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Productivity dynamics among union locals in the United States

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Abstract

Using panel data on union locals in the United States we examine the dynamics of the union sector, investigating the impact of inter-union competition on locals' productivity and survival. We find low entry rates, high exit rates and high levels of productivity dispersion in the sector. The entry of new locals is not associated with productivity improvements among incumbents but has a small negative association with locals' survival rates. These findings indicate that inter-union competition is not effective in raising productivity and the effects of creative destruction are weak, with these processes likely insufficient to stem the sector's overall decline.

KEYWORDS
business dynamics, competition, productivity, supply-side, survival, TFP, trade unions

JEL CLASSIFICATION
J5, L1, L2, L3

1 | INTRODUCTION

Union membership has been in decline in the United States for many years, as it has to varying extents in a number of developed economies (OECD, 2019; Schnabel, 2013). This decline has its roots in fundamental societal changes (Bryson et al., 2010) which, some argue, have resulted in a secular decline in worker demand for union representation (Farber & Krueger, 1992). Yet others contend that latent demand for unionization remains healthy (Bryson & Freeman, 2013; Kochan et al., 2019) such that union decline is, at least in part, a supply side problem, with unions unable to offer union services in a form suited to those who wish to pay for them.

Abbreviations: AFL-CIO, American Federation of Labor—Congress of Industrial Organizations; CATS, Case Activity Tracking System; CPS, Current Population Survey; CSA, Callaway and Sant' Anna; CZ, Commuting Zone; IT, information technology; LORS, Labor Organization Reporting System; NAICS, North American Industry Classification System; NAPFE, National Alliance of Postal and Federal Employees; NLRA, National Labor Relations Act; NLRB, National Labor Relations Board; NRLCA, National Rural Letter Carriers Association; OECD, Organization for Economic Co-operation and Development; OLMS, Office of Labor Management Standards; OLS, ordinary least squares; OP, Olley-Pakes; RTW, Right to Work; SEIU, Service Employees International Union; TFP, total factor productivity; TFPQ, quantity-based total factor productivity; TFPR, revenue-based total factor productivity; UAW, United Auto Workers.

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In the United States, this supply-side problem has a number of different, but interrelated causes. Repeated waves of industrial restructuring have eroded unions' traditional organizing grounds in manufacturing and led to employment growth in areas of the economy where successful organizing requires new tactics that are unfamiliar to many unions (MacDonald, 2014; Milkman, 2013). The institutional environment in which unions operate has also become more challenging, with an increasing number of states enacting "Right to Work" laws which make it more difficult for unions to collect fees from organized workers. Allied to this is a recognition that corporations are increasingly willing to expend substantial resources to thwart the organizing efforts of unions (Bronfenbrenner, 2009; Logan, 2006).

Recent empirical studies of the supply side of this market have tended to focus on the experiences of unions at the national level, examining the strategies and administrative practices adopted by different nationals (e.g., Clark et al., 2021; Katz et al., 2003; Krachler et al., 2021), the creation of new nationals (e.g., Chaison, 2010, 2018; Moody, 2009) and the financial performance of the sector (Masters et al., 2022). However, such studies give only a partial view of sectoral dynamics because most organizing activity occurs at workplace-level within union locals. A union local is a local branch of a national trade union, established to represent the union's members in a particular company or geographical area. From the perspective of business demography, they may be considered analogous to establishments (plants), and the national union to which they belong as analogous to the parent organization or firm.

Under the National Labor Relations Act (NLRA) system, union locals operating in the private sector must win workplace votes to achieve bargaining rights. Studies have examined the factors associated with the success or failure of organizing campaigns (e.g., Aleks, 2015; Farber, 2015; Ferguson, 2008; Fiorito & Jarley, 2010; Hickey et al., 2010), but little is known about the dynamics of the sector as a whole at the local level.

We contribute to the literature on the supply-side of unionization in the United States via an empirical study of industry dynamics and productivity among union locals. Using unbalanced panel data that unions are required to file to the Department of Labor (DOL) under the Labor Organization Reporting System (LORS), we observe almost all union locals in the United States over the period 2000–2022. We use these data to study the dynamics of the supply-side of the sector, focusing on the entry of new union locals into the marketplace, as well as their productivity, price-setting behavior and survival rates.

Our contribution is three-fold. First, we provide evidence on the dynamics of union local entry and exit over a period in which most union nationals in the US experienced a net decline in their number of locals. Aggregate trends give little insight into the process of market entry and exit within a sector (Haltiwanger, 1997), and we show how the net decline in locals has come about through low and declining entry rates, accompanied by relatively high rates of exit. We link these patterns to the particular features of the market for union representation.

Our second contribution is to go beyond these dynamics to analyze the performance of union locals. We highlight the characteristics associated with selection into and out of the market, and we explore the ability of incumbent locals to grow their membership. We regard membership as an important source of power and income for the local, and the recruitment and retention of members as an important intermediate output from union activity (see later discussion). We compare this measure of output across locals after accounting for the stock of human and capital resources at their disposal, seeing this as one measure of the local's productivity. In studies of commercial organizations, it is typical to find that the most efficient establishments in an industry are three, four or even five times as productive as the least efficient (Syverson, 2011, pp. 326, 327; Cunningham et al., 2022). There may even be substantial variance between establishments in the same firm (Griffith et al., 2006). We examine the scale of productivity dispersion in the union sector, and the extent to which differences in performance can be attributed to the national, the local, or features of the surrounding environment such as the region in which it operates.

Third, we explore whether competition between union locals acts as a driver for change within the sector. In the for-profit sector, competition is typically encouraged as a disciplinary mechanism to improve consumer welfare and economic efficiency. Empirical studies of market structure confirm that increased levels of competition discourage rent-seeking by encouraging firms to set prices that reflect costs, to the advantage of consumers. Studies of for-profit enterprises also confirm theoretical expectations that increased competition results in the reallocation of productive resources to more efficient producers as the least productive exit; incumbents also increase their productive efficiency in response to competition, for instance by adopting new technology (Ackigit, 2023; Syverson, 2011). In the union sector, however, the collective strength of the labor movement is often seen as a means of improving worker welfare. Competition between unions may damage the degree of unity and co-operation within the movement, as well as wasting resources which could otherwise be committed to advancing its collective interests.

Consistent with studies of other economic sectors, we find that locals entering the market have lower prices and higher total factor productivity (TFP) than incumbents. However, in a departure from many markets, the entry of new

locals does not lead incumbents with similar jurisdictions to raise their productivity. There is also little evidence that existing locals respond by lowering prices, possibly because of governance arrangements which limit their flexibility in this regard. Entry does negatively affect incumbents' survival rates, however. We lack a source of exogenous variation in competition, and so our results are descriptive rather than having a causal interpretation. Nevertheless, they indicate that a process of creative destruction exists in the union sector, although its effects have been insufficient to stem the sector's overall decline.

Our findings are consistent with productivity dynamics in a "cost-disease" sector where it is difficult to drive down operating costs because the labor input of service delivery is hard to reduce (see Willman et al., 2020, for a discussion). Technological change has played a relatively small role in service delivery in the union sector to date, although this is now beginning to change (Geelan, 2021). Our findings also provide policy-relevant insights into the operation of a sector where the regulations governing union organizing and the collection of union dues create high barriers to entry, where union federations dissuade unions from competing over members, and where unions' own systems of governance typically limit flexibility over prices.

The remainder of the article is organized as follows. We first discuss the market for union representation, consider the broader literature on business dynamics and productivity, and set out the propositions we test regarding the role of competition. We then introduce the data and estimation techniques. Results are then presented before we finally conclude.

2 | THE MARKET FOR UNION REPRESENTATION

Union membership has been in decline in the United States for many years. Longitudinal data from the Current Population Survey (CPS) shows that total membership fell from 16.8 m in 1990 to 14.3 m in 2022 (a decline of 15%) (Hirsch et al., 2023). In the private sector, membership fell from 10.3 to 7.2 m (a decline of 30%). These declines took place against the backdrop of rising employment, with union density (the share of workers who are union members) falling from 16.0% to 10.1% overall, and from 11.8% to 6.0% in the private sector (Hirsch et al., 2023).

At the heart of this marketplace are trade union locals. Each union local belongs to a national union, which operates as a taxable non-profit entity. Some locals represent the employees at a specific workplace (e.g., a factory or warehouse in a given town); others represent employees from a number of workplaces in their local area.

New locals enter the market when a national successfully extends its organizing activity. One route is through green-field organizing, whereby a union gains bargaining rights in a firm with no prior unionization. If the union can demonstrate majority support among the workforce, the employer can choose to recognize the union voluntarily. Otherwise, a union that can persuade at least 30% of employees in the proposed bargaining unit to sign a request for union representation can submit a petition to the National Labor Relations Board (NLRB). The union is awarded bargaining rights if it wins the resulting election. A second route is for a union to supplant another in a re-election contest, with workers switching their allegiance. Under either route, the newly-organized workers may be absorbed into an existing local, though in some cases a new one may be set up to represent them. The union's decision whether to enter a new local into the market place will be guided to some extent by the likely ratio between income and representation costs, since the anticipated dues and agency fees received from newly-represented workers should exceed the marginal costs of setting up the new local if it is to be financially viable (Farber, 2015).

Re-election contests may, of course, also lead to the exit of locals from the market, if the defeated union decides that the local is no longer viable. Locals may also exit if the demand for union representation declines among the workforce in an establishment where it organizes, and the union is de-certified, and also if economic or organizational restructuring causes the establishment where it has bargaining rights to close. It is difficult to get a full sense of the relative importance of these different mechanisms. Evidence from NLRB suggests that direct election contests are rare, but these are only likely to take place when both unions have considerable sunk investments and an even chance of winning.

Entry and exit are important features of most markets. Empirical evidence from firm-level data shows substantial rates of entry and exit in a wide range of industries across many countries (Bartelsman et al., 2004). Such business dynamics are linked to a process of creative destruction and, typically, represent the outcome of product market competition or rivalry (Ackigit, 2023). Where firms are free to enter alongside others in the market and compete, one tends to see reallocation from less to more-efficient producers associated with a gradual process of innovation, which

tends to generate better value for consumers in the medium-term (Syverson, 2011). Where there are barriers to entry, firms stagnate with negative implications for productivity, price competition and consumer welfare.

Much of this existing evidence comes for studies of profit-maximizing firms. How might the union objective function differ? Orthodox union models contend that a union is primarily concerned to maximize the economic welfare of its members, which is typically seen as an increasing function of members' wages and employment and, in some models, as a decreasing function of members' effort on the job (see Booth, 1995, pp. 82–119; Pencavel, 1991, pp. 54–94). Such outcomes are achieved by negotiating with employers over members' terms and conditions and supporting members in individual disputes. The local may also lobby policy-makers to bring about a more favorable economic or political environment that will benefit its members, such as an increase in the state minimum wage. In both cases, bargaining power relies on the union's representative legitimacy and monopoly power. Both are an increasing function of membership density, and so membership maximization is an important secondary objective for the union under this perspective (Pencavel, 1991, p. 57).

Those departing from an orthodox approach have emphasized the primary importance to unions of organizational survival and growth (e.g., Ross, 1948, p. 16; Dunlop, 1944, p. 43). Here, unions' prospects are partly a function of the attractiveness of the union, which again increases with the economic welfare gains it can offer to members. But the union has an incentive to moderate its wage or employment demands in order to extend the lives of unionized firms. This helps the union to survive by ensuring that the flow of dues from the firm continues into the future. It also has an indirect effect on union survival by generating a continuous flow of revenue to finance organizing drives. These insights, which are encapsulated in Kremer and Olken's (2009) biological model of unions, suggest that membership and revenue are important primary objectives for the union's leadership, alongside members' welfare. Reducing unit costs is also an important union objective since it improves the financial viability of the local.

Under both perspectives, the union has an interest in finding ways to become more efficient. Ultimately, if the revenue from membership dues and agency fees is insufficient to support the costs of representation, the local will be financially non-viable and will be forced to close or merge.

The union sector has a number of important environmental and institutional features when it comes to considering the role of dynamics and competition, however. Employees may belong to any union of their choosing (or none at all), but the NLRA's sole-agency provision creates a local monopoly for a union after it wins a representation election, with members paying dues to the union and (in states that do not operate “Right-to-Work” laws) non-members paying an agency fee for representation. Another union might try to supplant the incumbent, but this requires significant coordination since at least 30% of the employees in the bargaining unit must sign cards or a petition asking the NLRB to conduct an election. The raiding union must also expend resources to compete in the election, the outcome of which is necessarily somewhat uncertain. The switching costs are therefore onerous, both for locals and employees. The main union federation, the American Federation of Labor—Congress of Industrial Organizations (AFL-CIO), also seeks to dissuade competition for organized workers via a “no-raiding” rule which requires affiliates to refrain from raiding the established bargaining relationship of any other affiliate (AFL-CIO, 2022, Article II, Section 9). Raiding is dissuaded as it is seen as detrimental to the wider union movement, in which members share common goals and strategies. Not all unions are affiliated to the AFL-CIO however, and in view of the declining market, it is possible that affiliates may prioritize their own survival at the expense of other locals.

It is also the case that many workplaces in the United States are unorganized. The NLRA sole-agency provisions mean that a successful organizing campaign can create a semi-protected source of revenue into the near future (see Farrell & Klemperer, 2007) but, whilst demand is notionally high (Bryson & Freeman, 2013; Kochan et al., 2019), encouraging workers to organize is not easy. As Bryson and Gomez (2003) have indicated, union representation is an experience good, the quality of which is difficult to determine ex ante. And winning elections in new territories—often in the face of employer resistance—has proved to be extremely challenging. Employers engage in a range of activities to dissuade employees from organizing, including meeting or corresponding with employees to highlight the perceived downsides of union representation, and banning union organizers from communicating with workers at the worksite (McNicholas et al., 2019).

Nevertheless, some unions have succeeded in forming new locals to represent significant numbers of previously-unorganized workers in industries such as hospitality, logistics, and cleaning (Kochan et al., 2023; Milkman, 2013). Where these locals have led, others have followed, sometimes leading to turf wars, in spite of the existence of AFL-CIO provisions designed to avoid jurisdictional disputes (AFL-CIO, 2022, Article III, Section 8).[1]

The preceding discussion focuses on competition for membership. However, the entry of new locals into the marketplace can also create indirect competition for resources. In the case of union locals, this may involve competition for talented organizers or business agents, or competition for financial resources to support organizing.

What outcomes are likely to accompany these processes in the union sector? A large literature examines market dynamics in the for-profit sector, primarily in manufacturing (Criscuolo et al., 2003; Foster et al., 2008, 2016; Griffith et al., 2006; Hsieh & Klenow, 2009; Klepper, 1996, 1997, 2002; Syverson, 2004a, 2004b). A number of empirical regularities have emerged from this literature.

First, new entrants tend to have higher physical productivity than incumbents, but charge lower prices; as a result, they tend to have little or no advantage in terms of revenue productivity (Foster et al., 2008). Foster et al. (2016) argue that entrants set prices low in order to build future demand, taking a hit on current profitability in expectation of future profits. Indeed, low prices are found to be a particular feature of entry in markets with high switching costs, where penetration pricing or introductory offers are prevalent as a means of attracting new customers (Farrell & Klemperer, 2007). Incumbents may respond to low-priced entrants by lowering their own prices, leading to price wars (Farrell & Klemperer, 2007).

Union locals set prices low on entry by typically not requiring newly-organized workers to pay membership dues until the first bargaining contract is signed with the employer. Beyond that, locals usually have some freedom to set the level of dues in response to changes in their local environment, but this autonomy is usually limited by their union's constitution which often specifies a minimum rate that can be charged. The local is then free only to charge above that limit.[2] Price changes must also sometimes be agreed by a majority vote of members in the local. The price of union membership can be expected to be a relevant factor for potential union members, since rational-choice theory suggests that employees will only join the union if they consider that the benefits outweigh the costs. Indeed, most unions present prospective members with information explaining the benefits of union membership and how these benefits are dependent on dues from members.[3] But the degree of price flexibility exhibited by established union locals when competition increases is open to question, for the reasons discussed above.

A second empirical regularity in for-profit sectors is that increased competition leads to productivity improvements among surviving firms (Backus, 2019). For unions, this competition may come from other unions or from employers. There is only limited evidence as to *how* incumbents improve their productivity in response to competition, but studies point to mechanisms such as investments in new products or services, investments in new technology, and investments in management practices (Bloom et al., 2019; Schmitz, 2005). In the union sector, a local might switch to a different set of organizing strategies and tactics, as seen in Mareschal's (2006) study of the Service Employees International Union (SEIU)'s efforts to organize home care workers. However, there may be organizational constraints on the extent of local innovation, with strategy often determined at the center, and members liable to oppose any redirection of resources which emphasizes new organizing at the expense of servicing their own needs (MacDonald, 2014, p. 736). A local must also be able to call on institutional knowledge of alternative strategies: Milkman (2013) argues that industrial unions in the US found it difficult to adapt to new circumstances in the 1970s because they did not have the broad strategic repertoire of unions such as SEIU. There is some evidence of investments in new technology in the sector (Geelan, 2021), but this is relatively recent and some have argued that opportunities to improve unions' productivity via capital-labor substitution are limited overall (Willman et al., 2020).

In terms of management practices, unions vary greatly in terms of the relative amounts spent on administration and compensation (Masters et al., 2022, p. 9). A specific local might seek to become more efficient by cutting administrative costs or streamlining processes. Such strategies are particularly contentious in the union sector because it has been argued that the democratic nature of unions causes administrative efficiency to undermine representative effectiveness (Child et al., 1973); improving democracy may be promoted as an alternative means of improving union outcomes. However, recent empirical evidence suggests that administrative efficiency and representative efficiency can complement one another (Clark et al., 2021).

A third empirical regularity from for-profit sectors is that higher competition leads to higher rates of exit. Competition between producers leads to the reallocation of market share toward more efficient (i.e., lower-cost) establishments. This causes relatively high-cost establishments to shrink, raising the likelihood that they will leave the market. High entry rates thus tend to go hand-in-hand with high exit rates (Disney et al., 2003). In this process of Darwinian selection, those establishments that cannot adapt will fail, if allowed to do so. But whether the probability of exit among union locals is exacerbated by competition from other unions is not clear. The price inflexibility and difficulties of innovating discussed earlier may make locals vulnerable to exit where competition exists. And some have argued that inter-union competition may be particularly destructive in the union sector because it undermines

solidarity, ultimately making unions less effective and harming their chances of survival (Steppan-Norris & Southworth, 2010). However, we have already raised questions as to the strength of competitive pressures in the face of high switching costs. And in the union sector, it may even be the case that new entrants can give force to claims of institutional standing—building legitimacy for union representation in the local area—and may also provide economies of scale by widening the base of experience and knowledge (see Hannan & Freeman, 1988, p. 28).

Based on the theory and empirical evidence discussed above, we anticipate the following productivity dynamics to be at work. First, we anticipate new entrants to the sector will have greater TFP and lower prices than incumbents. Second, increased competition from new entrants will result in incumbents responding through increases in TFP. Third, entry will lead to exit. However, we anticipate that these responses may be more muted in the union sector than in some other industries. And for this reason, we hypothesize that the sector will be characterized by relatively high levels of productivity dispersion.

3 | DATA AND EMPIRICAL STRATEGY

3.1 | The union dataset

Our data are the LORS for the period 2000–2022. The LORS data are a product of the Labor-Management Reporting and Disclosure Act of 1959 (also called the Landrum-Griffin Act). The legislation requires labor organizations representing private sector employees, federal employees or postal employees to report annually to the DOL detailed financial information about their organizations.[4] Labor organizations representing only state or local government employees are not covered by the legislation and so are not included in the LORS data. Unions covered by the regulations are required to report information to varying degrees, depending on the value of their receipts. All must report basic identifying information (form LM1). Those with annual receipts of less than $10,000 must report their total membership, and the total value of their assets, liabilities, receipts and disbursements, including the sum of payments to staff (form LM4). Those with annual receipts of $10,000-$249,999 must additionally list their officers, and provide further detail on their assets, liabilities, disbursements and receipts, including the specific amount collected in dues (form LM3). Those with annual receipts of $250,000 or more are required to itemize these elements in even greater detail (form LM2). The data are publicly available and have previously been used by Holmes and Walrath (2007), Wilmers (2017) and Masters et al. (2022).

The LORS data include filings from organizations at the national level (e.g., International Brotherhood of Teamsters) and local level (e.g., Teamsters Local 125, representing members in Wayne, New Jersey). We use data on locals only. Each local is assigned a permanent unique identifying number, which enables individual locals to be tracked over time. Our final dataset contains data on 21,714 different locals, generating 341,848 local $\times$ year observations with union membership data. This corresponds to an average of 14,863 locals per year. The LORS data identify the national to which each local belongs, and the locality in which they are chartered to operate. Full details about the data and the approach we have taken to data cleaning are provided in Appendix S1.

We use the full set of LORS returns to chart trends in union membership. The LORS series shows higher membership than the CPS private sector series (Figure 1), but lower membership than the CPS "all employee" series. The LORS may diverge from the CPS private sector series in levels because a union that represents both private sector and state or local government employees will report on its total membership, and also because LORS data may include retired members. Both series show a declining trend in membership, but this is less pronounced in LORS than in the CPS.

The union locals are viewed as a set of suppliers, all acting in a single industry, in the sense that they are all producing the same type of good (union representation) purchased by customers (union members) through the payment of membership fees (dues). But like car manufacturers, banks or grocery stores they are supplying heterogeneous consumers and hence not all are competing in exactly the same market. Their competitors come from within the industry (other unions) and, perhaps, from those supplying competing goods.[5] We discuss the measurement of competition later.

Union locals may differentiate themselves from one another in the good they offer in terms of price and quality. Although we observe prices, we do not observe quality differentials. However, quality variation between producers or service providers is a common feature of most markets. Furthermore, in our empirical analysis of competition, we investigate within-local changes to productivity, so union local fixed-effects will capture the time-invariant component of quality differentials.

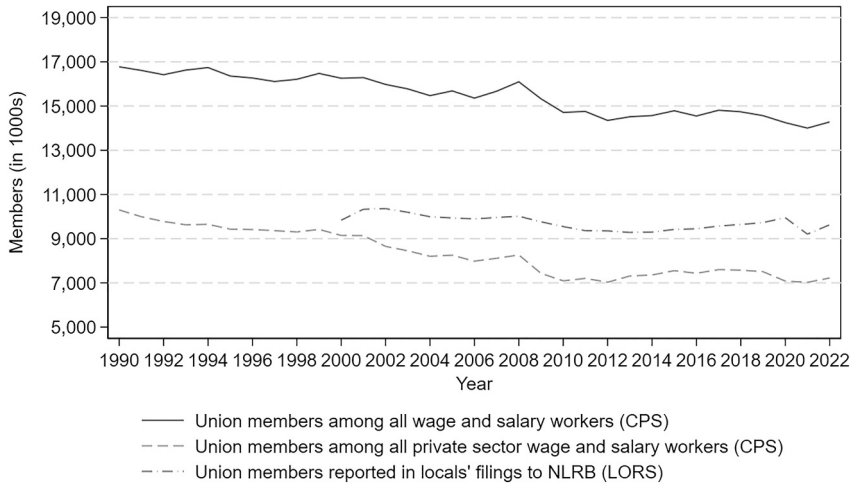

FIGURE 1 Aggregate union membership numbers in the U.S., various sources. The series from the Labor Organization Reporting System (LORS) only includes membership reported by local unions (desig_name = "LU") who also report employment. Unions that do not have locals (such as the Boilermakers) and those who do not report employment are not included. See Appendix S1 for further details. Source for Current Population Survey series: Hirsch et al. (2023).

3.2 | Measures of business dynamics

A local × year observation is identified as an entrant if, in that year, the local is appearing in the dataset for the first time. Exits are identified through either one of two routes. The first route identifies declared exits. When a local ceases to exist, it is required to file a "terminal financial report" within 30 days after the date it ceases to exist. We define a local × year observation as an exiter via this route if the local is present in the data in year t but reports in year $t + 1$ that it has been terminated. We expect that some locals may fail to report their termination and so we also utilize a second route in which we count as exits those instances in which the local appears in year t but does not appear in both years $t + 1$ and $t + 2$. Requiring a local to be absent at $t + 1$ and $t + 2$ under this route avoids the risk of counting as exiters those who are simply missing for 1 year. Exits coded via either of these two approaches are combined to create a single indicator. Across the series, 37% of exits are identified via declared terminations, with the remaining 63% identified via the disappearance of the local from the panel.

3.3 | Measures of productivity

We measure a local's output using two alternative measures, namely its total revenue and the number of members recorded as belonging to it. The existing literature typically measures output only via revenue. This makes it difficult for analysts to identify links between competition and productivity due to the confounding effect of price adjustment. Whereas competition will increase the incentive for producers to increase the efficiency with which they produce a single unit of output it will also limit the scope for providers to raise prices. In less competitive environments producers have opportunities to raise prices, thus increasing revenue with no corresponding increase in output efficiency (Bartelsman & Doms, 2000, p. 8).

The output (i.e., revenue or membership) that is generated via the utilization of locals' labor and capital inputs is one measure of operating performance which indicates the local's capacity to make progress on its overall strategic objectives. More specifically, it indicates the organization's ability to use its capital and human resources (its inputs) to generate an income stream that will enhance its ability to offer quality services. It can be viewed as one crucial aspect of its financial performance. It is certainly not a comprehensive measure of the local's performance, for the reasons outlined earlier, and so we use the term "intermediate productivity" as a shorthand.

The measurement of "intermediate productivity" is a common feature of performance management in non-profit businesses (Lee & Nowell, 2015), typically being viewed as one integral part of a balanced scorecard (Kaplan, 2003). In the union case, this balanced scorecard is likely also to include measures such as the number of members receiving assistance, or levels of member satisfaction, as well as the extent to which the union's bargaining activities have

improved members' terms and conditions. An holistic appraisal of union performance would likely take all of these factors into account.[6]

Our preferred productivity measure is the number of members recorded, or the amount of revenue generated, for a given amount of capital assets and human resources. This is termed "total factor productivity" (TFP) in the literature. A standard Cobb-Douglas production function is commonly used to estimate TFP (Syverson, 2011). In the basic Cobb-Douglas specification, ordinary least squares (OLS) regression is used to regress ln(output) on ln(capital inputs) and ln(labor inputs):

$$\ln(y_{it}) = a_0 + a_1 \ln(K_{it}) + a_2 \ln(L_{it}) + e_{it}, \quad (1)$$

where y_{it} is the number of members attached to local i in year t, or its revenue, L_{it} the number of employees of the local, and K_{it} its capital (measured as the book value of all fixed assets, cash, investments etc). The establishment-specific component of logged TFP at time t is then contained within e_{it} (since a_0 is common across all locals and years). Here, the employees of the local may include organizers, who recruit new members and deliver front-line services to incumbents, along with specialist support staff (e.g., legal advisors) and back-office staff (e.g., accountants, IT support and so on). Capital may include fixed assets (e.g., office space and office equipment) and cash.

In the literature, this basic equation is sometimes augmented by specifying different types of capital or labor inputs, or by identifying factors which contribute to the variation in e_{it} across establishments. These may be internal (e.g., forms of intangible capital) or external (e.g., aspects of the market in which it operates). We do not do that in our estimation of Equation (1), though we do report later on the correlation between TFP and certain characteristics of the local and its surrounding area. Furthermore, we ignore intermediate inputs such as materials or electricity as most locals in our data do not report it. As locals provide services rather than transforming an intermediate good into a final one, ignoring intermediate inputs should not be a problem; indeed, those locals that do report it in their annual accounts typically cite very small amounts.

Missing values regarding the number of employees or capital mean that we can fit the OLS production function for 230,520 local × year observations out of the aforementioned 341,848 for which we have non-missing membership information. Smaller locals (those with annual receipts of less than $10,000) are not required to report employment figures and so only a minority of the observations from these locals can be retained for the production function estimation (120 out of 93,629). Larger locals (those with annual receipts of $10,000 or more) have more extensive reporting requirements and, among the 248,153 local × year observations deriving from these larger locals, 230,130 (around 93%) have complete information. Our results should then be taken as representative of these larger locals which, together, account for 96%–97% of total membership in the LORS depending on the year.

In the OLS specification, we see that returns to scale are slightly decreasing ($a_1 + a_2 < 1$) and that labor accounts for a larger share of output than capital ($a_2 > a_1$) (Table 1, Model 1). We check for robustness by restricting the sample to relatively large locals (those with annual receipts of $250,000 or more) for which inputs may be measured more accurately (model 2). The relative importance of capital for output is lower in large locals in this more restricted sample.

In estimating TFP, it is well known that OLS estimation of firm-level production functions introduces simultaneity and selection bias. As an alternative, we implement a variant of the Olley and Pakes (1996) approach (OP hereafter), which uses investment as a proxy for unobserved time-varying productivity shocks and incorporates survival probabilities to address selection problems. We do not employ a measure of capital investment, as is conventional in the literature, but instead follow Wilmers (2017) in viewing unions' spending on activism as an appropriate proxy for unions' investment in future returns. In common with Wilmers, we use the LORS data to derive a value for each local's annual expenditure on activism, calculated as the residual after subtracting spending on routine administration activities from total annual expenditure. We take logs and use the once-lagged value of activism spending as the proxy for unobserved productivity shocks. Survival is measured using the exit indicators discussed earlier. Our estimation sample for this approach is similar to that used in model (2) in Table 1, since detailed expenditure data is only available for unions completing LM2 returns, but we lose some additional observations through the use of lags and the restrictions imposed by the measurement of exit. Column 3 of Table 1 shows the estimated OLS coefficients on this sample. The Olley-Pakes (OP) coefficients in column 4 are similar to those shown in column 3, and estimates of TFP generated via the OLS and OP approaches are highly correlated with one another ($r = 0.89$). The results of later analyses which focus on TFP are similar whichever measure is used.

To highlight the advantage of having data on quantities, we also fit production functions with output measured in terms of revenue, as usually done when output is not directly observed (columns 5–8 of Table 1). We see that the

TABLE 1 Union locals' production function.

	Y = log(membership)				Y = log(sales)			
Dependant variable	**OLS (1)**	**OLS (large locals only) (2)**	**OLS (Olley-Pakes sample) (3)**	**Olley-Pakes (4)**	**OLS (5)**	**OLS (large locals only) (6)**	**OLS (Olley-Pakes sample) (7)**	**Olley-Pakes (8)**
Log assets	0.415	0.219	0.210	0.182	0.627	0.454	0.444	0.421
	(0.001)	(0.002)	(0.003)	(0.021)	(0.001)	(0.002)	(0.002)	(0.018)
Log employment	0.518	0.747	0.767	0.476	0.492	0.551	0.565	0.267
	(0.003)	(0.005)	(0.005)	(0.015)	(0.003)	(0.004)	(0.0044)	(0.012)
Constant A	0.671	7.112	7.673	21.617	31.688	440.652	489.402	800.245
	(0.008)	(0.209)	(0.237)	(0.047)	(0.403)	(11.148)	(12.876)	(1.895)
Observations	230,250	81,801	74,071	74,071	213,844	81,359	73,602	73,602
R-squared	0.624	0.422	0.428	NA	0.727	0.604	0.612	NA

Note: Standard errors in parentheses. Large locals are those with annual receipts of $250,000 or more.

contribution of labor is lower relative to capital when using data on revenue, indicating that capital-labor ratios are correlated with price differentials across the sector.[7] The changes in estimated coefficients when output is not measured in terms of units sold highlight the value of using the quantity of units sold to avoid confounding productivity differences with price effects. Foster et al. (2008) find important differences between revenue and physical productivity in a range of manufacturing industries. Studies of service industries are less common (though see Morikowa, 2019).

3.4 | Changes in the competitive environment

To test the link between the degree of competition and market dynamics, we investigate how locals' productivity, pricing and probability of exit respond to the entry of new locals into their vicinity. We measure the entry of new locals for each year at Commuting Zone (CZ) level. CZs are geographic units of analysis intended to closely reflect the local economy where people live and work. There are 741 CZs in our classification. Further information on the allocation of locals to CZs is provided in Appendix S1.

We estimate the effect of competition on various outcomes using the following empirical model:

$$y_{ict} = \alpha \text{Entry}_{ct} + \gamma X'_{zt} + \theta_i + \varphi_t + \epsilon_{ict}, \quad (2)$$

where y_{ict} is the outcome of interest (price, TFP or exit) in local i, observed in CZ c at date t. Entry_{ct} is a dummy to indicate the entry of one or more new locals in CZ c at date t, taking the value one in year t and zero otherwise. X'_{zt} are time-varying controls at the zip-code level that include proxies for demand (see later). θ_i is a local fixed effect that controls for time-invariant characteristics of the local, φ_t are year dummies to control for general, time-varying factors and ϵ_{ict} is the error term.[8] All models are estimated via OLS.[9]

Not all entrants provide incumbent locals with direct competition for members. Some unions have specific jurisdictions, organizing only in a particular set of sectors or occupations. All entrants may, however, be competing for scarce resources. We therefore adopt two alternative measures of entry.

The first measure considers all entrants into a particular CZ and so allows for resource competition between locals of all types. We include entrants of all sizes, rather than restricting our measure to the larger locals for which we can estimate TFP, since many locals will start out small and we wish to include all potential sources of entry competition for incumbents. Since entry is relatively uncommon, we measure it with a simple dummy variable identifying the entry of any new local into the CZ within the year. We do not count the total number of entrants. Overall, 11% of CZs see at least one entrant in a given year (see Appendix S2: Table B1).

The second measure of entry considers only those entrants that we judge likely to provide direct membership competition for incumbents. Identifying jurisdictions is challenging because unions have different ways of defining their area of activity. The union's name is sometimes uninformative (e.g., UNITE HERE) and many unions have

engaged in jurisdictional creep away from their core areas, sometimes via merger.[10] Unions' websites do not provide information on the union's jurisdiction in a systematic way. To meet this challenge, we use data from NLRB elections to identify the sectoral dimension of national unions' jurisdictions. In our view, a sectoral approach is the only feasible means of categorizing union jurisdictions systematically at scale. We use data from the NLRB's Case Activity Tracking System covering the period 1999–2011 (Ferguson, 2016). For each representation election, the dataset identifies the unions involved and also the industry sector of the firm in which representation is being sought.[11] Using these data, we are able to build an indicator of the industry sectors in which each national union is active. We measure the share of its NLRB cases that occur in each sector of the North American Industry Classification System (NAICS). An individual local may not necessarily organize workers across all of those sectors covered by the national to which it belongs, but we interpret the share of elections that national union n has in a given industry sector j as the probability that local i from union n organizes workers in sector j (p_{inj}). The product of these probabilities is computed for each entrant-incumbent pair, thus providing an estimate of the probability that they have the same jurisdiction and thus are notionally competitors.[12] We test the sensitivity of the measure to alternative levels of industry disaggregation. Where there is no industry overlap between the two unions, this continuous variable necessarily takes the value of zero and the entrant is ignored. In this measure, we also ignore entrants belonging to the same national as the incumbent local. In other words, we consider that locals do not compete for members with other locals from the same national.

The NLRB election data is somewhat partial. As noted earlier, some establishments are organized as a result of a majority sign-up (or "card check"); there is then no need for an NLRB-supervised election. In addition, public sector employees are not covered by the NLRA, so unions that organize exclusively in the public sector do not feature in the NLRB election data. However, we are able to impute a sectoral jurisdiction for some public sector unions that appear in the LORS data (e.g., the National Alliance of Postal and Federal Employees and National Rural Letter Carriers Association postal unions).

3.5 | Confounding factors

In our analytical framework, we would ideally identify the effects of competition via the exogenous entry of new locals into the CZ, that is, entry that occurs for reasons that have nothing to do with incumbents' payoffs or strategies. However, we have no source of exogenous variation in entry rates and no feasible instruments. We control for factors that may be correlated with the propensity for a union to set up a new local, insofar as we are able, by including variables that can capture changes in the total demand for unions in each county: log of total employment, log of labor cost per employee, number of establishments, and average establishment size. These data were retrieved at ZIP-code level from the website of the US Census Bureau (2020) and aggregated to county-level for the purposes of analysis. When matching these data with our main dataset we recover those variables for about 90% of our observations. These variables attempt to capture variations in the demand for unions: the more employees, the more unions can have members; higher wages may lower the demand for union representation (unless unions are seen to have influenced recent wage increases); larger establishments are expected to raise the opportunities for collective action; whilst a high number of establishments may either provide additional opportunities for new organizing or reduce demand for unions by fragmenting the labor force. As noted above, the objective is to make sure that variations in entry are not indirectly capturing changes for product demand in the area. Another potential source of unobserved heterogeneity, which we do not control for, is a local strike wave, which may lead to membership growth and the entry of new locals. In the absence of an exogenous source of variation in entry rates, our results are descriptive rather than having a strict causal interpretation.

4 | RESULTS

4.1 | The dynamics of the union sector

There is a high degree of stability in the union sector. Each local is present for an average of 15.7 years over the 23-year period of observation. Fifty-four percent of locals are present in all 23 years. But consistent with Klepper's (1996, pp. 572, 573) assertion that the total number of firms declines as industries mature, the number of locals in the data set has fallen by 37% since 2000 (Table 2, column 2). Further analysis indicates that this sharp decrease in the number of locals has affected almost all large unions. The decline in suppliers is larger in relative terms than the decrease in union

TABLE 2 Entry, exit and mean growth of locals 2000–2022.

Year (1)	Number of locals (2)	Number of entrants (3)	Number of exiters (4)	Entry rate (5)	Exit rate (6)	Number of members (,000s) (7)	Members in entrants (,000s) (8)	Members in exiters (,000s) (9)	Annual change in membership (,000s) (10)	Net change from exit at $t-1$ and entry at t (,000s) (11)	Net change among continuers (,000s) (12)
2000	12,338		285		0.023	9863		134			
2001	12,392		336		0.027	10,375		105	512		
2002	12,193	119	328	0.010	0.027	10,402	204	106	27	98	−71
2003	11,930	76	297	0.006	0.025	10,331	94	104	−71	−11	−59
2004	11,522	79	297	0.007	0.026	10,070	43	282	−260	−61	−199
2005	11,274	78	261	0.007	0.023	10,051	229	119	−18	−52	34
2006	11,071	49	274	0.004	0.025	10,025	49	227	−25	−69	43
2007	10,807	49	256	0.005	0.024	10,046	303	186	20	75	−55
2008	10,552	68	198	0.006	0.019	10,130	128	114	84	−57	142
2009	10,272	37	229	0.004	0.022	9853	48	134	−277	−65	−212
2010	9955	38	274	0.004	0.028	9559	54	236	−293	−80	−213
2011	9837	61	209	0.006	0.021	9402	98	69	−156	−137	−19
2012	9667	65	203	0.007	0.021	9326	61	92	−75	−7	−68
2013	9495	39	177	0.004	0.019	9448	27	53	121	−64	186
2014	9374	35	147	0.004	0.016	9399	45	35	−49	−8	−40
2015	9243	25	167	0.003	0.018	9449	204	50	50	169	−119
2016	8942	33	151	0.004	0.017	9673	25	57	223	−24	248
2017	8947	39	160	0.004	0.018	10,085	23	118	412	−33	445
2018	8814	30	134	0.003	0.015	9658	121	78	−426	3	−429
2019	8627	25	119	0.003	0.014	9782	80	90	124	2	122
2020	8356	16	128	0.002	0.015	9920	12	550	137	−78	216
2021	8183	16		0.002		9325	6		−595	−544	−50
2022	7743	11				9648	2		322		

Note: Estimates restricted to locals reporting non-zero employment in the year.

membership observed over the same period (membership fell by only 2% comparing 2022 with 2000, or 10% if comparing 2021 with 2001) (Table 2, column 7). This has led to a growth in the average size of union locals over time. The average number of members per local rose from 799 in 2000 to 1246 in 2022—a56% increase. This is consistent with unions consolidating their resources, thus stripping out some of the fixed costs attached to running smaller locals.

Figure 2 charts entry and exit rates in the union sector over time (tabulated in columns 5 and 6 of Table 2) and includes a comparison with all establishments operating in private sector services using data from the Bureau of Labor Statistics' Business Employment Dynamics series (Bureau of Labor Statistics, 2022). In the broader services component of the US economy (of which unions are one part), entry rates average around 3.2% per year and exit rates around 2.9%, delivering a net gain in the number of establishments. In the union sector, exit rates are higher than entry rates (averaging 2.1% and 0.5% per annum, respectively). The fact that the exit rate has remained above the entry rate throughout the period explains the net decline in the number of locals, and points to the importance of the union movement finding new ways to organize beyond their existing territory.

In columns 7–9 of Table 2 we show the total number of members recorded in the LORS data each year, and the numbers of members accounted for by new entrants and exiters. For the period t = 2001–2021, we can decompose the

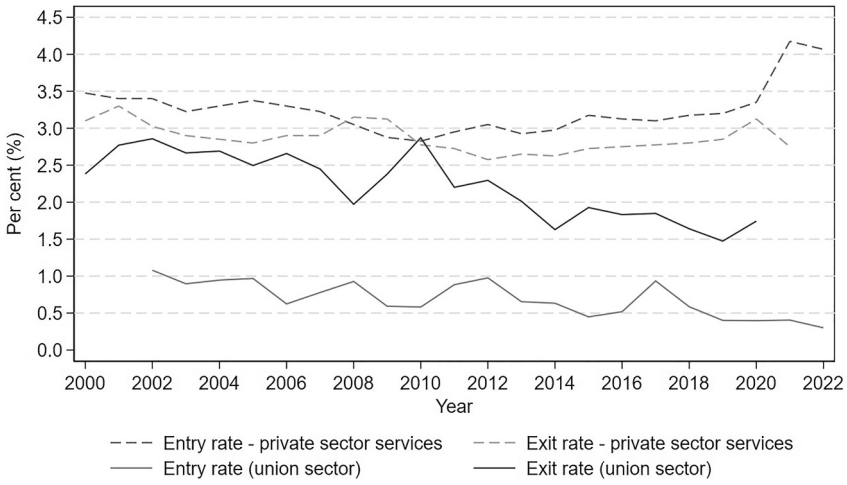

FIGURE 2 Establishment entry and exit rates in private sector services and local entry and exit rates in the union sector. *Source* (private sector services): Bureau of Labor Statistics (2022). Annual estimates generated as the mean of four quarterly estimates within each year. *Source* (union sector): Labor Organization Reporting System (LORS) dataset.

annual change in total membership between *t-1* and *t* into the parts accounted for by entrants, exiters and surviving locals. In 15 of the 20 periods, membership in entrants was insufficient to make up for losses due to exit (Table 2, column 11). But surviving locals also saw a net reduction in membership in the majority of periods (column 12). In the LORS data overall, unions lost a total of 1.05 m members over this period (52,550 per annum on average). An average of 47,500 members were lost each year via the net effects of entry and exit. A further 5000 were lost on average each year in surviving locals. Expansion into new territory and preventing exit are thus important means of stemming union decline but maintaining membership in existing sites is also important.

4.2 | Productivity dispersion

To investigate these dynamics further, we continue to investigate the productivity of locals. Table 3, Panel A, presents dispersion in productivity across union locals measured in terms of labor productivity (membership per employee) and TFP from a membership (quantity-based) production function (TFPQ). Panel B of the same table presents revenue per employee and TFP from a revenue-based production function (TFPR). The measures of TFP are the residuals obtained from the estimations presented in Table 1. We use the suffix OLS to refer to TFP estimated via OLS and the suffix OP to refer to TFP estimated via the Olley-Pakes approach. Out of sample prediction is used to get a measure of $TFPQ_{OP}$ for all local × year observations having non-missing information on membership, assets and number of employees.

Whichever measure is used, there is substantial variance in productivity across locals. The interquartile range in log (TFP) is at least 1.1 and the 90-10 percentile range is at least 2.2. These values are at least double those reported by Syverson (2004b, Table 1) as the average industry-level productivity dispersion in the US manufacturing sector, and also considerably higher that those reported by Criscuolo et al. (2003) for UK manufacturing plants.[13] The values reported by Syverson and Criscuolo are considered indicative of a high degree of productivity dispersion in the commercial sector (Griffith et al., 2006). We can thus say that productivity dispersion is also very high among union locals, even higher than among commercial plants.

What causes this variance? We first examine the characteristics of the locals themselves. We then turn to the role of competition. For brevity, we focus on TFP_{OP} given the similarity between this measure and TFP_{OLS}, discussed earlier.

4.3 | Productivity and the demographics of union locals

The literature on establishment productivity indicates that the firm to which the plant belongs can account for a sizable part of its productivity. For example, Bailey et al. (1992, p. 232) show firm-level productivity growth accounts for a substantial part of establishment-level productivity growth in U.S. manufacturing. They speculate: "There may be

TABLE 3 Productivity dispersion across locals.

Productivity measure	75—25 productivity ratio	90—10 productivity ratio	95—5 productivity ratio
Panel A: Membership-based			
Labor productivity	1.55	2.84	3.53
TFPQ from OLS	1.11	2.16	2.79
TFPQ from Olley-Pakes	1.41	2.63	3.38
Panel B: Revenue-based			
Labor productivity	2.16	3.68	4.39
TFPR from OLS	1.15	2.21	2.90
TFPR from Olley-Pakes	1.60	2.77	3.41

Note: Panel A uses 230,250 local × year observations. Panel B uses 213,844 local × year observations.

common productivity shocks that hit the establishments in the same firm because of similarities in technology or product mix. And these 'shocks' may not be simply random events. They could easily be the result of research and development or product development at the firm level."

In the case of union locals, it is conceivable that they will be hit by shocks at national union level, but it is also possible that locals' productivity is shaped by the policies and practices that emanate from the center. Some part of a local's productivity may therefore be accounted for by the national to which it belongs. Nevertheless, most of the dispersion in productivity in manufacturing plants in the U.S. over the period 1972–2010 occurs within firms, rather than across firms (Kehrig & Vincent, 2013).

Table 4 shows how much of the variance in productivity dispersion across locals and time in our dataset is accounted for by the national union, the geographical location of the local, or by local fixed effects. Estimates are generated by regressing $\log(TFPQ_{OP})$ for each local on various sets of fixed effects, along with year dummies. Around one quarter (24.6%) of TFPQ variance across the 230,250 local × year observations in our sample is accounted for by the 104 union nationals to which they belong, showing that the "firm" effect is quite important. So too is location: although the 52 state dummies can only explain 5.1% of TFPQ variance across locals, CZs account for 13.3% and Zip code areas account for 50.9%. The most important single factor in explaining productivity variance, however, is the local's fixed effect: this accounts for 88.5% of the variance in TFPQ, a finding which is consistent with Bailey et al.'s (1992) research which emphasizes the importance of the role played by persistent establishment-level factors in explaining productivity variance among U.S. manufacturing plants.

In Table 5, we investigate the role played by locals' age, membership size and location in determining their productivity differentials. TFPQ is higher among locals with larger memberships. Here, one might view a local's membership base as a form of intangible capital, providing legitimacy in the eyes of prospective members, leverage vis-a-vis employers, and volunteer activists to support grassroots campaigns. It is not feasible to identify the scale of volunteer activity. Its omission from the direct labor input measured in LORS will necessarily introduce a downward bias in the employment coefficient in Table 1 via measurement error.[14] Here, there is a positive association between membership numbers and TFP. This suggests that unions can make efficiency gains by moving toward a smaller set of larger locals. This may be done via merger, for example, as a means of making more efficient use of declining resources.

TFPQ is higher among younger cohorts of locals. This is in line with expectations that new entrants have higher productivity than incumbents (see Foster et al., 2008). It may be the case that, in a declining market, unions only set up new locals when they are highly productive. Another possibility is that older locals are "locked" into less efficient methods of recruiting and retaining members, perhaps due to the costs of switching to better methods, costs which new locals do not incur. These cohort effects are independent of locals' membership size, an important control given the likely correlation between age and membership growth. In terms of location characteristics, column 1 shows that TFP is higher in Right to Work (RTW) states. Here, the political climate is less favorable toward unions, suggesting they are likely to face higher levels of employer opposition.[15] The positive coefficient suggests that such opposition may push locals to higher levels of efficiency, though selection effects may also be at work, since only those locals with high underlying productivity potential may be able to organize successfully and enter the market in this environment. Replacing the RTW indicator with the time-varying controls at zip-code level intended to proxy for demand, we find

TABLE 4 Accounting for variance in locals' $TFPQ_{OP}$.

Type of fixed effect	Share of the variance explained (adj. *R-squared*) (%)
104 nationals	24.6
52 states	5.1
2057 states × nationals	37.0
617 Commuting Zones	13.3
6618 Commuting Zones × nationals	52.6
12,767 zip code areas	50.9
25,190 zip area × nationals	82.2
15,621 locals	88.5

Note: Results from OLS regression of $\log(TFPQ_{OP})$ for each local on various sets of fixed effects. All models include year dummies.

that locals' TFP is negatively correlated with the level of employment in the zip code area, but positively correlated with average wages, average plant size and the total number of plants.

4.4 | The effect of entry on productivity, pricing, and exit

In line with expectations from studies of other sectors, descriptive analysis of the union sector shows that entrants are more productive and have lower prices than incumbents (Table 6). Entrants collect an average of $440 per member per annum in dues and have mean TFPQ of 3.66. Among incumbents, the equivalent figures are $885 and 3.13. Exiters have higher prices and lower TFPQ than both entrants and incumbents.

In Table 7 we estimate locals' log TFPQ, prices and probability of exit as a function of the entry of new locals. All models contain local fixed effects and time dummies, so they estimate associations between the entry of one or more new locals at CZ level and changes in the dependent variable. All models also include the four zip-code level controls for the demand for unionization.

Panel A of Table 7 presents results from the estimation of Equation (2) by OLS, using the basic measure of entry which captures all entrants to the CZ, including locals that belong to the same national as the incumbent, and ignoring any jurisdictional differences where the entrant belongs to a different national. In this set of results, the arrival of new locals is not associated with any statistically significant change in locals' TFPQ or prices. There is a positive and statistically significant association with the probability that incumbents will exit the market. The coefficient implies that the entry of one or more new locals into the CZ increases the probability of exit among incumbents by 0.3 percentage points.

Panels B–D switch to our preferred measure of entry based on the probability of jurisdictional overlap between incumbents and entrants. Here we obtain a more direct indication of the effects of competition for members by discounting entrants from the same union or from unions organizing in different industry sectors. Jurisdictional overlap is measured at three different levels of industry aggregation, to explore the sensitivity of the results to using broader or narrower definitions of industry sector. In these models, the size of the coefficients tends to increase as the measure of jurisdictional overlap becomes more precise, consistent with a reduction in measurement error as one moves to narrower definitions of industry. Again, we see no statistically significant association between entry and the productivity of incumbents. The coefficient on entry in the model of prices is negative and statistically significant when jurisdictional overlap is measured at the 1-digit NAICS level, but not when measured at more detailed levels, due to lower precision of the estimated coefficients. Hence, we see only limited evidence of a price response to increased competition. This may reflect the constraints locals face over pricing, discussed earlier.

The coefficient on entry in the models of exit remains statistically significant in all three models using the measure of jurisdictional overlap. In Panel D, entry of one or more new locals into the CZ increases the probability of exit among incumbents by 1.5 percentage points. This suggests that new entrants may be pushing out incumbents via a process of creative destruction, perhaps accentuated by challenges that existing locals face in improving their own efficiency in the face of competition.

TABLE 5 The correlation between log $TFPQ_{OP}$ and locals' characteristics.

	(1)	(2)
Lagged membership		
1st quintile	REF	REF
2nd quintile	0.689***	0.697***
	(0.006)	(0.006)
3rd quintile	1.245***	1.250***
	(0.006)	(0.006)
4th quintile	1.852***	1.848***
	(0.006)	(0.006)
5th quintile	2.811***	2.791***
	(0.006)	(0.006)
Cohort:		
Created before 1970	REF	REF
Created in the 1970s	0.095***	0.091***
	(0.005)	(0.005)
Created in the 1980s	0.120***	0.112***
	(0.005)	(0.005)
Created in the 1990s	0.164***	0.157***
	(0.005)	(0.005)
Created after 2000	0.264***	0.261***
	(0.005)	(0.005)
Location characteristics:		
Right to Work state	0.023***	
	(0.002)	
Log(employment in the zip code area)		−0.024***
		(0.001)
Log(payroll costs per worker in zip code area)		0.045***
		(0.004)
Log(average plant size in zip code area)		0.000***
		(0.000)
Log(number of plants in zip code area)		0.000***
		(0.000)
Constant	1.228***	1.219***
	(0.008)	(0.020)
Observations	213,899	192,286
R-squared	0.741	0.743

Note: Robust standard errors in parentheses. All models contain fixed effects for the five largest nationals and year dummies.
***$p < .01$, **$p < .05$, *$p < .1$.

An ancillary model of exit in which we model exit as a function of incumbents' own productivity and prices, along with the standard set of controls, shows that locals with higher TFPQ and higher prices are less likely to exit (see Table B2 of Appendix S1). The association with prices seems anomalous but higher prices may be proxying for less

competitive environments. The association with TFPQ does suggest that efficiency matters in the union sector by supporting the survival of individual locals. However, it remains an open question as to whether unions can play a role in stemming the decline of the sector by actually instituting improvements in their own efficiency and operations.

One natural question arising from this analysis is what has happened to aggregate productivity in the sector over time? Figure 3 shows that aggregate productivity in the sector has been declining over the period that we observe.[16] This may be because the incentives caused by competition are weak. We have shown that entry rates are relatively low and

TABLE 6 Descriptive statistics for entrants, exiters and incumbent locals.

		Log $TFPQ_{OP}$	Price (2022 $)	*N* members	Sales (2022 $)	Assets (2022 $)	*N* employees
Type of local							
Entrant ($N = 836$)	Mean	3.63	440.00	2160	1,003,427	830,212	11.97
	SD	1.11	447.83	10,291	5,167,865	3,171,772	34.84
Exiter ($N = 3501$)	Mean	2.62	1241.66	710	406,362	407,815	8.32
	SD	1.28	10,791.38	9104	2,153,846	1,544,136	11.67
Incumbent ($N = 174{,}069$)	Mean	3.11	884.65	1029	903,007	1,283,192	10.85
	SD	1.03	10,441.96	5882	4,239,764	5,607,213	19.58
Total ($N = 178{,}406$)	Mean	3.10	889.57	1028	893,731	1,263,891	10.81
	SD	1.04	10,424.63	5991	4,214,193	5,548,514	19.56

Note: Years 2002–2020. We exclude years 2000–2001 and 2021–2022 as the variable describing entrants and exiters are constructed based on two former years of data for entrants and two posterior years of data for exiters. Statistics are provided for the subsample of locals that have provided non-missing information for all described covariates.

TABLE 7 New entrants and locals' productivity, prices and probability of exit 2000–2022.

	Log of $TFPQ_{OP}$ (1)	Log of membership price (2)	Exit in $t+1$ or $t+2$ (3)
Panel A: Basic measure of entry			
Entry of a new local	−0.000	−0.002	0.003***
	(0.002)	(0.003)	(0.001)
Controls	Yes	Yes	Yes
Observations	181,455	182,711	265,273
R-squared	0.827	0.809	0.183
Panel B: Jurisdiction-specific measure of entry (1-digit NAICS)			
Entry of a new local	−0.005	−0.018**	0.008***
	(0.006)	(0.009)	(0.002)
Controls	Yes	Yes	Yes
Observations	176,188	177,307	256,957
R-squared	0.904	0.810	0.185
Panel C: Jurisdiction-specific measure of entry (2-digit NAICS)			
Entry of a new local	−0.002	−0.018	0.009***
	(0.009)	(0.013)	(0.003)
Controls	Yes	Yes	Yes
Observations	176,175	177,291	256,812
R-squared	0.904	0.810	0.185

TABLE 7 (Continued)

	Log of $TFPQ_{OP}$ (1)	Log of membership price (2)	Exit in $t+1$ or $t+2$ (3)
Panel D: Jurisdiction-specific measure of entry (3-digit NAICS)			
Entry of a new local	−0.019	−0.030	0.015***
	(0.013)	(0.019)	(0.005)
Controls	Yes	Yes	Yes
Observations	176,101	177,208	256,559
R-squared	0.904	0.810	0.185

Note: Robust standard errors in parentheses. Control variables in all specifications: locals' fixed effects; demand-side controls (log employment, log of payroll per worker, average plant size and number of plants within the zip code area in which the local is based); and year dummies. Jurisdiction-specific measure based on sectoral overlap and ignores entrants from locals belonging to the same national—see text for definition.

***$p < .01$, **$p < .05$, *$p < .1$.

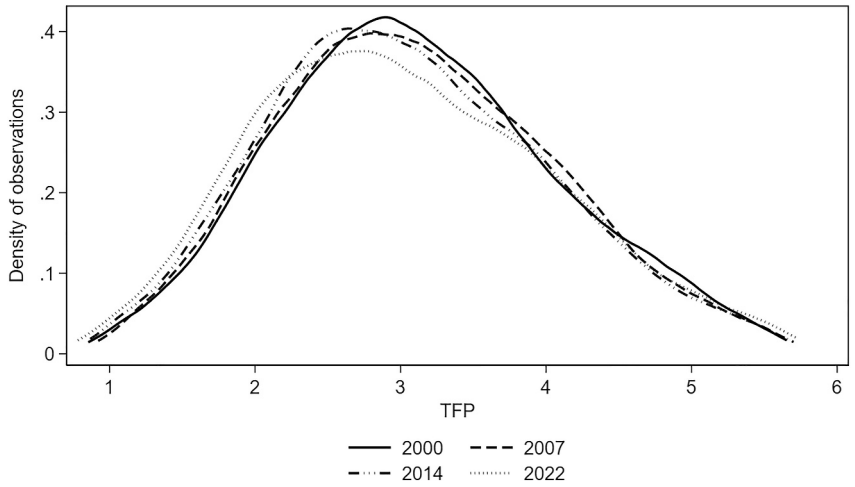

FIGURE 3 Distribution of $TFPQ_{OP}$ across locals: evolution over time. $TFPQ_{OP}$ is the residual of a regression of log(membership) on log(assets) and log(*N* employees). Values below the 1st percentile and above the 99th percentile of each annual distribution are excluded.

falling in the union sector (Figure 2). We have also shown that, where new locals are established in a particular local area and (at least notionally) offer competition for members, the productivity response from incumbents is muted (Table 7). However, the environment in which unions operate has also become more challenging, so the aggregate productivity decline shown in Figure 3 may not necessarily be explained purely by supply-side factors.

5 | CONCLUSIONS

We contribute to the literature on the supply-side of unionization in the United States via an empirical study of productivity dynamics among union locals. We focus on the period 2000–2022 using annual panel data on union locals obtained from the LORS. Our study is one of the few attempts to study unionism from this perspective, where the market for union representation is treated as an economic sector and the empirical focus is on productivity differences within and across union locals, and the importance of competition in affecting the dynamics of the sector.

We show that the aggregate decline in union membership is linked to both the low rate of new organizing and falling membership in existing locals. We also examine the extent of productivity dispersion among locals. We find that dispersion is high, even higher than among commercial plants. A substantial share of this variance (around one quarter) is explained by the national to which each local belongs; location also plays a role. However, there is extensive establishment-specific variance, even after accounting for these factors. In particular, productivity is higher among younger cohorts, suggesting that many older locals may be "locked" into less efficient methods of recruiting and

retaining members, perhaps because of switching costs; productivity is higher among locals with a higher critical mass in terms of membership, however, suggesting that locals can make efficiency gains via mergers.

We then hypothesize that competition between union locals will act as a driver for increased productivity and creative destruction within the sector. Consistent with studies of other economic sectors, we find that locals entering the market have lower prices and higher TFP than incumbents. When we focus on the entry of locals who are likely to provide membership competition for incumbents, we find that entry does not lead incumbents to raise their productivity. Our findings also suggest, on balance, that locals do not adjust their prices. Instead, the entry of competitors appears to have a negative effect on the chances of survival among incumbents. These findings are consistent with a market in which incumbents face challenges in adjusting their offerings, perhaps due to internal governance processes. The association between the entry of new locals and the survival of incumbents implies that the process of creative destruction—which drives efficiency gains in many other economic sectors—is present to some extent in the market for union representation. However, despite unions' efforts to pursue new forms of organizing, productivity in the sector is in steady decline.

Unions face challenges on the demand side too. However, our findings are consistent with assertions that the supply side of the sector is subject to its own "cost-disease" pressures, whereby the challenge of improving labor efficiency (e.g., via technological innovation and reallocation) leads to stagnation (Willman et al., 2020). The deeper roots of this stagnation cannot be teased out from our analysis. However, they arguably lie, at least in part, in the high costs of adjustment in the union sector, where internal governance structures limit the degree of price flexibility and the legislative environment is designed to give unions local monopolies. These arrangements each have their own internal logic. However, the prospect of supply-side solutions to union decline appear limited in the absence of large-scale changes to the governance, regulation and operation of the sector.

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DATA AVAILABILITY STATEMENT

The main data used in this article derive from the Labor Organization Reporting System (LORS). The data are publicly available from the website of the Office of Labor Management Standards (OLMS, 2022). We accessed the data on September 5, 2017 (for years 2000 to 2016) and on May 3, 2022 (for years 2017 to 2022). The article also uses publicly-available data on union representation cases filed with the National Labor Relations Board (NLRB) over the period 1999–2011. We accessed the data in research-ready format on May 12, 2023 via John Paul Ferguson's NLRB-cats repository on GitHub: https://github.com/jpfergongithub/nlrb-cats (Ferguson, 2016). The article also uses data on ZIP codes from the US Census Bureau (2020), on union membership from Hirsch et al. (2023) and on business dynamics from the Bureau of Labor Statistics (2022). A replication package is available (Breda et al., 2025).

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ENDNOTES

[1] See for example, http://tinyurl.com/4afdve4f, http://tinyurl.com/mrys7hff, and http://tinyurl.com/m2kvnun.

[2] See for example the constitutions of the SEIU (Article XV, Section 6), the UAW (Article 47) and the Teamsters (Article X, Section 3). The constitution of the Steelworkers' Union also specifies a maximum rate (Article XIV, Sections 3–4).

[3] Unions also seek to ensure that some elements of the union good are excludable. For instance, by providing dispute assistance only to paid-up members.

[4] One of the motivations behind the original legislation was the desire to limit unions' opportunities to commit fraud, particularly with respect to the use of political funds, by providing the public with a means of monitoring their activities.

[5] It is arguable whether, in fact, unions are monopoly suppliers of the union good. Certainly, when they achieve recognition status following an NLRB-sanctioned vote, a union obtains sole rights to act as the bargaining agent of covered workers. However, union membership has been conceived of more widely as a multi-attribute good offering services, such as worker voice or legal protection, which might conceivably be provided by others, whether it be a solicitor, a worker center, employer-generated voice mechanisms such as town hall meetings or even the state (Bryson & Gomez, 2003; Piore & Safford, 2006).

[6] In this respect, the measurement of performance in non-profits, such as union locals, brings complications that are less apparent in commercial firms, where profitability can more easily be taken as the ultimate performance objective, allowing managers to evaluate different courses of action with respect to the value they may deliver for the company's owners (Speckbacher, 2003).

[7] Again, estimates of TFP generated via the OLS and OP approaches are highly correlated with one another ($r = 0.84$).

[8] It is implicit that we do not attempt to control for time-varying characteristics of locals. We consider this too demanding, as it is likely to partial out changes in union activities (such as improvements in management practices) which may account for any productivity effects that we are seeking to observe.

[9] Callaway and Sant'Anna (2021) (CSA hereafter) have pointed to the bias that can arise in models with multiple time periods and staggered treatments. However, in contrast to the scenarios considered by CSA, we view entry as a temporary shock to a local area rather than a permanent change. So assigning zip code areas to be permanently treated once they experience a new entry, as CSA's approach is designed to do, does not seem appropriate in our setting.

[10] For instance, the United Auto Workers now represents employees in health care, museums and higher education, alongside its traditional base of workers in automobile manufacturing.

[11] NLRB data on representation elections post-2011 do not identify the industry sector of the firm.

[12] Strictly speaking, it is computed for each entrant-incumbent pair across the first five entrants in any CZ $\times$ year cell. In the rare event that a cell has more than five entrants, and there is no jurisdictional overlap between incumbents and the first five entrants, we set the competition measure to missing. This is for reasons of computational efficiency.

[13] Productivity dispersion statistics for the services sector in the US are not available, to our knowledge. However, evidence from the UK and other European countries indicates that dispersion in TFPR within the service sector is typically of a similar magnitude to that seen in manufacturing (see Bartelsman & Wolf, 2017, Table 2).

[14] Masters et al. (2022) notes that more democratically-oriented unions rely more on volunteers.

[15] States with RTW laws generally have lower unionization rates than non-RTW states, and private-sector workers in RTW states are less likely to be covered by a union contract than peers in non-RTW states (Sherer & Gould, 2024).

[16] The mean value of TFPQ has fallen by around 3 percentage points over the period 2000 to 2022—a difference that is statistically significant at the 1% level ($z = 5.50$; $p < 0.01$).

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