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Making products last: Sales versus renting

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Abstract

We compare product durability and profitability under sales and renting when product quality is unobservable to consumers. Ownership structure determines who bears the consequences of product failure and thereby shapes incentives to enhance durability. Under sales, consumers invest in maintenance, while firms have no incentive to invest in quality and may benefit from replacement sales following failure. Under renting, consumers exert no maintenance effort, while firms invest in quality because they internalize repair and replacement costs. We show that sales generates greater durability when consumer maintenance is relatively more effective, whereas renting can generate greater durability when firm quality investment is relatively more effective and replacement costs are sufficiently high. Profitability follows a different pattern, so the more profitable business model need not be the more durable one. Extensions with deductibles and complementary durability inputs further highlight the role of failure-risk allocation in shaping durability incentives.

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Labor market tightness and persistent retail–farm price spreads in U.S. meatpacking

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Abstract

Episodes of elevated prices in concentrated industries are often interpreted as evidence of market power. However, price spikes can also reflect input cost shocks, particularly in labor-intensive sectors. This paper revisits the COVID-19 period in U.S. meatpacking to examine whether sustained labor market disruptions help explain the persistent widening of retail–farm price spreads in 2021. Using descriptive evidence on industry concentration, retail–farm price spreads, online job postings, and advertised wages, the analysis emphasizes sequencing rather than causal identification. Industry concentration remained stable, while hiring intensity and posted wages increased prior to or alongside the sustained elevation of retail–farm price spreads. The timing is consistent with a cost-based labor mechanism operating within a structurally unchanged but concentrated industry. The findings caution against inferring anticompetitive behavior from price spikes alone and highlight the role of labor market conditions in shaping price dynamics in concentrated industries.

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1. Introduction

Episodes of elevated prices in concentrated industries often generate allegations of market power. Yet price spikes may also reflect input cost shocks, particularly in sectors where production remains labor intensive. The COVID-19 period provides a useful setting for examining this distinction. U.S. meatpacking experienced large movements in retail meat prices and retail–farm spreads, alongside well-documented disruptions to processing operations and labor supply.

Two distinct episodes emerged. In spring 2020, temporary plant disruptions coincided with a sharp but short-lived spike in retail–farm spreads. Beginning in early 2021, spreads widened again and remained elevated. Understanding the timing of these episodes is central to interpreting price dynamics in a concentrated industry facing sustained labor market tightness. This paper contributes by showing that the timing of persistent price spreads aligns with a prolonged period of elevated hiring pressure under a stable industry structure. The analysis is timely given renewed interest in the role of industry structure in explaining elevated meat prices.

This paper documents these episodes and relates movements in retail–farm spreads to measures of labor market tightness in meatpacking. Monthly USDA spread data are combined with online job posting measures and advertised wage information. The evidence shows that while the initial 2020 spike was brief, the prolonged elevation of spreads in 2021 coincided with sustained hiring pressure and upward shifts in advertised wages. Industry concentration changed little during this time.

The analysis is intentionally descriptive and does not attempt structural identification, providing an initial empirical benchmark for evaluating the timing of labor market tightness and price spreads. It assesses whether the observed sequencing of spreads and labor market indicators is consistent with a cost-based labor mechanism operating within a structurally unchanged but concentrated industry. By documenting this sequencing, the paper clarifies how sustained labor market tightness can influence processing margins and cautions against treating persistent price spreads as *prima facie* evidence of anticompetitive conduct.

2. Literature

A substantial body of research examines how market structure, cost conditions, and input shocks shape price dynamics in concentrated industries. A recurring insight from this literature is that long-run performance reflects consolidation, scale economies, and technological change, while short-run price movements often respond to input cost shocks rather than contemporaneous changes in market structure.

In U.S. meatpacking, consolidation has been linked to plant restructuring, mechanization, and the realization of scale economies that lowered average processing costs (MacDonald et al. 2000; MacDonald and Ollinger 2000). Industry concentration evolved gradually, driven by durable technological and organizational advantages rather than short-run strategic shifts. Because structural change is slow-moving, abrupt retail price movements are unlikely to reflect contemporaneous shifts in concentration or conduct. Theoretical models of asymmetric

competition similarly show that cost shocks can alter margins without requiring changes in market structure or conduct (Krumel and Meyer 2026).

A complementary literature highlights the continued labor intensity of core production tasks. Carnes (1984) documents that meatpacking relies heavily on frontline labor, with labor comprising a substantial share of processing costs once livestock procurement costs are excluded. Although modernization and larger plant scale reduced average processing costs, MacDonald and Ollinger (2000) find only modest technological scale economies, suggesting that efficiency gains alone did not eliminate the industry's dependence on frontline labor. Kandel and Parrado (2005) show that industry restructuring was accompanied by increased reliance on migrant labor, reinforcing the sector's dependence on a stable labor supply. Taken together, this literature suggests that COVID-19 labor market disruptions occurred within an industry that had become increasingly dependent on immigrant labor over several decades. These structural features imply that sustained contractions in labor availability can raise marginal processing costs and, consequently, consumer prices even when industry concentration remains unchanged.

Empirical work links labor conditions to consumer prices. Krumel (2017) associates long-run declines in real retail meat prices with reductions in labor costs accompanying workforce restructuring. During the COVID-19 period, plant-level outbreaks and workforce disruptions were documented by Krumel and Goodrich (2023), while Krumel, Goodrich, and Fiala (2023) report sustained hiring difficulty in frontline sectors. Cooper et al. (2023) similarly attribute pandemic-era meat price increases in part to supply disruptions and higher processing costs rather than to contemporaneous structural change.

The COVID episode also generated a literature on vertical price transmission. Balagtas and Cooper (2021) document large wholesale and retail price movements during early processing disruptions, and Ramsey et al. (2021) estimate transmission models that suggest initial shocks were largely transitory, with price dynamics eventually returning toward pre-pandemic patterns. Lusk et al. (2021) argue that widening margins during the spring of 2020 are consistent with competitive adjustment under severe supply constraints. While this literature focuses primarily on the speed and symmetry of transmission, it leaves open the interpretation of the more persistent widening of retail–farm spreads during 2021, when industry concentration remained largely stable but labor markets tightened.

More recent analyses emphasize the durability of scale economies, capital requirements, and modernization constraints that limit rapid entry or capacity expansion (MacDonald 2014, 2024; Keller, MacDonald, and Paudel 2024; Paudel and Keller 2025). In such environments, adjustment to shocks is more likely to occur through costs and margins than through rapid structural change.

The present paper builds on these structural, empirical, and theoretical insights. Rather than estimating structural parameters or adjudicating between conduct models, it evaluates whether the timing of retail–farm spreads and labor market indicators during COVID-19 is consistent with a cost-based labor mechanism operating in a concentrated but structurally stable industry. By focusing on timing, the analysis clarifies how sustained labor market tightness can generate persistent price effects even in the absence of contemporaneous structural change.

3. Data and Methodology

The empirical analysis combines USDA retail–farm price spread data, industry concentration measures, and online job posting data to document how price spreads and labor market conditions evolved during the COVID-19 period. The approach is descriptive and focuses on timing rather than structural estimation.

Retail price outcomes are measured using historical U.S. Department of Agriculture Economic Research Service meat price spread series.¹ These data capture the difference between retail and farm-level prices and are expressed in real terms by deflating nominal values to 2021 dollars using the Consumer Price Index. The series are used to characterize the magnitude and persistence of retail–farm spreads during the pandemic.

Industry concentration is measured using four-firm concentration ratios for beef, pork, and broiler processing reported in USDA Packers and Stockyards Program Annual Reports and Assessment of the Cattle, Hog, Poultry, and Sheep Industries reports. Because these measures changed only gradually over time, they provide a structural benchmark for assessing whether industry concentration changed materially during the period of elevated retail–farm price spreads.

Labor market conditions are measured using monthly online job posting data from Burning Glass Technologies (now Lightcast), a commercial labor market analytics firm whose database aggregates and deduplicates online vacancy postings from thousands of employer websites and job boards. These data have been widely used in labor economics to measure employer recruiting activity, occupational skill requirements, and offered wages (see Shen and Zhu, 2023, for a review of recent applications). Monthly postings for NAICS 3116 are used as an indicator of hiring intensity, while advertised wage ranges characterize changes in labor market tightness and potential cost pressures over time.

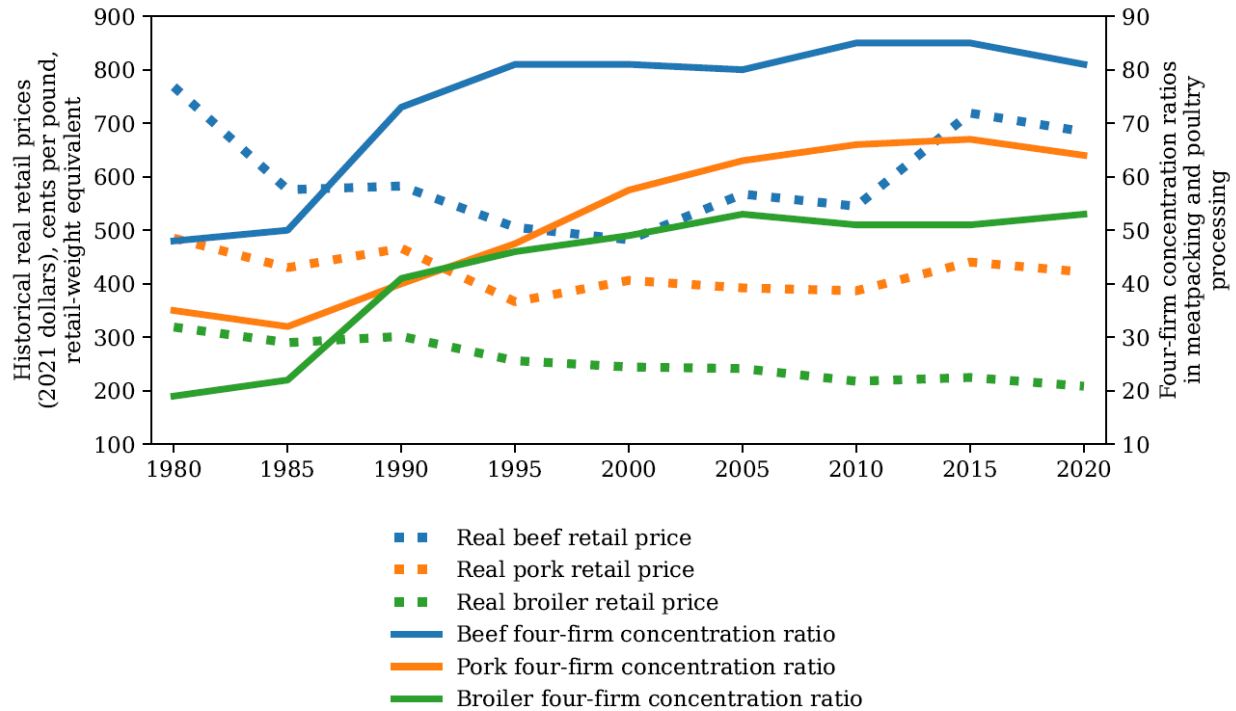
The analysis does not attempt to decompose price changes into specific causal components. The sample ends in December 2021 because the objective is to isolate the labor market disruptions associated with the COVID-19 period before the sharp increase in cattle prices beginning in 2022 changed market conditions. The analysis therefore evaluates whether movements in retail–farm spreads coincide with sustained hiring pressure and rising advertised wages during a period in which industry concentration remained stable. The central question is whether the observed timing aligns with the prediction that persistent labor constraints raise processing costs and contribute to elevated margins. More formal causal or structural estimation is left to future work, as the objective here is to establish descriptive ordering and empirical correlations.

¹ Farm-to-wholesale spreads isolate meatpacking margins more directly, whereas the objective of this paper is to explain the persistent widening of retail–farm price spreads during COVID-19. Retail–farm spreads capture the cumulative transmission of processing cost shocks to consumers and therefore provide the relevant outcome for the descriptive timing analysis presented here. This focus remains policy-relevant because contemporary debates over meatpacking continue to center not only on packer profits and concentration, but also on the prices consumers pay for meat at retail. The objective is not to isolate the contribution of individual stages of the supply chain, but rather to examine whether sustained labor market tightness coincided with the persistent elevation of the retail–farm price spread.

4. Results

Figure 1 presents the real retail price spreads for beef, pork, and broilers alongside the four-firm concentration ratio in meatpacking and poultry processing.

Historical real retail–farm price spreads and four-firm concentration ratios in U.S. meatpacking and poultry processing, 1980–2020.

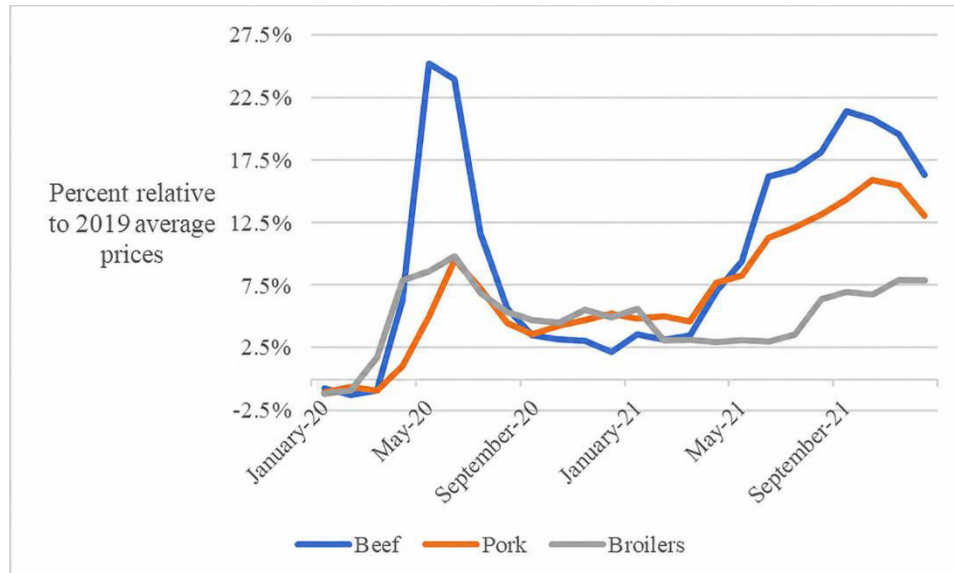


Note: Real retail–farm price spreads (cents per pound, retail-weight equivalent; left axis) are plotted alongside four-firm concentration ratios (percent; right axis) for beef, pork, and broilers. Retail–farm price spreads are calculated using USDA Economic Research Service data and deflated to constant dollars using the Consumer Price Index. Four-firm concentration ratios are from USDA Packers and Stockyards Program annual reports and reports to Congress. Four-firm concentration ratios illustrate the gradual evolution of industry concentration alongside long-run movements in real retail–farm price spreads. Data sources: USDA Economic Research Service; U.S. Bureau of Labor Statistics; USDA Packers and Stockyards Program Annual Reports and Assessment of the Cattle, Hog, Poultry, and Sheep Industries reports.

To align these measures with price outcomes, yearly averages of real retail–farm price spreads are calculated from USDA Economic Research Service data. Figure 1 highlights two important features of the historical record. First, industry concentration evolved gradually over several decades rather than through abrupt changes, with the largest increases occurring before the mid-1990s and relatively modest changes thereafter. Second, the long-run decline in real retail–farm price spreads occurred during a period of rising concentration. Figure 1 does not establish a causal relationship, but it provides little evidence that higher concentration was systematically associated with higher retail–farm price spreads over the long run. Instead, the historical patterns are consistent with earlier research attributing consolidation to scale economies, technological change, and declining processing costs.

Figure 2 plots monthly retail price spreads for beef, pork, and broilers in 2020 and 2021 relative to their 2019 averages.

Figure 2. Real monthly retail–farm price spreads relative to 2019 averages, January 2020–December 2021.

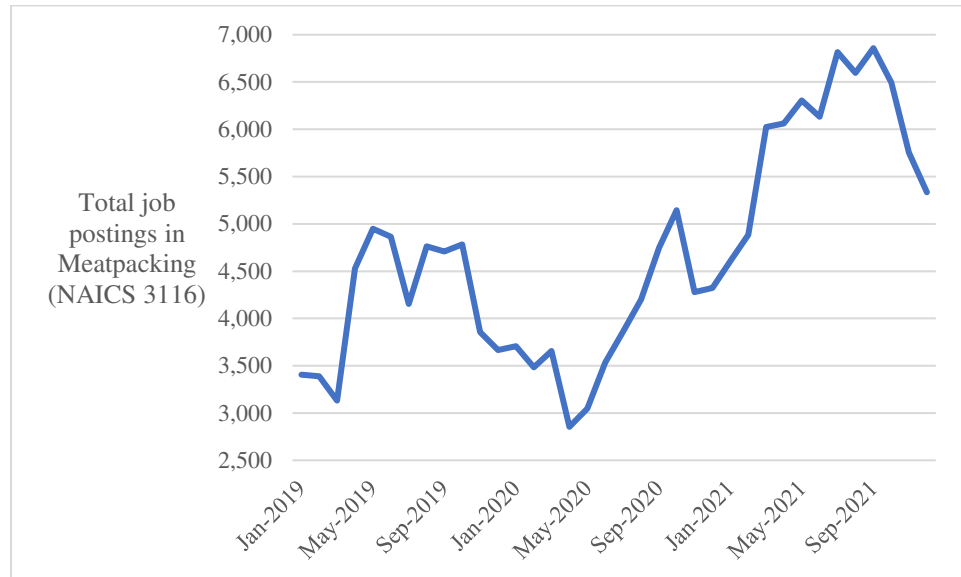


Note: Monthly spreads for beef, pork, and broilers are expressed as percentage deviations from their respective 2019 averages. Two episodes are visible. A short-lived spike occurs in mid-2020 during peak COVID-19 plant outbreaks, followed by a second episode beginning in early 2021 in which elevated spreads persist for an extended period. The analysis ends in December 2021 to isolate the period before the sharp increase in cattle prices beginning in 2022 fundamentally altered market conditions. Data source: USDA Economic Research Service.

Two episodes warrant particular attention. The first occurs in May 2020, when beef price spreads rise by 25.1 percent relative to 2019. This short-lived spike coincides with the peak of COVID-19 outbreaks in meatpacking plants. By August 2020, beef spreads had declined to 5.7 percent above the 2019 average and then remained below 4 percent for seven months. Pork and broilers show similar but less pronounced movements. The second episode begins in early 2021. Beef and pork price spreads again rise above their 2019 averages, but this time the elevation proves persistent, with spreads remaining elevated for an extended period. The timing and duration of this second episode suggest a distinct and sustained force operating on processing margins.

Figure 3 turns to monthly job postings in meatpacking using Burning Glass Technologies data.

Figure 3. Total online job postings in the U.S. meatpacking industry (NAICS 3116), January 2020–December 2021.

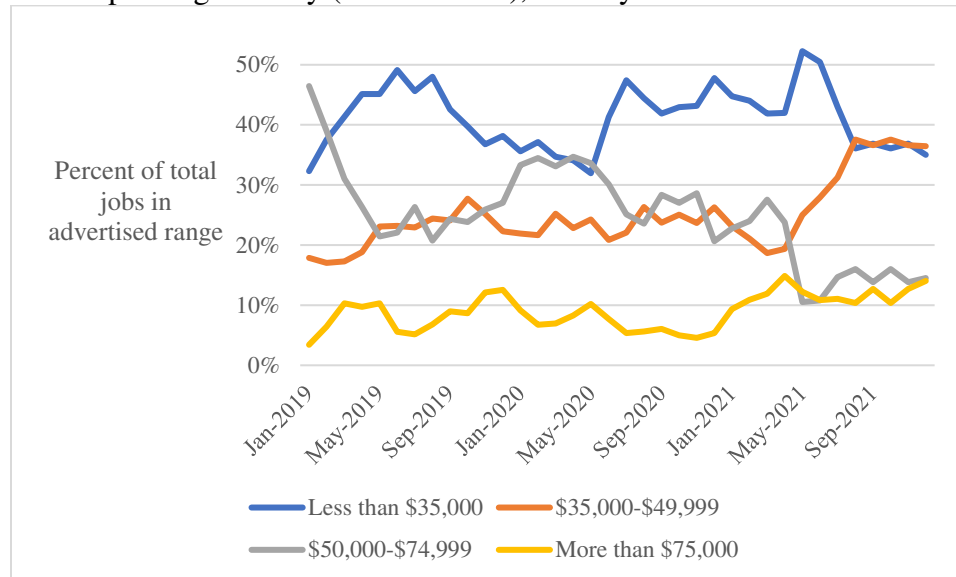


Note: Job postings decline sharply at the onset of the pandemic but recover quickly and rise above pre-pandemic levels beginning in early 2021. By late 2021 postings are nearly 40 percent higher than baseline, indicating sustained hiring pressure during the post-pandemic period. Data source: Burning Glass Technologies.

Despite meatpacking being designated essential employment, job postings decline sharply at the onset of the pandemic. Beginning in May 2020, postings rebound and return to pre-pandemic levels by late summer, then remain elevated into early 2021. In March 2021, postings exceed pre-pandemic levels and continue rising, reaching nearly 40 percent above baseline by September 2021. In contrast to the stability of industry concentration, employer recruiting activity increases markedly. Elevated job postings are consistent with greater hiring pressure, although they do not by themselves identify the underlying source of that pressure. Because measured industry concentration changed little during this period, the temporal variation in retail–farm price spreads aligns more closely with measured recruiting intensity than with changes in industry structure.

Figure 4 examines the distribution of posted salaries.

Figure 4. Distribution of advertised annual salaries in online job postings for the U.S. meatpacking industry (NAICS 3116), January 2020–December 2021.



Note: Lines report the share of total postings falling within each advertised salary category. Before the pandemic, postings below \$35,000 were nearly twice as common as those in the \$35,000–\$49,999 range. Beginning in early 2021, these shares converge, reflecting a reallocation toward higher advertised wages consistent with intensified recruitment difficulty at prevailing wage levels. Data source: Burning Glass Technologies.

The total number of postings increases across all wage categories, consistent with broad-based recruiting pressure rather than a shift in job composition. Before the pandemic, postings offering less than 35,000 dollars annually were nearly twice as common as postings in the 35,000 to 49,999 dollar range. Beginning in early 2021, these shares converge sharply, reflecting a reallocation toward higher wage postings. This pattern aligns with increasing recruitment difficulty at prevailing wage levels. Given Bureau of Labor Statistics estimates placing the median wage for production workers in meatpacking at 31,210 dollars in May 2020, this convergence implies a meaningful increase in hiring costs.

Taken together, the figures reveal a consistent sequence. The prolonged widening of retail–farm price spreads that begins in early 2021 coincides with persistently elevated job postings and higher advertised wages in meatpacking. Importantly, the increase in job postings appears before or alongside persistent spread elevation rather than following it. At the same time, rising posted wages suggest that firms initially attempted to hire at existing wage norms, encountered persistent frictions, and then increased offered wages in response. This timing aligns with the prediction that sustained labor constraints raise processing costs in a labor-intensive industry.

The alignment between hiring pressure, posted wage adjustments, and retail–farm price spreads is consistent with a cost-based labor mechanism playing an important role during the COVID-19 period. In a setting where industry structure changed little, the evidence suggests that sustained hiring pressure was a plausible and economically meaningful contributor to elevated processing margins.

5. Conclusion

This paper uses descriptive evidence on retail–farm spreads, industry concentration, job postings, and advertised wages to revisit the COVID-19 period and examine how labor market disruptions shaped short-run price dynamics in a concentrated industry. The central empirical insight is timing. Persistently elevated job postings and rising advertised wages precede or coincide with the prolonged elevation in retail–farm spreads that begins in 2021, during a period in which concentration changed little. These patterns are consistent with a cost-based labor mechanism contributing to higher processing margins.

The analysis does not attempt to adjudicate definitively between market power and cost-based explanations. Instead, it disciplines interpretation. In labor-intensive industries with limited short-run substitution possibilities documented in the meatpacking literature (Carnes 1984; MacDonald and Ollinger 2000), and with a production system that has become increasingly dependent on immigrant labor over several decades (Kandel and Parrado 2005; Krumel 2017), contractions in labor availability can raise marginal costs and influence consumer prices even when market structure remains stable. Observed price movements therefore need not imply contemporaneous changes in market conduct.

More broadly, the COVID-19 episode illustrates how short-run shocks operate within slow-moving structural environments. When industry concentration evolves gradually, cost disturbances may generate persistent price effects without structural change. Recognizing this distinction provides a clearer framework for interpreting price spikes in concentrated industries and for evaluating when elevated margins are more consistent with cost pressures than with shifts in market power. This distinction remains policy relevant because ongoing debates over competition and regulation in the meatpacking industry increasingly hinge on whether elevated consumer prices reflect market power or underlying cost pressures. By documenting the sequencing of labor market tightness and retail–farm price spreads during the COVID-19 episode, this paper provides a useful empirical benchmark for distinguishing cost-based pressures from structural explanations when elevated margins reemerge.

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