wide trends that had different effects on different industries. While technology facilitated a wholesale reorganization of some industries, others were much less affected by it; competition from imports was devastating to some industries but restrained in others (Autor et al. 2012). This variation again provides a means for testing the roles of these changes in reshaping employment relationships. If globalization and technology were responsible for the decline in long term employment, then we would expect that industry levels of imports and technology use would be associated with lower tenure, and also that increases over time in imports and technology use would explain some of the declines observed in worker tenure. I hypothesize that:

H2a: Industry levels of import competition are associated with lower tenure

H2b: Controlling for industry level import competition helps to explain the decline in worker tenure since the 1970s.

H3a: Industry levels of technology use are associated with lower tenure

H3b: Controlling for industry levels of technology use helps to explain the decline in worker tenure since the 1970s.

Organizational Size as a Contingency

The above hypotheses emphasize the role of industry conditions in shaping changes in tenure. However, the employment closure perspective outlined above suggests that declines in tenure may also have been shaped by another characteristic of employing organizations: their size.

Even during the post-war period, not all organizations fostered long term employment relationships. Instead, dual labor market theory emphasized that long-term employment relationships were predominantly a characteristic of larger organizations (Blossfeld and Mayer 1988; Tolbert et al. 1980), because those large organizations represented a more attractive target for unions (Hodson and Kaufman 1982), faced stronger social and governmental pressures to conform to a model of closed employment (Baron et al. 1986), and were better able to afford the costs of closed employment.

Those arguments have two implications for the decline in long-term employment. First, if closed employment relationships were only ever a characteristic of large employers, then their decline should also be most pronounced among those large employers. If declining tenure reflects a change in employers' willingness to concede closed employment, then I would predict that:

H4: Over-time changes in worker tenure have been greater for larger organizations.

Second and relatedly, the environmental changes described above should have had a greater impact on larger organizations. If larger organizations were initially more vulnerable to worker demands to foster longer term employment relationships, then declines in the legal and normative support for unions should have disproportionately affected those organizations. Similarly, if larger organizations were previously more able to afford closed employment, then the turbulence created by foreign competition and technological change may have affected them most. It is therefore likely that organizational size has moderated the effects of declining unionization and increasing import penetration and technological change on tenure. Specifically, I predict that:

H5: The effects of industry unionization, import competition and technological change on tenure are greatest for large organizations.

DATA

I test these accounts of declining worker tenure using data from the CPS. The CPS is a monthly, nationally representative survey of households that is used to assess workforce trends, including the unemployment rate. Rather than drawing a completely new sample of households every month, the CPS surveys each household eight times: once a month for four months, followed by an eight month hiatus,

followed by a further four monthly surveys. Although a standard set of questions are asked each month, a variety of irregular supplements have also been used to address particular topics. I measure tenure using data from several of these supplements: a mobility supplement from February 1996, 1998, and 2000, and January 2002, 2004, 2006 and 2008; a contingent workers supplement from February 1995, 1997, 1999, 2001 and 2005; and a pensions and benefits supplement from May 1979, 1983, 1988 and 1993.³⁴ I use this data to explore changes in tenure since 1979, which is the period that is believed to have seen the greatest changes in employment relationships (Cappelli 1999; Osterman 1999) and also that saw the most sustained attacks on union power. It is also the period that prior empirical studies of changes in tenure have focused on (e.g. Hollister and Smith 2011; Neumark et al. 1999).

Although the CPS data has no information on the organizational practices that shape workers' employment relationships, it has important strengths for understanding trends in worker attachment. It offers consistent data on worker tenure going back three decades and includes detailed demographic data, allowing effects of gender, age and education to be controlled for. As a consequence, the CPS has often been used to document the decline in worker tenure (Farber 2008a; Neumark et al. 1999). The CPS also captures data on employer size and industry, allowing me to test the hypotheses laid out above.

The Sample

Because my central interest is in the causes of changing tenure, I restrict my analyses to men aged between 30 and 65 who usually work full-time. While it is also important to understand the behavior of other demographic groups, changes in tenure should be clearest among these prime aged men, since they are the group that was previously most likely to be in long term employment relationships. In addition, married mothers became more likely to remain in their jobs during the 1980s and 1990s, even as the tenure of all other groups was falling (Hollister and Smith 2011). Restricting the sample to men

³ Mobility supplements in 1983, 1987 and 1991 also contained tenure data. However, these could not be matched to data for organizational size, so I did not use them in my analyses.

⁴ Most workers only appear once in the data, although many of the workers who were surveyed between 1996 and 2006 appear twice in the data, as they appear in the sample in consecutive years. Additional analyses showed that including individual random effects did not change the results. I do not use that specification in this paper, as it interfered with my ability to cluster errors at the industry level which does affect my results.

eliminates these confounding effects of changing gender roles; I explore some of the other possible implications for the analysis in the discussion section. Even among men, the early part of the career has traditionally involved relatively unstable employment relationships (Topel and Ward 1992). To the extent that long-term employment relationships were largely restricted to men in the latter stages of their careers, it makes sense to examine the decline of those relationships by focusing on this group. Excluding men over 65 also allows me to avoid any confounding effects of changing retirement patterns.

I also dropped those workers employed by the government. Governments face a very different institutional and economic environment than firms, and prior analyses of the CPS indicate that the tenure of public sector workers has not declined in the same way as private workers (Farber 2008a). Given that the public sector has seen neither a decline in union power nor an increase in competition, those differences between public and private sector workers are consistent with my arguments. Nonetheless, I omitted government workers from the analysis to avoid other effects of government employment from biasing the results. I also omitted self-employed workers and workers in the employment services industry (who are most likely to work for temporary help agencies)⁵ because of the difficulties of interpreting what tenure means for them.⁶

Variables

Worker Tenure. Worker tenure is measured in years, and is based on responses to the various tenure questions in the different supplements. The job mobility supplement asked workers “How long have you been working CONTINUOUSLY for your present employer?” The benefits supplements asked “How many years have you been working for [employer’s name]?” while the contingent work supplements asked “How long have you been working for [employer’s name]?” One problem in working with the tenure data is that people round their responses, leading to disproportionate peaks at 1 year, 2

⁵ I am unable to identify other contingent workers, such as independent contractors in most years of the data. Supplementary analysis using the contingent worker supplements suggested that including those workers has little effect on my results, though.

⁶ I reran key analyses using all male workers under the age of 65. The results were very similar to those presented here. Time trends for women are different to those for men, although the effects of organizational size and unions are similar for men and women.

years, 5 years and 10 years. I adopt Farber's(2008a) approach to this problem. Where respondents gave an exact number of years as their tenure, I add a random amount, uniformly distributed from -0.5 to +0.5 in order to approximate the true distribution of tenure.⁷

Organizational Size. The 1979, 1983, 1988 and 1993 benefits supplements contained data on both tenure and organizational size. I gathered organizational size data for other years by matching in size data from the "March supplement" of the CPS (see the Appendix for more information). The March supplement asked workers "Counting all locations where this employer operates, what is the total number of persons who work for ...'s employer?" The 1979, 1983 and 1988 benefits supplements similarly asked "How many employees are employed at all locations?" with a wider range of possible responses. I consolidated the different response categories into three: under 25; 25-999 workers; and 1000+.

One concern with this variable is that workers may often not know their employer's size. The limited number of response categories should mitigate this problem: most workers are likely to know whether their employer has fewer than 25 employees or more than 1000 employees. To the extent that some responses are still inaccurate, that would bias against finding effects of size. This measure also cannot test differences between the behavior of organizations with 100,000 employees versus 1,000 employees. Despite these limitations, much research has used the CPS data on firm size, finding strong effects of this variable on wages (e.g. Brown and Medoff 1989; Hollister 2004).

Unionization. Consistent with my arguments, I measure unionization at the industry level (I break out union and non-union members in supplementary analyses). The earnings supplement of the CPS asks workers whether or not they are members of a union. Because the earnings supplement is only implemented in the fourth and eighth month a household is interviewed, only one quarter of workers are asked this question each month. I matched answers for the other workers into the data using earnings supplements from subsequent months (again, see the Appendix for details). For each year and for each three-digit industry as defined by the census for that year, I then calculated the percentage of all workers

⁷ I also explored whether to use tenure or log tenure as a key dependent variable. Comparison of results showed that analysis using tenure fit the data better than analysis using log tenure. Qualitatively, the results of analyses using the linear and logged variable gave very similar results.

in that industry (including women and those outside the age range of my primary sample) who were members of a union, using the CPS weights to adjust for sampling differences.

Import penetration. I calculated import penetration using industry-level data on the gross value of imports for 1979 to 2006 (Feenstra et al. 2002). These import data are only reported for commodity and manufacturing industries, so the analyses using this data are restricted to these industries. These are the industries that were most exposed to foreign competition, though: if foreign competition affects tenure, it is in these industries that we would see the effects. I aggregated these data, which are identified by SIC and NAICS codes, into industries as defined by the census (the census uses its own coding scheme. I constructed crosswalks using tables from the Census (2001) and Unicon Research (2005)). I then calculated import penetration rates by dividing total industry imports by gross industry output, taken from the National Income Product Accounts.

Investments in new technology. I calculated industry-level spending on information technology using data from the Input-Output tables of the National Income Product Accounts. Unlike the other measures, these data are only released every five years (I used data for 1977, 1982, 1987, 1992, 1997 and 2002). I matched employment data with the most recent data on IT spending. Again, industries defined by commodity codes (1977-1992) and NAICS (1997 and 2002) were matched to census industry codes. I then calculated IT intensity by dividing each industry's total purchases of IT specific goods and services by the total purchases of those industries in that year.⁸ One limitation of the Input-Output tables is that they aggregate all of wholesale and retail industries into just two categories. I therefore lack detailed industry-level data for wholesale and retail industries, and they are omitted from analyses using this data.

Controls. I controlled for individual-level attributes that might affect tenure and have changed over time. These controls include age, age squared and dummies for completion of high school, associate's degree, bachelor's degree, and some postgraduate education. I also controlled for occupation: I

⁸ Before 1997, the specific IT goods and services were: calculating and accounting machines; electronic computers; computer peripheral equipment and computer and data processing services. After 1997, they were: computer and peripheral equipment manufactures; internet service provision; internet publishing and broadcasting; computer systems design and related services.

translated occupation categories from all periods into a modified set of the 2002 census categories (this set of dummies splits work into 24 different occupations. I combined three professional work categories because of difficulties in matching these across years).

I also controlled for unemployment, because of concerns that turnover rates vary systematically with unemployment (Hom and Kinicki 2001). I include a measure of the January unemployment level in each worker's state in each year in the analyses.

The full data set contains 138,612 observations, although the numbers in the analyses vary due both to missing data and to my analyses of subsamples. Table 1a gives descriptive statistics for the main variables. Table 1b gives annual averages of unionization, import penetration and technology intensity, both by industry and by worker. We see substantial changes in all three measures from 1979 to 2008.

ANALYTICAL APPROACH

The goal of my analyses is to understand how industry characteristics might help to explain changes in tenure over time. To that end, I conduct OLS regressions with tenure as the dependent variable. The unit of analysis is always the individual. Conducting analysis at that level allows me to control for changes in the composition of the workforce as workers got older and more educated and as the occupational distribution changed. I cluster standard errors at the industry level because my key independent variables are at this level, and errors may not be independent within industries. Observations are weighted by the supplement weights in the CPS, except in fixed effects analyses.

I assess changes in tenure over time using a linear year variable (I also conducted analyses using the more flexible form of dummies for each year. Those analyses, which are available from the author, depict a largely monotonic trend in tenure and showed substantively similar results to the linear specification. In the interests of space, I display the simpler, linear trend here). A significant negative effect of year on tenure indicates that tenure declined over time, holding worker demographics, occupation and local unemployment constant.

I then seek to explain that year effect in my analyses, by adding industry characteristics as a control. If the year effect declines once industry characteristics are controlled for, it suggests that part of

the change in tenure reflects changes in those industry characteristics. In a statistical sense, this test functions as a test of mediation (Baron and Kenny 1986): Table 1b demonstrates that time trends predict the mediating variables of industry characteristics; I then explore whether those mediating variables predict tenure, and whether including them in the analyses attenuates the effects of time on tenure.

RESULTS

Figure 1 graphs the average tenure of men aged 30-65 by year, broken out by employer size. The graph demonstrates striking differences in tenure trends across the different employer sizes. Average tenure in the smallest organizations actually increased; tenure in medium sized organization fell very slightly; but there was a strong decline in average tenure in large organizations, from a little over 14 years in 1979 to around 10 years in 2008 (underlying this trend is a particularly large increase in short term employment relationships. Among the employees of large organizations in my sample, the proportion of workers with less than three years of experience increased from 18% in 1979 to 28% in 2008).

Another way of comparing these trends is to examine the gap in tenure between the largest and smallest organizations. In 1979, the average tenure of men aged 30-65 in organizations with more than 1000 employees was 92% higher than average tenure in small organizations; by 2008, that gap had declined to just 22%. The figure therefore offers strong support for Hypothesis 4, that changes in tenure have been greatest for larger organizations.

Main Analyses

Table 2 presents the main regressions of tenure on time and industry characteristics. I first present the trends for all organizations (Model 1) and then for the three different size classes (Models 2-4). These models replicate Figure 1. There is a significant effect of year on tenure among all organizations (Model 1). Multiplying the coefficient by 29 years suggests a decline in tenure of around 1.7 years from 1979 to 2008. This effect is much stronger among employees of organizations with greater than 1000 workers (Model 4), where the coefficient implies a decline in tenure of 3.9 years over the same time period. By contrast, tenure increased slightly among the smallest organizations (Model 2) and only declined versus slightly among medium sized organizations (Model 3). Differences across the coefficients are significant,

supporting Hypothesis 4.

Models 5-9 then test H1-3, exploring whether changes in industry characteristics might explain some of the decline in tenure. In these analyses, I restrict the sample to employees of large organizations only. The earlier models show that tenure changes were restricted to those organizations. It therefore makes most sense to explore the causes of changing tenure among large organizations (supplementary analyses available from the author show very similar results among the employees of all organizations).

Model 5 provides strong evidence for H1a and H1b, which related declines in industry-level unionization to declines in tenure. Industry-level unionization has a highly significant effect on tenure, as proposed by H1a. According to the estimate, moving from the 10th percentile of industry unionization rates (0.012) to the 90th percentile (0.32) increases tenure by 3.3 years. The unionization variable also explains much of the change in tenure, as proposed by H1b, with the year coefficient declining by a little more than half from Model 4 to Model 5. A Sobel tests (Baron and Kenny 1986) for mediation of the change in tenure is also highly significant ($z = -8.2$). If the relationship between unionization and tenure is causal, then these results indicate that the average tenure of men aged 30-65 would only have declined by around half the amount that it did if unionization levels had stayed constant from 1979 to 2008.

Models 6-7 then test H2a and H2b, which related import competition to declines in tenure. Because I only have data on imports for manufactures and commodities, I first confirm the basic time trends within that restricted subsample (Model 6). I find that the year effect is smaller in those tradable industries, even though they should have been most exposed to global competition. Adding the import measure in Model 7, I find no support for H2a. Import penetration is not significantly associated with tenure. Similarly, including import penetration in the analysis does not significantly alter the year effect, offering no support for H2b.

Models 8-9 then test H3a and H3b, that use of information technology explains declines in tenure. Again, I only have data on a subset of industries (although there are no reasons to believe that the excluded sectors of wholesale and retail have behaved very differently from the rest of the economy). In Model 8, I confirm that time trends within the restricted subsample are similar to the economy as a whole.

I add the technology intensity variable in Model 9, finding no support for H3a. Technology intensity does not predict tenure. Nor does including this variable affect the year coefficient, contrary to H3b.⁹

Models 10-12 then provide a formal test of Hypothesis 5, that the effects of environmental pressures are greater for large firms. The hypothesis is confirmed for unionization: the effects of industry unionization on tenure are significantly higher for large organizations (interaction coefficient = 7.5, $z = 9.8$ in Model 13). This effect helps to explain why tenure has changed most in large organizations. I do not find similar effects for technology or import penetration.

These analyses show that controlling for industry unionization explains a substantial proportion of the decline in tenure that has taken place over the last 30 years, and that these declines have been particularly strong in large organizations. I probe these effects further in the remainder of this section.

Further Analysis of Unionization Effects

I have argued that unionization rates affect worker tenure because they help workers to bargain for the kinds of closed employment relationships that foster long-term employment. I have also argued that employment relationships often reflect industry-level pressures, as even nonunion firms in heavily unionized industries respond to the threat of unionization. There are, however, a number of alternative explanations for the correlation between unionization in tenure. I explore those effects in Table 3. I again restrict my analyses to employees of large organizations.

First, I explore the effects of wages. One explanation for the effects of industry unionization on tenure is that wages are higher in unionized industries (Freeman and Medoff 1981), and that those higher wages reduce turnover. I calculated industry wage premia by regressing weekly earnings on age, education and occupation in each year for the workers in the sample. I aggregated residuals from these regressions by industry to create a yearly measure of the industry wage premium. Model 1 confirms that industry wage premia correlate with tenure, but have a very small effect in explaining mobility trends (year effect declines from -.133 in Table 2 Model 4 to -.123 in Table 3 Model 1).

⁹ In supplementary analyses not reported here, I also explored whether these variables might have affected mobility during some portion of the period studied, without having long-term effects. Interacting the independent variables with year effects, I found little evidence for time varying effects of these pressures.

I also explored the effects of long-term industry growth rates: faster growing industries should have lower unionization rates, because new establishments were less likely to be organized by unions (Ferguson 2008). It is therefore possible that the strong relationship between unionization rates and the decline in tenure reflects lower tenure among industries that have grown more rapidly over the last 30 years. I tested for such an effect by including a variable for how much each industry had grown between 1979 and the observation date. For each year and industry, I used the CPS data to calculate the proportionate growth of the industry since 1979 (using data on all workers, rather than just men aged 30 to 65). Model 2 shows that tenure is indeed lower in industries that grew more over the last 30 years, but that the effects of this growth explain very little of the decline in tenure as measured by the year effect. The effects of unionization remain highly significant when controlling for wages and growth since 1979 (Model 3), and do not, therefore, simply reflect the differences between new and old industries.

I also explore whether unionization affects workers throughout an industry, or whether it simply makes union members reluctant to quit their workplaces. I do this by splitting the sample into union members and non-union members. Models 4 and 5 show that tenure has declined much less for union members than non-union members, consistent with my arguments. Models 6 and 7, though, show that the level of industry unionization has similar (and substantial) effects for both union and non-union members. These results confirm that unionization affects the entire industry, consistent with recent work on inequality (Western and Rosenfeld 2011).

I also examined the role of within- versus between-industry changes in driving the effects of unionization. Thus far, I have proposed a very simple relationship between unionization and closed employment: where unionization is high, closed employment relationships are more likely, leading to higher tenure. In reality, this relationship is likely to be complicated by institutionalization effects. Organizational and industry practices often demonstrate substantial inertia (Stinchcombe 1965). Tenure may therefore respond only gradually to declines in unionization within an industry.

One way to explore these inertial effects is to divide the effects of unionization into a within-industry effect of declining unionization, and a between-industry effect which represents the way that

differing levels of unionization across different industries are associated with different levels of tenure. It is likely that declines in unionization have affected tenure through both of these effects: tenure may have fallen as unionization fell within an industry; tenure may also have fallen as employment shifted from more unionized industries with higher tenure towards less unionized industries with lower tenure. Both such processes are consistent with the theory laid out above. After all, an important reason why growing industries have had lower unionization is that they have grown up during an era that is hostile towards unions. Where there is substantial within-industry inertia, we might also expect the between-industry effects of unionization to be larger than the within-industry effects.

I explore the relative balance of these within- and between- industry effects in Models 8 and 9 of Table 3, where I include industry-level fixed effects in the analysis (this requires creating a consistent set of industry categories across the time period. I drop a small number of observations that could not be classified into those industries). Including those fixed effects (Model 8) substantially reduces the size of the year coefficient (comparison with Model 4 in Table 2), suggesting that around 40% of the decline in tenure within large employers between 1979 and 2008 reflected a shift in the workforce from industries that generally have higher tenure to industries that generally have lower tenure. Model 2 demonstrates a marginal within-industry effect of unionization on tenure: controlling for industry fixed effects, industry unionization continues to have an effect on tenure, albeit only at the 10% significance level, and is associated with a further decline in the year effects (in other analyses which use more the more complete specification of year dummies, I found that the effect of unionization was significant at the 5% level and that including unionization had a more substantial effect on the time trend). The coefficient on unionization is smaller than the coefficient in the pooled OLS regression (Model 5, Table 2), though, suggesting that declining unionization has smaller within-industry effects than between-industry effects.

In supplementary analyses not reported here (available from the author) I also explored how changes in tenure and effects of unionization varied between blue collar workers, service and clerical workers, professional and technical workers, and managerial workers. I found very similar time trends across the different groups, although professional and technical workers demonstrated the smallest

declines in tenure. I also found that industry unionization had significant effects on tenure in all occupations, with the largest effects on service workers. The effects of unionization also explained more of the decline for blue collar workers than for other occupations, reflecting the way that unionization fell much further in industries employing blue collar workers. The far reaching effects of unionization on all occupations, including managerial workers, most likely reflects the way that employment practices for frontline workers often spill over to managers because of institutionalization processes and the need to maintain internal equity (Colvin et al. 2001; MacDuffie 1996).

Determinants of Unionization

Given the important role of unionization in explaining declines in tenure, it is valuable to ask what determines unionization. In particular, could changes in unionization themselves be driven by factors such as globalization, technological change, or pressures on profitability? I explore this question in Table 4, where I present logit analyses using individual union membership as the dependent variable. I include all employees (including women and younger and older men) in the analysis.

Consistent with Table 1B, Model 1 shows a significant negative effect of year on the odds of a worker being a union member. Employees of larger organizations are also more likely to be unionized. I find no evidence that unionization is lower in industries with more import penetration (Model 3), or higher technology intensity (Model 5). In Model 6, I include industry return on assets (winsorized at the 1st and 99th percentiles), taken from Compustat. Again, I find no effect of profitability pressures on unionization. I do find that unionization is significantly lower in industries that have grown more rapidly, consistent with accounts that emphasize the problems of organizing new establishments (Model 7). These analyses suggest that declines in union membership cannot be directly traced to pressures from import competition, technology or profitability. Instead, the results are consistent with accounts of union decline rooted in the difficulties of organizing new establishments in a hostile legal and normative climate.

Voluntary Turnover, Involuntary Turnover and Organizational Growth

At the beginning of the paper, I noted that declines in tenure could be driven by three separate processes: organizational growth, replacement hiring following voluntary turnover, and replacement

hiring following involuntary turnover. My theory development focused on the argument that changes in employment relationships could have increased both voluntary turnover and involuntary turnover, as decreased closure in employment relationships made it less appealing for employees to stay with their employer and easier for their employer to dismiss them. The analyses thus far have not been able to distinguish between these different sources of changing tenure. I can, however, shed some light on this question through supplementary analyses.

Evidence on Layoffs. Although most of the CPS supplements that I use do not describe why workers moved jobs, data on some forms of involuntary turnover are included in a “Displaced Worker Survey” which has been asked every second year from 1984 (Farber 2008b). This survey asks whether, during the last 3 years, a worker lost a job because their plant was closed, their employer went out of business, there was a layoff, their position was abolished, or similar reasons.¹⁰ This data can therefore be used to examine whether the trends in and determinants of layoffs are similar to tenure. It is worth noting that these questions do not count workers who were dismissed for cause; Oyer and Schaefer (2000) estimated that these dismissals accounted for around 20% of involuntary separations of young men between 1987 and 1994, and declined slightly following the passage of the Civil Rights Act in 1991.

Matching industry characteristics to this layoff data is more complex than for the tenure data. One possibility is to match in the characteristics of the industry that respondents were in at the time of the survey (this is the same as the industry that the workers were laid off from in about 40% of cases). This helps us to identify the industries in which falls in tenure partly reflect the hiring of recently laid off workers. Alternatively, it is possible to match in the characteristics of the industry that workers were laid off from to explore the determinants of layoffs. Such an analysis lacks an accurate control group though; instead, I assume that all workers who were not laid off are still in the same industry that they were in three years ago. In reality, many of those workers will have moved industries voluntarily during this time. Since neither analysis is perfect, I present both. In Table 5, I present logit analyses where the dependent

¹⁰ The wording of this question changed slightly in 1992. Also, prior to 1992 workers were asked if they had lost their job in the last five years. However, information on when they lost their job can be used to construct a consistent measure of whether a worker was laid off during the last three years.

variable is whether the worker has been laid off within the last three years. Because I lack data on organizational size for the early years of the data (and never have data on the size of the organizations that workers were laid off from), I look at employees of all firms.

The analyses of layoffs demonstrate a very different pattern to the tenure analyses. I do not find strong evidence of an increasing rate of layoffs (see also Davis 2008; Farber 2008b).¹¹ I find evidence that workers in unionized industries are less likely to have been laid off within the prior three years. I also find that workers are significantly less likely to have been laid off from unionized industries, although the effect is weaker. Unlike changes in tenure, I also find that industry import penetration and technology intensity significantly predict layoffs, both for the industries that workers are currently in and the industries that they were laid off from.

I also ran some additional analyses (available from the author) where I explored whether the rate of layoffs of workers from an industry have been associated with declines in tenure. Because I did not have layoff data for all years, I had to match many observations to layoff data from adjacent years (hence, I proxied industry layoffs in the three years to 1983 with data from 1984. For the other odd numbered years, I used the layoff data from the most recent year). That rough analysis found no significant relationship between layoffs of workers from an industry and the tenure of workers in that industry. The weak correlation between tenure and layoff rates, the somewhat different time trends in involuntary turnover versus tenure, and the way that they are explained by somewhat different industry variables suggests that layoffs may have played a limited role in driving declines in tenure.

Effects of Industry Growth Rates. In further analysis not reported here (available from the author) I also analyzed how industry growth rates might have affected my findings. Average tenure rates reflect fluctuations in growth rates over long periods of time, making it difficult to fully control for effects of industry growth in tenure regressions. I overcame this problem by dichotomizing tenure, to look at

¹¹ Supplementary analyses found some evidence that the rate of layoffs has increased once local unemployment is controlled for (tenure trends, by contrast, are unaffected by unemployment controls). Because local unemployment may be as much an effect of layoffs as a cause, I do not control for it in the main analyses reported here.

whether the worker had been hired within the prior three years (around 30% of the sample have less than three years tenure). I then created a control for the rate of industry growth during the prior three years, using data on total industry employment calculated from the January files of the CPS and creating a spline to allow industry growth and decline to have different effects. Logit analyses replicated the prior results: the probability that a worker had less than three years of tenure increased significantly over time, and changes in unionization rates explained essentially all of that increase. Although shorter tenure was associated with industry growth, introducing the growth variables had very little effect on the results. I also explored the effects of intra-industry turbulence, using data from the Statistics of US Business (SUSB) on the number of jobs destroyed by establishment contraction and death and the number of jobs created by establishment birth and expansion. Again, while I found some evidence that intra-industry turbulence reduces tenure, I did not find that those processes explained the increase in short-term employment or the effect of unionization. These analyses confirmed that changes in the rate of inter-and intra-industry reallocation of workers have played little role in driving over-time declines in tenure.

DISCUSSION

The marked decline in the length of employment relationships represents one of the most important changes in the nature of employment, careers, and organizations to have taken place over the last three decades. A foundational assumption of the post-war employment model for large firms was that employment relationships represented an enduring bond between firm and worker. The years since 1979, though, have seen the growth of a less stable, more transactional employment model. Tenure has declined by 30% among prime aged men, with particular increases in the proportions of men with less than three years of tenure. While much work has gone into documenting this decline in tenure, there has been little systematic analysis of its causes. This paper brings new evidence to bear on this question.

I argue that long term employment relationships arose as a consequence of workers' efforts to secure closed employment relationships that provided incumbent employees with preferential access to rewards and opportunities. I then explore why workers' ability to secure those closed employment relationships might have declined, proposing a role for a legal and political environment that became

more hostile to worker organizing and an economic environment that raised the costs of closed employment to employers. I test those explanations by examining how declines in tenure reflect changes in particular industry characteristics. In doing so, I establish a number of new empirical findings.

First, I find that declines in tenure have been strongly associated with changes in industry-level unionization: including unionization in my analyses explained around ½ of the decline in tenure within large organizations between 1979 and 2008. That unions are associated with longer tenure is well known (Pfeffer 1983). Yet my findings extend this simple association in important ways. My results provide evidence that declines in union membership have powerfully affected the duration of employment relationships. While other work has documented the decline in unionization (Kochan et al. 1994), prior work has not shown how that decline is associated with the fall in worker tenure.

Supplementary analyses shed further light on the pervasive effects of industry-level unionization on tenure. I found that levels of industry unionization have strong effects on union and non-union workers alike, as well as workers in all major occupational groups. These pervasive effects suggest that unionization may affect the institutionalization of different practices at the industry level, and is consistent with other research on the role of unions on wages and working conditions (Colvin et al. 2001; MacDuffie 1996; Western and Rosenfeld 2011). Although I find that changes in unionization affected tenure both within and across industries, the stronger across-industry effects also point to a role for institutionalization processes in shaping the effects of unions on tenure.

It is important to acknowledge the limits to what we can infer from the present study. I am able to establish a very strong relationship between changes in unionization and changes in tenure. This result is consistent with histories of the development of long term employment relationships which suggest a strong role for unionizations in promoting employment closure (Baron et al. 1986; Jacoby 1985). I also find little evidence to support many of the major alternative explanations for the findings, such as the idea that declining unionization is itself a response to technological change or globalization. Nonetheless, the nature of the data that I draw on means that my evidence is primarily correlational. I argue that declines in union power reflected a hostile legal and normative climate. Although studies of union organizing

supports this argument (Tope and Jacobs 2009), it is possible that other processes might be driving both declines in unionization and changes in tenure. One such candidate is the growth of new establishments. Given that union decline largely reflected the inability of unions to organize new establishments, establishment age should be correlated with declining union power, but is beyond my ability to measure. I am able to show that the mechanical effects of establishment growth do not explain declines in tenure, and that my results do not simply track the growth of new industries, but it is possible that younger establishments are less likely to offer closed employment relationships. The very strong correlations between industry unionization and tenure, though, suggest that a central reason why younger establishments would be less likely to offer closed employment is that they are emerging during a period when unions are weaker. Another possible omitted variable is shareholder power, which is very difficult to effectively measure using industry-level data. Where such pressures helped to shape tenure, they are likely to be complementary to the effects of declining unionization though, accentuating the shift in power from workers to employers. Overall, then, this paper cannot prove a conclusive role for union decline in shaping changes in tenure. Nonetheless, the evidence does suggest that the effects of union decline present the most promising avenue for further study of the causes of declining worker tenure.

I also show that declines in worker tenure have been concentrated among large organizations: in 1979, workers in large organizations had nearly double the tenure of employees of small organizations; by 2008, the tenure gap between large and small organizations was just 22%. Dual labor market theory argued that large organizations had longer employment relationships because they were more susceptible to the exercise of collective worker power and legitimacy pressures (Baron et al. 1986; Hodson and Kaufman 1982). It appears that the dilution of those pressures in recent decades has also primarily affected large organizations. As the worker pressures that sustained the dual labor market have lost their potency, so important differences between large and small organizations are fading away.

Almost as interesting are the hypotheses that are not supported. I argued that workers' declining tenure could reflect increased environmental turbulence, which raised employers' costs of maintaining long term employment relationships. Yet variables measuring the key changes that US organizations have

faced – increased foreign competition and technological change – had very little effect on either worker tenure or its changes over time. It is possible that the lack of results might reflect weaknesses in the measures. Although I am able to construct direct measures of the effects of imports and technology on different industries, these variables are not constructed from the CPS data. Weaknesses in matching external industry data with the CPS could therefore introduce measurement error. That said, the ability of both variables to predict layoffs should reassure us about their accuracy.

As I noted at the beginning of the paper, changes in tenure could reflect organizational growth, voluntary turnover, or involuntary turnover. My supplementary analyses were able to rule out growth as a cause of increasing tenure, showing that declines in tenure have not been driven by increases in inter-industry restructuring or a more rapid rate of organizational growth and decline within industries. Because the data that I use do not tell us why workers left their prior jobs, it is more difficult to fully tease apart the relative roles of voluntary versus involuntary turnover in driving changes in tenure. Moreover, my theory development suggests that both kinds of turnover may have been affected by declines in employment closure, as workers saw less advantage to remaining with their employers and faced fewer protections against layoffs. Given the limitations of the data which do not include proper industry risk sets, include all sources of exit, or break out employers by size, my supplementary analyses of layoffs should be treated with some caution. Nonetheless, I believe that those analyses suggest that voluntary turnover may have played the dominant role in driving tenure declines since 1979. The data indicate that the rate of layoffs was largely static during the same period that tenure was falling, and that layoffs were often associated with different industry conditions than declines in tenure: import competition and technology are strongly associated with layoffs but not changes in tenure. Nor do layoffs from an industry appear associated with tenure in that industry, suggesting that layoffs within industries have played a limited role in reducing tenure. Although not conclusive, these analyses suggest that declines in worker tenure may represent a distinct phenomenon from the downsizing with which they are often linked, and that changes in tenure may often reflect increased voluntary turnover.

The suggestion that declines in tenure are due to increases in voluntary mobility is consistent with

my theory, which argues that an important effect of unionization was to allow employees to secure improved rewards and opportunities within the firm, reducing their incentives to move organizations. An important question for future work is whether such increased turnover reflects declining opportunities for mobility within firms, reduced returns to seniority or benefits for workers, or increased ease of mobility into new organizations. Some research provides suggestive evidence on this topic. For example, Hollister (2004) finds that the premium received by employees of large firms declined during the 1980s and 1990s, consistent with a reduction in the rewards offered by large firms to their workers. DiPrete et al (2002) also find that the returns to tenure have declined for some groups of workers. Future research should explore how the wage profiles of employees in larger organizations have changed.

Future work should also look at changes in employment practices. The nature of the data used in this study did not allow me to directly measure how organizations foster long-term employment relationships. The concentration of tenure declines within large organizations supports the argument that those declines are rooted in changes to closed employment relationships, since the protection of existing workers was only ever a feature of those large organizations (Blossfeld and Mayer 1988). Nonetheless, future work that examines the adoption and abandonment of specific practices, extending work on the initial adoption of internal labor market practices (Baron et al. 1986; Baron et al. 1988), is important for shedding further light on the firm-level processes that have mediated declines in tenure. A further limitation of the data is that I have very little organization-level information on employers. Longitudinal data on the tenure of workers within identified organizations would allow for the analysis of how specific actions, such as mergers or shareholder activism, have affected tenure.

A further important area for future study is how tenure has changed within different demographic groups, and what interaction there might be between those groups (see Hollister and Smith (2011) for a discussion of gender differences). A particularly interesting question is whether women's gains in employment stability could have come at the expense of men. For example, if the stability of men's jobs partly reflected their employment in more privileged, core sectors of the economy then it is possible that displacement of men from those sectors by women might partly account for declining male tenure. I

carried out some preliminary analyses that cast doubt on such an account. While I found that men's tenure was higher in more male dominated industries, that effect appeared to be entirely explained by unionization levels. Furthermore, an influx of women into an industry (which we might expect to displace men from core positions) was associated with an increase in men's tenure, rather than a decline. It is also worth noting that the convergence in tenure across different employer sizes suggests that declines in long term employment reflect an abandonment of closure practices by core firms, not declining male access to the core. Nonetheless, this paper's focus on trends in male tenure needs to be complemented by a more systematic examination of how and why the tenure of demographic groups differ and interact.

Implications for Theory

In addition to explaining the causes of the changes we have seen in the US labor market, this paper also has implications for our broader understanding of employment relationships. Perhaps most important, the paper contributes to our understanding of the way that the shifting balance of power between workers and employers, and changes in the ability of workers to collectively organize in particular, have affected employment relationships and careers. While scholars have explored the effects of union decline on income inequality (Card 2001; Western and Rosenfeld 2011), or explored how the relative power of workers and employers affects promotion prospects among managers and professionals (Dencker 2009; Phillips 2001) they have said much less about how shifts in the power of workers versus employers has shaped other facets of the employment relationship. My findings therefore emphasize the importance of paying more attention to societal power as we seek to understand how employment has changed, rather than the oft cited effects of technology and globalization.

Such a focus has particular implications for how we think about the future of employment relationships, suggesting in particular that worker tenure will not increase again unless we see a substantial increase in the power of workers to influence the structure of employment relationships. This study suggests that long term employment relationships were dependent on an institutional structure that supported the exercise of collective worker power in favor of closed employment. There is very little evidence of a resurgence in institutional support for worker power that would allow a return of closed

employment. Some scholars have pointed to the counterproductive consequences that may stem from employers' naked exercise of power, as they erode the trust necessary for knowledge intensive production (Adler 2001). It is therefore conceivable that we will see a re-emergence of long-term employment relationships in support of modern production techniques. It is hard, however, to see evidence of such a re-emergence in the existing data.

It is worth noting, though, that collective organization is not the only source of power for workers. As unionization has become more difficult, the individual threat to leave is likely to be a greater constraint on employers' practices. It seems unlikely that such a source of power will take workers back toward closed employment practices, since any move towards closure automatically undermines the threat to leave. Nonetheless, it is possible that different sources of power will shape employer practices in new ways. An important topic for research therefore is how employers respond to tight labor markets.

The strong empirical relationship between unionization and long term employment may also have implications for the consequences of declining tenure. Increased mobility could benefit workers by giving them increased opportunities to find jobs that match their needs and abilities. Yet it could also reflect worsening conditions for workers, as firms offer fewer opportunities for internal mobility or fewer rewards to more senior employees. That tenure has declined most where organized labor is weakest offers some support for the latter, more pessimistic viewpoint. Long term employment relationships existed where workers were best placed to advance their own interests. The move towards more short-term employment may therefore disproportionately benefit employers.

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TABLE 1A: DESCRIPTIVE STATISTICS FOR MAIN VARIABLES

| | Mean | S.D. | Correlations | | | | | | | | | | | |
|-----------------|-------|------|--------------|------|------|------|------|------|------|-----|------|-----|------|-----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 Year | 1998 | 6.97 | 1 | | | | | | | | | | | |
| 2 Tenure | 9.56 | 8.95 | -.04 | 1 | | | | | | | | | | |
| 3 Age | 43.72 | 8.97 | .06 | .4 | 1 | | | | | | | | | |
| 4 Age squared | 1992 | 817 | .05 | .4 | .99 | 1 | | | | | | | | |
| 5 High school | 0.89 | 0.31 | .09 | .02 | -.05 | -.06 | 1 | | | | | | | |
| 6 Associates | 0.40 | 0.49 | .04 | -.04 | -.02 | -.02 | .29 | 1 | | | | | | |
| 7 Bachelors | 0.31 | 0.46 | .05 | -.04 | 0 | 0 | .23 | .82 | 1 | | | | | |
| 8 Post grad | 0.11 | 0.31 | .03 | -.02 | .05 | .05 | .12 | .42 | .51 | 1 | | | | |
| 9 State unemp. | 5.85 | 1.85 | -.47 | .03 | -.02 | -.02 | -.06 | -.02 | -.02 | 0 | 1 | | | |
| 10 1000 + emp | 0.37 | 0.48 | -.05 | .15 | .01 | .01 | .09 | .08 | .07 | .03 | .03 | 1 | | |
| 11 Unionization | 0.14 | 0.14 | -.26 | .19 | .03 | .03 | -.05 | -.14 | -.16 | -.1 | .14 | .2 | 1 | |
| 12 Import pen. | 0.19 | 0.38 | .07 | .02 | .01 | .01 | .03 | .05 | .05 | .02 | -.02 | .06 | -.09 | 1 |
| 13 Tech intens. | 0.01 | 0.02 | .07 | -.02 | -.01 | -.01 | .07 | .13 | .13 | .08 | -.04 | .07 | -.15 | .22 |

TABLE 1B: OVER TIME TRENDS IN MAIN INDEPENDENT VARIABLES

| year | Average by industry | | | Average by worker | | |
|------|---------------------|--------------------|----------------|-------------------|--------------------|----------------|
| | Unionization | Import penetration | Tech intensity | Unionization | Import penetration | Tech intensity |
| 1979 | 0.229 | 0.115 | 0.00275 | 0.274 | 0.136 | 0.00289 |
| 1983 | 0.180 | 0.135 | 0.00360 | 0.217 | 0.117 | 0.00430 |
| 1988 | 0.147 | 0.211 | 0.00476 | 0.173 | 0.145 | 0.00445 |
| 1993 | 0.135 | 0.230 | 0.00607 | 0.165 | 0.153 | 0.00491 |
| 1995 | 0.129 | 0.274 | 0.00607 | 0.145 | 0.186 | 0.00537 |
| 1996 | 0.122 | 0.330 | 0.00602 | 0.140 | 0.192 | 0.00512 |
| 1997 | 0.127 | 0.315 | 0.00753 | 0.144 | 0.209 | 0.00964 |
| 1998 | 0.112 | 0.326 | 0.00753 | 0.132 | 0.173 | 0.00825 |
| 1999 | 0.123 | 0.352 | 0.00753 | 0.135 | 0.186 | 0.00878 |
| 2000 | 0.111 | 0.393 | 0.00753 | 0.129 | 0.205 | 0.00917 |
| 2001 | 0.109 | 0.414 | 0.00753 | 0.126 | 0.204 | 0.00908 |
| 2002 | 0.104 | 0.488 | 0.00817 | 0.120 | 0.213 | 0.00899 |
| 2004 | 0.102 | 0.462 | 0.00812 | 0.108 | 0.196 | 0.00815 |
| 2005 | 0.099 | 0.494 | 0.00812 | 0.105 | 0.229 | 0.00879 |
| 2006 | 0.089 | 0.597 | 0.00813 | 0.102 | 0.238 | 0.00850 |
| 2008 | 0.091 | | 0.00812 | 0.104 | | 0.00878 |

Note: Average by industry includes one observation per industry per year. Average by worker includes one observation per worker by year.

TABLE 2: DETERMINANTS OF TENURE

| Employer size Sample Model | Time trends by employer size | | | | Effects of Industry Characteristics | | | | | Interactions with size | | |
|-------------------------------|------------------------------|------------------------|-----------------------|---------------------------|-------------------------------------|-------------------------|-------------------------|---------------------------|---------------------------|-------------------------|-------------------------|-------------------------|
| | All 1 | <25 emp 2 | 25-999 3 | 1000+ 4 | 1000+ 5 | 1000+ Tradable 6 | 1000+ Tradable 7 | 1000+ IT only 8 | 1000+ IT only 9 | All 10 | All Tradable 11 | All IT only 12 |
| Age | 0.537*** [0.0603] | 0.158* [0.0691] | 0.308*** [0.0575] | 0.938*** [0.0844] | 0.855*** [0.0763] | 1.036*** [0.118] | 1.037*** [0.118] | 0.938*** [0.0947] | 0.938*** [0.0947] | 0.482*** [0.0543] | 0.542*** [0.0805] | 0.481*** [0.0726] |
| Age squared | -0.00140* [0.000605] | 0.00198* [0.000810] | 0.00041 [0.000668] | -0.00475*** [0.000877] | -0.00399*** [0.000798] | -0.0049*** [0.00130] | -0.0049*** [0.00130] | -0.00453*** [0.000984] | -0.00453*** [0.000984] | -0.000895 [0.000549] | -0.000707 [0.000824] | -0.000594 [0.000710] |
| High school | 1.141*** [0.153] | 1.144*** [0.216] | 0.376* [0.180] | 1.627*** [0.252] | 1.403*** [0.237] | 1.557*** [0.335] | 1.557*** [0.335] | 1.517*** [0.292] | 1.519*** [0.292] | 0.990*** [0.144] | 1.146*** [0.180] | 1.063*** [0.163] |
| Associates | -0.923*** [0.133] | -0.261 [0.204] | -0.952*** [0.155] | -1.203*** [0.171] | -1.074*** [0.167] | -1.345*** [0.277] | -1.351*** [0.275] | -1.267*** [0.211] | -1.264*** [0.211] | -0.846*** [0.129] | -1.254*** [0.249] | -0.988*** [0.197] |
| Bachelors | -0.416** [0.127] | -0.158 [0.257] | -0.354* [0.170] | -0.545** [0.181] | -0.428* [0.177] | -0.909** [0.283] | -0.914** [0.284] | -0.542** [0.206] | -0.539** [0.207] | -0.308* [0.124] | -0.803*** [0.215] | -0.385* [0.167] |
| Postgrad | -0.877*** [0.224] | -0.339 [0.393] | -0.988*** [0.242] | -1.265*** [0.196] | -1.200*** [0.189] | -1.482*** [0.341] | -1.487*** [0.340] | -1.563*** [0.204] | -1.557*** [0.203] | -0.776*** [0.224] | -1.223*** [0.336] | -1.313*** [0.209] |
| State unemp | 0.101*** [0.0286] | 0.0254 [0.0321] | 0.0772** [0.0279] | 0.151*** [0.0394] | 0.127*** [0.0336] | 0.126* [0.0553] | 0.126* [0.0554] | 0.174** [0.0571] | 0.173** [0.0569] | 0.0837*** [0.0218] | 0.115* [0.0466] | 0.149** [0.0457] |
| 25-999 emp | 0.311* [0.158] | | | | | | | | | 0.186 [0.138] | 0.719* [0.314] | 0.392 [0.228] |
| 1000+ emp | 3.104*** [0.270] | | | | | | | | | 1.312*** [0.236] | 4.173*** [0.443] | 3.205*** [0.350] |
| Year | -0.0601*** [0.0103] | 0.0277* [0.0115] | -0.0260** [0.0100] | -0.133*** [0.0153] | -0.0595*** [0.0137] | -0.0971*** [0.0157] | -0.0997*** [0.0163] | -0.124*** [0.0151] | -0.123*** [0.0152] | -0.013 [0.00893] | -0.0425** [0.0132] | -0.0724*** [0.0131] |
| Unionization | | | | | 10.70*** [0.722] | | | | | 5.009*** [0.779] | | |
| Import pen | | | | | | | 0.314 [0.478] | | | | -0.445 [0.295] | |
| Tech intensity | | | | | | | | | -2.613 [3.413] | | | -12.33* [5.313] |
| 1000+emp * Unionization | | | | | | | | | | 7.522*** [0.771] | | |
| 1000+ emp * Imports | | | | | | | | | | | 0.322 [0.512] | |
| 1000+ emp * Tech intensity | | | | | | | | | | | | 6.5 [4.079] |
| Observations | 138612 | 36921 | 50447 | 51244 | 51244 | 19606 | 19606 | 33428 | 33428 | 138612 | 48656 | 88317 |
| R-squared | 0.222 | 0.171 | 0.164 | 0.276 | 0.305 | 0.311 | 0.311 | 0.285 | 0.285 | 0.244 | 0.272 | 0.24 |

Note: OLS regression. Errors clustered by industry. All models control for 24 occupation dummies.

*** p < .001; ** p < 0.01; * p < 0.05

TABLE 3: FURTHER ANALYSIS OF DETERMINANTS OF TENURE – LARGE EMPLOYERS ONLY

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----------------------------|---------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-------------------------|---------------------------|---------------------------|---------------------------|
| | All | All | All | Union mem | Non union | Union mem | Non union | Consistent ind. | Consistent ind. |
| Age | 0.877*** [0.0774] | 0.915*** [0.0873] | 0.818*** [0.0785] | 1.118*** [0.164] | 0.866*** [0.0765] | 1.057*** [0.156] | 0.825*** [0.0741] | 0.789*** [0.0803] | 0.788*** [0.0797] |
| Age squared | -0.00416*** [0.000812] | -0.00446*** [0.000908] | -0.00354*** [0.000821] | -0.00530** [0.00176] | -0.00459*** [0.000836] | -0.00473** [0.00167] | -0.00420*** [0.000809] | -0.00363*** [0.000785] | -0.00362*** [0.000778] |
| High school | 1.238*** [0.232] | 1.601*** [0.255] | 1.182*** [0.235] | 1.429*** [0.334] | 1.754*** [0.307] | 1.305*** [0.330] | 1.532*** [0.309] | 0.855*** [0.217] | 0.879*** [0.218] |
| Associates | -1.295*** [0.167] | -1.216*** [0.176] | -1.187*** [0.169] | -1.925*** [0.334] | -0.752*** [0.177] | -1.867*** [0.319] | -0.703*** [0.174] | -1.108*** [0.173] | -1.106*** [0.172] |
| Bachelors | -0.678*** [0.170] | -0.517** [0.187] | -0.548** [0.173] | -1.050** [0.378] | -0.514* [0.210] | -1.092** [0.387] | -0.449* [0.208] | -0.400** [0.141] | -0.399** [0.141] |
| Post grad | -1.264*** [0.199] | -1.186*** [0.209] | -1.124*** [0.202] | -1.343 [1.062] | -1.269*** [0.193] | -1.08 [0.959] | -1.243*** [0.195] | -1.204*** [0.173] | -1.203*** [0.173] |
| State unemployment | 0.128*** [0.0365] | 0.152*** [0.0399] | 0.118*** [0.0332] | 0.0881 [0.0544] | 0.131** [0.0413] | 0.0873+ [0.0487] | 0.120** [0.0377] | 0.0798** [0.0269] | 0.0765** [0.0269] |
| Year | -0.123*** [0.0139] | -0.119*** [0.0157] | -0.0610*** [0.0132] | -0.0515* [0.0247] | -0.127*** [0.0131] | 0.0201 [0.0239] | -0.0855*** [0.0131] | -0.0789*** [0.0134] | -0.0629*** [0.0140] |
| Industry wage premium | 8.322*** [1.026] | | 5.783*** [0.820] | | | | | | |
| Industry growth since 1979 | | -0.485*** [0.111] | -0.370*** [0.0697] | | | | | | |
| Unionization | | | 8.028*** [0.741] | | | 8.379*** [1.074] | 8.218*** [0.872] | | 3.149+ [1.797] |
| Industry Fixed Effects | | | | | | | | Yes | Yes |
| Observations | 51242 | 48410 | 48408 | 11476 | 37805 | 11476 | 37805 | 51017 | 51017 |
| R-squared | 0.295 | 0.286 | 0.319 | 0.342 | 0.242 | 0.363 | 0.256 | 0.217 | 0.218 |

Note: OLS regression. All analyses also control for occupation. Errors clustered by industry.

*** p < .001; ** p < 0.01; * p < 0.05

TABLE 4: DETERMINANTS OF UNIONIZATION

| Sample Model | All 1 | Tradable 2 | Tradable 3 | IT data 4 | IT data 5 | w/public firms 6 | Consistent industries 7 |
|----------------------------|--------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|-------------------------------|
| Age | 0.114*** [0.00679] | 0.101*** [0.00964] | 0.101*** [0.00986] | 0.105*** [0.00738] | 0.105*** [0.00736] | 0.110*** [0.00704] | 0.111*** [0.00679] |
| Age squared | -0.0011*** [7.52e-05] | -0.00088*** [0.000110] | -0.00088*** [0.000113] | -0.00093*** [8.22e-05] | -0.00093*** [8.20e-05] | -0.0010*** [7.78e-05] | -0.0010*** [7.57e-05] |
| High school | 0.283*** [0.0618] | 0.303*** [0.0703] | 0.302*** [0.0704] | 0.300*** [0.0777] | 0.306*** [0.0772] | 0.276*** [0.0667] | 0.280*** [0.0638] |
| Associates | -0.0556 [0.0474] | -0.0591 [0.0735] | -0.0568 [0.0735] | -0.0155 [0.0611] | -0.0119 [0.0615] | -0.0675 [0.0523] | -0.0578 [0.0495] |
| Bachelors | -0.358*** [0.0883] | -0.657*** [0.0858] | -0.658*** [0.0858] | -0.337** [0.112] | -0.330** [0.111] | -0.408*** [0.0985] | -0.356*** [0.0912] |
| Post grad | 0.0772 [0.186] | -0.501*** [0.137] | -0.499*** [0.136] | -0.00416 [0.157] | -0.00113 [0.157] | -0.114 [0.127] | 0.0639 [0.193] |
| Year | -0.0434*** [0.00345] | -0.0489*** [0.00413] | -0.0480*** [0.00421] | -0.0437*** [0.00398] | -0.0426*** [0.00398] | -0.0456*** [0.00360] | -0.0390*** [0.00358] |
| 25-999 emp | 1.139*** [0.0594] | 1.020*** [0.0659] | 1.017*** [0.0650] | 1.027*** [0.0489] | 1.028*** [0.0489] | 1.048*** [0.0422] | 1.122*** [0.0581] |
| >1000 emp | 1.890*** [0.105] | 1.746*** [0.122] | 1.742*** [0.124] | 1.673*** [0.103] | 1.679*** [0.103] | 1.803*** [0.0980] | 1.869*** [0.105] |
| Import pen. | | | -0.189 [0.163] | | | | |
| Tech intensity | | | | | -7.741 [3.992] | | |
| ROA (prior 3 years) | | | | | | 0.0311 [0.384] | |
| Industry growth since 1979 | | | | | | | -0.200*** [0.0524] |
| Observations | 282793 | 78626 | 78626 | 165557 | 165557 | 254126 | 260213 |
| Chi ² | 2864 | 2704 | 2745 | 3207 | 3282 | 3733 | 3237 |
| Log likelihood | -21688 | -8031 | -8028 | -12884 | -12869 | -19345 | -20587 |

Logit analysis. Dependent variable is whether worker is a union member. Contains all workers with tenure data, including women and those below 30 and over 65. Government workers, self employed and usually part time dropped from analysis. Errors clustered by industry *** p < .001; ** p < 0.01; * p < 0.05

TABLE 5: DETERMINANTS OF LAYOFFS

| Sample Model | All 1 | All 2 | All 3 | Tradable 4 | Tradable 5 | Tradable 6 | w/ IT data 7 | w/ IT data 8 | w/ IT data 9 |
|------------------------------|--------------------------|--------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Age | 0.0121 [0.0117] | 0.0173 [0.0113] | 0.00348 [0.0108] | -0.012 [0.0202] | -0.0123 [0.0203] | -0.0201 [0.0145] | 0.00234 [0.0180] | 0.00231 [0.0180] | -0.00833 [0.0143] |
| Age squared | -0.000259* [0.000129] | -0.000311* [0.000125] | -0.00015 [0.000120] | -0.00001 [0.000220] | -0.00001 [0.000221] | 0.00012 [0.000153] | -0.00014 [0.000197] | -0.00014 [0.000196] | -0.00001 [0.000156] |
| High school | -0.0127 [0.0285] | 0.0041 [0.0266] | -0.00674 [0.0322] | -0.0563 [0.0451] | -0.0572 [0.0443] | -0.0392 [0.0438] | 0.0125 [0.0449] | 0.0109 [0.0452] | 0.0081 [0.0582] |
| Associates | 0.0927** [0.0324] | 0.0909** [0.0321] | 0.0796* [0.0365] | 0.0774 [0.0577] | 0.0746 [0.0578] | 0.0569 [0.0598] | 0.101* [0.0437] | 0.0983* [0.0437] | 0.0124 [0.0572] |
| Bachelors | -0.0974* [0.0414] | -0.109** [0.0413] | -0.0999* [0.0438] | -0.0974 [0.0728] | -0.101 [0.0729] | -0.0982 [0.0672] | -0.116* [0.0580] | -0.119* [0.0579] | -0.147* [0.0610] |
| Post grad | -0.210** [0.0656] | -0.226*** [0.0673] | -0.214** [0.0667] | -0.015 [0.0820] | -0.0155 [0.0812] | -0.124 [0.0917] | -0.0699 [0.0574] | -0.0758 [0.0574] | -0.0506 [0.0602] |
| Year | -0.00195 [0.00376] | -0.00674 [0.00348] | -0.0082** [0.00291] | -0.00494 [0.00601] | -0.00537 [0.00504] | -0.00927* [0.00372] | -0.00138 [0.00421] | -0.00214 [0.00415] | -0.0142** [0.00439] |
| Unionization (current ind) | | -1.050*** [0.183] | | | | | | | |
| Unionization (initial ind) | | | -0.485* [0.224] | | | | | | |
| Import pen (current ind) | | | | | 0.220*** [0.0599] | | | | |
| Import pen (initial ind) | | | | | | 0.252*** [0.0705] | | | |
| Tech intensity (current ind) | | | | | | | 2.974*** [0.671] | | |
| Tech intensity (initial ind) | | | | | | | | 4.487*** [0.712] | |
| Observations | 230353 | 230353 | 225728 | 79473 | 79473 | 79292 | 129340 | 129340 | 126925 |
| chi2 | 531.4 | 718.5 | 638 | 938.6 | 981.2 | 1033 | 455.7 | 509.1 | 545 |
| Log likelihood | -25744 | -25691 | -24950 | -9445 | -9437 | -9955 | -14831 | -14825 | -14684 |

Logit analysis. Dependent variable is whether worker has been laid off within the last three years. “Current ind” refers to characteristics of industry laid off workers are employed by at time of survey. “Initial ind” refers to characteristics of industry laid off workers were employed by before layoffs. Industry remains same for all workers who were not laid off. All analyses control for occupation dummies. Errors clustered at industry level.

*** p < .001; ** p < 0.01; * p < 0.05

Figure 1: Changes in average tenure by organization size

Men from 30-65 only. Excludes government workers, self employed, part time and employment services industry



APPENDIX: MATCHING ACROSS CPS WAVES

The CPS surveys each household eight times, spread across 16 months. In order to build a data set that could test my hypotheses I had to match different waves of the CPS (Bureau of Labor Statistics 2009). I matched the tenure data to size data from the “March supplement” from 1992 onwards.

Unionization data was matched in using earnings supplements which each household answers twice.

Matching across waves of the CPS creates three problems. First, not all workers can be matched. In addition to workers who are interviewed for the last time in a given month, some respondents may not fill out later months’ surveys, perhaps because they refused, moved house, died, or could not be contacted (Madrian and Lefgren 1999). I found that around 80% of those eligible to match from one wave to another could be matched, consistent with prior work. Of particular concern is that this non-match rate might bias the results. I checked this by comparing time trends in tenure for those workers who could be matched to organizational size and those that could not. The time trends were extremely similar. I also checked whether match rates varied by organization size. Among the 2008 data, I did not find substantial variation in match rates across the different organizational size classes. It does not appear that failure to match across waves should introduce substantial biases.

The second problem is that some matches may be inaccurate due to recording errors in the CPS. Such mismatches are reasonably easy to detect by looking at changes in sex, or changes in age that cannot be accounted for by the passage of time. Using these metrics, I found that match rates were extremely good (errors of the order of 1-2%), with the exception of 2002 and 1995, where I found matching errors of around 10% (Madrian and Lefgren (1999) note, though, that at least some of these errors may be due to inaccurate recording of age and sex, rather than matching errors). All mismatches were dropped from the sample.

The third problem with matching workers’ details across waves is that it assumes that they remain in the same job throughout that time. Fortunately, the level of mobility for our sample is low enough to lead to very small levels of mismatches. Based on the distribution of tenure within the surveys (based on those waves where workers were asked how many days they had been in the current job), around 1.5% of

the sample should change jobs from one month to the next, and 2.5% of the sample should change jobs over the course of two consecutive months. In addition, many moves within the sample occur between firms of the same industry, further reducing mismatch (the data does not enable us to estimate the extent to which workers move between firms of similar size, but it is reasonable to assume that there is also some persistence in organizational size in moves across firms). I ran two robustness checks to assess the extent of this measurement error. First, I introduced analogous measurement error into the pre-1995 data (which was not matched), randomly assigning organizational sizes to 1.5% of the sample. The time trends for these robustness checks were extremely similar to those in the actual data. Second, I matched the April 1993 benefits data (which included both tenure and employer size in the same survey) with March 1993 data on employer size (these were the only overlapping sources of data on employer size). This exercise produced two parallel sets of 1993 data – one set that had employer size from the same survey, as with the other data before 1995, and one set that had employer size matched in from another survey, as with the post 1995 data. Examination of the time trends in mobility demonstrated no significant bias from this matching for the largest and smallest size categories.