NCCC-134
APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

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Suggested citation format:

Swanson, A., A. Bekkerman, and M. Taylor. 2019. "Cost and Cooperation: The Effects of Section 199 on the Basis Offered by Grain Marketing Cooperatives." Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Minneapolis, MN. [http://www.farmdoc.illinois.edu/nccc134].

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Paper presented at the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management
Minneapolis, Minnesota, April 15-16, 2019

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The 2004 American Jobs Creation Act created Section 199, a tax provision for producers of domestic goods. During the ensuing decade, Section 199 became especially important for agricultural cooperatives, partly because of a series of favorable Internal Revenue Service private letter rulings for marketing cooperatives. We analyze the impacts of Section 199 on agricultural markets by assessing differential effects on the pricing behavior of grain marketing cooperatives and non-cooperatives in Nebraska and Kansas through using a difference-in-difference empirical strategy and winter wheat basis data. The results indicate that the series of IRS letter rulings in 2008 widened the basis differential between cooperative and non-cooperative firms by almost 5 cents per bushel on average. Furthermore, these market distorting effects are greater for elevator locations that do not have a competing location within 10 miles of their location. While the benefits of Section 199 have been widely touted by cooperative lobbying groups, the results of this paper show the importance of also considering the costs of policy interventions directed at specific agricultural firm types.

Key words: basis, cooperatives, difference-in-difference, spatial competition, Section 199

Introduction

A widely accepted belief is that U.S. agricultural commodity markets are representative of perfectly competitive markets. A large number of homogeneous producers market a homogeneous product to a large number of homogeneous buyers. However, the reality has repeatedly been shown to be different (Rogers and Sexton, 1994; Lavoie, 2005). Commodity markets have unique structures, may exercise market power, and may produce quality differentiated goods, among others. Another example of how markets can be heterogeneous is the structure of firms that buy agricultural commodities. Many firms in commodity markets use a form rarely seen in other markets: the producer-owned cooperative.

Cooperatives have been an ongoing presence in U.S. agricultural markets since the first dairy and cheese cooperative was formed in 1810.[1] In 2015, 2,047 agricultural cooperatives served 1.9 million members and accounted for $212.1 billion in business throughout the United States (Wadsworth and Huang, 2017).[2] In addition, cooperatives hired over 187,200 employees (ibid). Grain marketing and supply cooperatives are a main buyer and supplier of goods for producers. They account for over $48 billion in revenue while serving over 365,000 members (ibid).

Cooperatives face specific regulatory conditions. Since the passing of the 1922 Capper-Volstead Act, cooperatives have been exempt from antitrust laws because—as producer-owned organizations—cooperatives are assumed to be an anti-monopsony entity. In addition to their exemption from antitrust laws, cooperatives also have their own section of the IRS tax code

[1] The University of Wisconsin-Madison provides a brief history of agricultural cooperatives in the U.S. See: http://www.uwcc.wisc.edu/whatisacoop/History/

[2] The USDA provides numerous statistics on agricultural cooperatives, including data differentiated by cooperative type, commodity, and size. The latest year data are available is 2015. See: https://www.rd.usda.gov/files/publications/SR79AgriculturalCooperativeStatistics2015_0.pdf

called Subchapter T, which governs how they can pass through monetary benefits to their patron-owners.

Even as recently as 2017, cooperatives continued to be differentially treated by new tax laws. In December of 2017, a last minute provision in the Tax Cuts and Jobs Act called Section 199A brought one aspect of cooperative tax policy into the limelight. This amendment was supposed to replace a long standing tax policy called the domestic production activities deduction (DPAD), which gave domestic producers and manufacturers of any firm type a tax deduction. However, the new amendment was designed in a way that gave producers a deduction in their tax liability of up to 20% of their gross sales receipts from their business with cooperatives. This created a significant incentive for agricultural producers to market their commodities to cooperatives instead of non-cooperatives because they could significantly reduce (if not fully eliminate) their annual income tax liability.

Some independently-owned firms (IOFs) became concerned that they would not be able to compete with cooperatives.[3] Lawmakers eventually repealed the amendment; however, they did not entirely do away with the provision. Instead, they reverted back to policies initially passed in 2004: the original Section 199 provision. While this original law did not generate as much outcry, it still may create market-distorting impacts in the grain handling industry by artificially increasing incentives to market products to agricultural cooperatives rather than private firms.

Complicating the effects of Section 199 is the Internal Revenue Service's (IRS) application of Section 199 for marketing cooperatives. In 2008, the IRS issued a series of letter rulings that significantly increased the value of the deduction for commodity marketing cooperatives (Harris and McEowen, 2013). This deduction became so important for cooperatives that lobbying groups representing them claimed that Section 199 saved farmers across the United States $2 billion annually.[4] However, the IRS letter rulings may have exacerbated market distortions resulting from Section 199.

Despite the fact that the Section 199 tax policy has existed since 2004, no empirical work has been conducted to test whether the deduction has altered markets by creating competitive advantages for cooperatives. This paper conducts an empirical price analysis of grain marketing firms to estimate the effects of Section 199 on grain markets through measuring changes in local basis—the difference between the local cash price and the next winter wheat futures contract at the Kansas City Board of Trade. We use a difference-in-difference empirical strategy to test for market distorting effects using publicly available winter wheat basis data for the time period of 1998-2017 in Nebraska and Kansas. The main hypothesis is that if the original Section 199 policy caused farmers to increase their deliveries to cooperatives as a result of the policy and cooperatives are capacity constrained in the ability to accept the increased supply, the cooperatives would respond by altering their combination of prices or patronage in order to stay within their capacity limitations. Furthermore, non-cooperatives—competing against cooperatives for the same group of producers' commodities—will have to increase their prices, if they want to maintain a similar volume of grain pre- and post-Section 199. However, the size of these price changes may depend on the amount of spatial competition.

[3] https://www.wsj.com/articles/agriculture-firms-decry-provision-in-new-tax-law-1515529022
[4] http://ncfc.org/press-release/co-ops-oppose-increased-tax-burden-farmers/

We find that Section 199 before any of the IRS letter rulings went into effect did not cause a widening of the price differential between cooperatives and non-cooperatives. However, after the IRS letter rulings went into effect, the price difference between cooperatives and non-cooperatives increased by almost 5 cents per bushel on average. That is, cooperatives offered prices that were approximately an additional 5 cents per bushel lower than private firms offered than before the Section 199 policy. Moreover, this increase in the price differential is 2.5 cents per bushel greater for elevator locations that do not have a competitor within 10 miles of their location than elevator locations that do have a competitor within 10 miles of their location. Thus, the IRS letter rulings appear to exacerbate any distortions in grain markets caused by Section 199, but these distortions may be partially mitigated by the presence of spatial competition in local grain markets, which reduce firms' abilities to pass through costs to producers.

The results of our research add to the empirical literature of cooperatives. There is almost no literature comparing the price differences between cooperatives and non-cooperatives (Katchova, 2010), and the results of our empirical analysis indicate the importance of local market conditions for agricultural policy making. The presence of market power may cause the benefits of agricultural policies to accrue with intermediaries in agricultural markets such as commodity processors and marketing firms, even if the policy is mainly supposed to help agricultural producers.

Furthermore, the fight over Section 199A in 2017 revealed the continual influence of agricultural lobbying groups—such as the National Council of Farmer Cooperatives—on policy making. These proponents of agricultural policy changes need to be forthright with the possible costs of their proposals to producers, consumers, and taxpayers. While Section 199 may indeed have provided benefits to agricultural commodity producers, this study puts into question whether Section 199 was indeed a net gain for producers. In the future, when Section 199A or a similar tax policy is proposed by lobbyists or lawmakers, this work will hopefully improve the discussion over the benefits and the costs of such proposals.

The History of Section 199 and its Applications

The infamous late-night addition to the 2017 Tax Cuts and Jobs Act was meant to replace an older version of Section 199 passed in the 2004 American Jobs Creation Act. Internal Revenue Service (IRS) letter rulings that started to be issued in 2008 then gave Section 199 special importance to agricultural cooperatives, particularly through their internal patronage policy. And as evidenced by the Section 199A provision in the 2017 legislation, cooperatives are likely to continually be a focal point of future legislation.[5]

History of Section 199

The original Section 199—also known as the domestic production activities deduction (DPAD)—was passed by legislators to replace Section 114 of the U.S. tax code. Section 114 gave a tax deduction for U.S. companies from their net income derived from foreign trade. It was, in effect, an incentive for U.S. companies to increase their exports. However, in 2001, the World Trade Organization deemed this tax provision as a violation of its free-trade rules, calling

[5] See U.S. Code § 199A. Qualified business income for the current law. The text is available at www.law.cornell.edu/uscode/text/26/199A

it an export subsidy. In response to the WTO ruling, the U.S. legislature repealed Section 114 and passed Section 199.

Section 199 gave domestic manufacturers a tax deduction based on their qualified production activities income from sales to buyers within the United States. In effect, the law gave a deduction for domestic production of real goods in the United States such as the production of commodities, real estate construction, software, and natural gas. However, it excluded the retail sellers of those goods. For example, natural gas drillers would get a Section 199 deduction for the net income derived from the sale of raw natural gas to refiners in the United States, but companies that sell natural gas to consumers would not be eligible for a Section 199 deduction on those sales. When the Section 199 was passed, it included a phasing-in provision. From 2005-2006, the deduction was only 3% of net income. In 2007, the amount increased to 6%, and in 2010, it increased to 9% of net income. Furthermore, from its inception, Section 199 was capped by 50% of the W-2 wages—wages where the employer withholds a portion of income for taxes—the domestic manufacture paid, as the purpose of the provision was to increase domestic employment.

The capping of Section 199 by W-2 receipts made the deduction unusable for a significant portion of agricultural producers across the Midwest because they hire little paid labor and generally pay wages that do not withhold taxes (Harris and McEowen, 2013). Furthermore, wages paid to a farmer's dependents or a members of the partnership owning the farm business would not be eligible for the Section 199 tax benefits (ibid). However, the cooperative firms that procured the products of farmers were eligible, as the cooperatives storing, processing, and marketing of raw agricultural products qualified as domestic production. To allow farmers to take advantage of Section 199, lawmakers included a provision in the law allowing cooperatives to pass-through their own deduction to their patrons, as can be seen in the IRS final rules and regulations for Section 199 issued in 2006.[6]

However, while some marketing cooperatives used the pass through provision, many were unsure of its proper application.[7] In fact, the IRS scrutiny of the DPAD deduction for all firm types is rather notorious.[8] Nevertheless, starting in 2008, the IRS began to issue private letter rulings guiding the implementation of the DPAD pass-through for cooperatives (Harris and McEowen, 2013).[9] Moreover, the IRS gave favorable rulings for agricultural marketing cooperatives (Kenkel, Boland, and Barton, 2014).[10] The 2008 letter rulings affirmed that marketing cooperatives could count their cash receipts to producers for commodity sales as advance per unit retains payments in money (PURPIM) (Harris and McEowen, 2013). That is, cooperatives did not have to deduct their cash sales to their patrons from their domestic production gross receipts (DPGR), effectively increasing the potential size of the DPAD deduction (ibid). If commodity sales from patrons represented a substantial portion of a cooperative's business, then the effect of the letter rulings could be quite significant (ibid.). Thus, while the private letter rulings only technically applied to the cooperatives that specifically

[6] See 26 CFR § 1.199–6 Agricultural and horticultural cooperatives.
[7] Tidgren, K., personal communication, February 14th, 2018
[8] See www.mwe.com/insights/a-look-at-tax-code-section-199/#overview for more details (McDermott Will & Emery is one of the largest law firms by revenue in the world).
[9] See IRS written determinations index number: 1382.00-00, 199.06-00 (subject: Taxable Income of Cooperatives) for the start of the letter rulings regarding the Section 199 pass through for cooperatives.
[10] For example of one these favorable letter rulings, see IRS letter ruling: 200806011.

petitioned the IRS, they still provided a rubric for all commodity marketing cooperatives to follow.

Finally, while the IRS letter rulings on Section 199 did indeed give cooperatives an advantage over IOFs, it does not appear the advantage was large enough to induce IOFs to change their firm form to cooperatives. When Section 199A was passed in 2017, grain marketing corporations began to speak of changing their firm forms to cooperatives in order to take advantage of the new tax advantages.[11] Furthermore, even non-agricultural firms were considering forming new cooperatives to take advantage of Section 199A.[12] However, there appears to be no discussion—in the press at least—of corporations forming cooperatives to take advantage of Section 199.

This could be the result of the costs of switching to a cooperative from a corporate form. Orsi, Lisa, and Jacob (c. 2017) discuss how to convert an IOF into a worker-owned cooperative. All means of conversion involve some form of divesting of the original entity and then reinvesting in the new cooperative (ibid.). This process would inevitably include the paying off or reorganizing of liabilities, and the investors of the IOF entity would have to pay capital gains taxes on the value of their equities. The entire process would require the extensive use of lawyers and accountants. Moreover, the process could take several years, as evidenced by case studies in Orsi, Lisa, and Jacob (c. 2017). Thus, while the IRS letter rulings did give an advantage to cooperatives over IOFs, these costs may have been too prohibitive to allow for IOFs to switch to cooperatives.

Example of DPAD and IRS Letter Rulings

The inclusion of the IRS letter rulings creates added complexity to the understanding of DPAD. These complexities are best understood through example. For this example, it is worth using a direct quote at length from the newsletter prepared by tax lawyers with the Center for Agricultural Law and Taxation at Iowa State University:

> Ruraltown Farmer's Cooperative is a marketing cooperative that had $5,000,000 in gross receipts in 2008 from the sale of corn its members delivered to it, who are the farmers that produced the corn. Ruraltown paid $4,000,000 to its members at the time they delivered the corn and another $500,000 in patronage dividends after the close of the 2008 tax year. Ruraltown also had $500,000 of other expenses that includes $120,000 of wages.
>
> Historically, Ruraltown treated the payments to its members at the time they delivered corn as payments for the purchase of the corn. However, after reviewing its membership agreement in light of the letter ruling issued by the IRS, Ruraltown concluded that those payments are advance PURPIM. Therefore, it did not deduct those payments from DPGR to compute its QPAI [qualified production activities income, i.e. DPGR minus relevant expenses and deductions] for 2008

[11] See https://www.wsj.com/articles/agriculture-firms-decry-provision-in-new-tax-law-1515529022 for examples of corporations decrying the effects of Section 199A.

[12] See https://www.forbes.com/sites/peterjreilly/2018/02/11/cooperative-glitch-in-tax-bill-may-mean-food-fight-in-congress/#598cd46d65dd for a journalist discussing the possibility of law firms forming worker-owned cooperatives to take advantage of the law.

> and it included those payments in Box 3 of the 2008 Forms 1099-PATR it sent to its members.
>
> Because Ruraltown marketed grain produced by its members, all of its receipts are DPGR. Consequently all of its expenses are allocable to DPGR and its QPAI is $4,500,000 ($5,000,000 - $500,000). (Harris and McEowen, 2013)

In the above example, without the IRS letter ruling, the cooperatives QPAI would be $500,000 ($5,000,000 - $500,000 - $4,000,000). The DPAD deduction is then the relevant rate multiplied by QPAI, which would be $405,000 with the letter ruling and $45,000 without the letter ruling once the 9% tax deduction went into effect in 2010. This gives commodity marketing cooperatives a substantial potential—actual deduction will be capped by W-2 wages and net income—increase in the size of their Section 199 deduction over non-cooperatives. Furthermore, if they decide to pass through their deduction, it increases the incentive of producers to market their commodities through cooperatives versus IOFs, ceteris paribus.

The 2008 IRS letter rulings created the impetus for cooperatives to change how they calculate the deduction to maximize its size (ibid.). Moreover, the IRS letter rulings on the cooperative implementation of Section 199 may have created a greater reliance on Section 199 for cooperatives for their production decisions as compared to their independently-owned competitors, for the letter rulings only applied to cooperatives. Furthermore, only cooperatives could pass-through their Section 199 deduction calculated at the firm level (ibid.). In the end, the deduction became so important for cooperatives and their members that during the fight to keep Section 199 in the 2017 tax law, the National Council of Farmer Cooperatives claimed that the Section 199 deduction amounted to $2 billion annually across the U.S. with a substantial majority being passed-through to members.[13]

Cooperative Patronage

One limiting factor for cooperative implementation of the Section 199 pass through is that they could only pass through their Section 199 deduction through a specific type of patronage called qualified distributions. Qualified distributions are just one form of cooperative patronage; therefore, to better understand the workings of Section 199 and its implications, some background knowledge in cooperative patronage policy is necessary.

Cooperatives operate according to the user-owner principle. This principle states that those who patronize the cooperative should primarily be the owners of the cooperative. Thus, the accounting profits of the cooperative are primarily generated by its equity holders. Furthermore, when a cooperative makes accounting profits through the business it conducts with its patrons, the cooperative must then choose how to distribute those profits. The profits are then distributed into four categories: “(1) allocated patronage refunds to patrons, (2) unallocated retained earnings, (3) dividends on selected equity classes to owners, and (4) income taxes based on the taxability of the first three distribution choices” (Kenkel, Boland, and Barton, 2014).

Cooperatives have two classes of equity: allocated and unallocated. With allocated equity, the equity on the balance sheet is attached to a specific producer, who has a legal claim to her equity. Cooperatives distribute allocated equity to members based upon their percentage of the total business conducted with the individual cooperative. However, the user-owner structure creates

[13] http://ncfc.org/press-release/co-ops-oppose-increased-tax-burden-farmers/

pressure for the cooperative to redeem—pay out in cash—allocated equity to their patrons at a future date (Li, et al, 2015). If a farm business is no longer using the cooperative, then the equity is useless to the farm business, as the equity does not accumulate interest nor is it transferable to other members (ibid). This pressure to redeem equity at a future date creates ambiguity in how lenders may treat allocated equity on a cooperative's balance sheet (ibid.).

Unallocated equity is not attached to any specific producer and is simply owned by the patrons as a whole. When a cooperative losses money, it can use unallocated equity to absorb the loss (Kenkel, 2016). The presence of unallocated equity, however, may create pressure to dissolve the cooperative if the ratio of unallocated to allocated equity gets sufficiently high (Boland, 2012).

Once a cooperative has decided the amount of profits to allocate, it must then distribute those allocated profits among two different equity classes: nonqualified and qualified. With nonqualified equity, the equity is in the name of a specific producer, but the cooperative assumes the full tax burden of the equity. However, if the equity is redeemed at a future date, then the cooperative receives a refund of its previous tax payments, and the producer must pay a tax on the redeemed equity at their relevant marginal income tax rate. With qualified distributions, the producer is liable for the income tax of the entire distribution; however, at least 20% of the distribution must be paid in cash. One possible downside of qualified distributions is that they may result in a negative cash flow if the percentage paid in cash is less than the producer's marginal tax rate (Kenkel, Boland, and Barton, 2014; Junge and Grinder, 1986). Furthermore, the patron always owes the tax on qualified distributions at the patrons relevant marginal income tax rate—just as corporate shareholders must always pay taxes on dividends received from the corporation.

Qualified distributions become important for the purposes of Section 199 for two reasons.[14] First, IRS code stipulates that the Section 199 pass-through must occur through qualified distributions. However, the pass through cannot be double counted. For example, if a cooperative issues $500 in qualified patronage and passes through $100 in DPAD, then cooperative only gets to deduct the value of the qualified patronage not including the DPAD pass through. Second, because patrons must always pay the tax on their received qualified distributions, the passing through of the DPAD deduction can simply be used against the qualified distribution tax liability, even if the farm business itself makes no accounting profits. For example, consider a farm business that makes $0 in accounting profits, receives $10,000 in qualified distribution with $2,000 paid in cash, and has a tax rate of 20%, then, without any DPAD pass through, the farm business would only have $8,000 in equity after paying taxes. However, if the cooperative also passes through its DPAD deduction, of which the producer receives $500 in tax write-off, then the producer would have $8,000 in equity and $500 in cash after taxes. As such, the DPAD pass through can be seen as increasing the net value of any qualified distributions.

[14] Historically, nonqualified distributions played a small role in cooperative patronage policy (Kenkel, Boland, and Barton, 2014); in fact, in 2008, nonqualified distributions only accounted for 4% of allocated distributions (Eversull, 2010). However, the use of nonqualified—and unallocated equity—distributions has increase in recent years, perhaps because some cooperatives were declining to pass-through their Section 199 deduction (Kenkel, 2016). Still there is no evidence to date—that this author is aware of—that reveals that the use of non-qualified equity has substantially replaced qualified equity for a large majority of cooperatives.

The Optimality of Cooperative Distributions and DPAD Deductions

The choice to pass through the Section 199 lies with each cooperative firm. Cooperatives may indeed take advantage of the Section 199 deduction to reduce their own tax liability. The National Council of Farmers Cooperatives claims that 95% of the Section 199 deduction is passed through by cooperatives to their patrons.[15] However, as no publicly available data exist on cooperative financials, it is not possible to verify this claim. Nevertheless, existing economic research provides some clues about the behavior of cooperatives by asking the question: what is the optimal choice?

Existing research has focused on whether cooperatives should use non-qualified or qualified deductions. The main method of analysis is the maximization of net present value for producers' after-tax cash flow.[16] For example, using simulation methods, authors have shown that the optimal patronage decisions depend on the marginal tax rates of the farm businesses, as compared to the marginal tax rate of the cooperative—which is taxed at the corporate rate (Royer, 1987; Junge and Grinder, 1986). Russell and Briggeman (2014) find that a risk averse producer may prefer a greater proportion of nonqualified distributions to qualified distributions, indicating that producer's perception of the relative risk between the cooperative and the farm business may be more important than marginal tax rates for optimal allocations. However, Royer (2017) finds that after-tax cash flows for producers are maximized when the Section 199 deduction is passed through to producers, ceteris paribus.

Another method used to evaluate whether cooperatives should pass through or retain the DPAD deduction is the maximization of internalized rates of return (IRR). The IRR is a means of calculating the profitability of an investment by finding the discount rate that makes the investment have a zero net present value. Kenkel, Boland, and Barton (2014) find that the IRR is maximized when the Section 199 deduction is retained at the cooperative level. The primary reason for this result would be the reduction in the tax burden created by an increase in the nonqualified distributions, while keeping the farm business' cash flows constant. However, one difficulty of this approach may be member preferences. Zhang et al (2013) find that for Financial Credit Services (FCS) members—a financial cooperative—their patrons favored cash patronage payments over better interest rates. Moreover, they find that the number of FCS associations paying cash patronage increased over the first decade of the 2000s increased from 40 to 73% (ibid). While the study is not perfectly analogous to commodity marketing cooperatives, the results may still indicate that even if Section 199 may be better used at the cooperative level, member preferences may be such that they would prefer the immediate tax break rather than a greater return in the future.

In general, there's no consensus about optimal deduction pass-through strategies. However, there is suggestive evidence in support of cooperatives passing through deductions to their members. Even if the deduction could achieve a higher rate of return at the cooperative level, a higher after-tax cash flow and member preferences may be enough to convince cooperative managers to pass through some if not all of their Section 199 deduction to their members. This implies that the Section 199 provision could impact not only management decisions at the cooperative-level, but also management and marketing decisions by farmers, who may view tax deductions passed

[15] http://ncfc.org/press-release/180-groups-call-house-preserve-section-199-ensure-farmers-not-face-tax-increase/
[16] For the cash-flow studies, it is important to note that equity in cooperatives does not accumulate interest.

through by cooperatives as an additional value of marketing to cooperatives rather than private firms.

These possible effects can by systematically theorized and incorporated into existing theoretical models. Swanson (2019) provides one such approach. The model used by Swanson (ibid) provides several useful predictions. First, the passing-through of Section 199 by cooperatives to their members may lower cash prices at those cooperatives (ibid). Second, IOFs competing against cooperatives that pass-through their Section 199 deduction may have to raise their prices in response to keep their same through-put (ibid). Lastly, the presence of increased competition may mitigate the previous two price distortions caused by Section 199 (ibid). Because of local competition factors causing heterogeneous effects of Section 199, it is important to have a thorough knowledge of the local competitive environment in Midwestern grain markets.

Cooperatives and the Competitive Environment

Another factor possibly affecting possible market distortions caused by Section 199 is market power. Over the last several decades, the conventional notion that agricultural markets largely resemble perfectly competitive markets has been widely challenged (Rogers and Sexton, 1994; Sexton, 2013). While being the typical textbook example of perfectly competitive markets, actors in agricultural commodity markets do indeed have to contend with market power (Lavoie, 2005; Davis and Hill, 1974). A thorough study of commodity markets in the United States needs to account for the possible presence of local oligopsonies. Furthermore, the presence of market power could drastically effect who actually receives the benefits of a policy change (Saitone et al., 2008; Russo et al., 2011). Policies such as Section 199 are legislated at the national level, yet, local oligopsonies may create heterogeneous effects on prices and on welfare outcomes. The effects of oligopsonies on prices may also be influenced by the presence of competing cooperatives (Sexton, 1990). Therefore, a thorough research study into the effects of Section 199 needs to consider the impacts of oligopsonies and the form of the firm possessing local market power.

The key term describing the presence of cooperatives in agricultural markets is the “competitive yardstick”. The competitive yardstick states that producer cooperatives in agricultural markets will counteract some market power exerted by profit-maximizing firms, resulting in higher prices for farm businesses. In commodity markets, cooperatives exert a pro-competitive effect through the vertical integration of farm businesses—thereby, increasing prices for members—and competing for the raw products of farm businesses with IOFs, moving the market towards the perfectly competitive structure.

However, the pro-competitive effects of cooperatives appear to depend on the form of the cooperative itself. In an oligopsonistic market, an open-membership cooperative—a cooperative in which any individual or firm can join—will offer higher prices than its competitors, creating a pro-competitive effect on the market (LeVay, 1983; Sexton, 1986; Sexton, 1990). A closed-membership cooperative, on the other hand, may have a much more limited effect on the competitive landscape in agricultural markets (Helmberger, 1964; Sexton, 1990; Royer, 2014). In fact, if marketing cooperatives have market power on the downstream wholesale/retail markets, then they may use their market power to raise prices on consumers (Cakir and Balagtas, 2012). Yet, if a cooperative is limiting output on the raw product market, the negative social welfare effects may be less than if the cooperative was a profit-maximizing firm (Royer, 2001).

Furthermore, a tax on the cooperatives profits may actually move the cooperative to produce the socially optimal amount (ibid.).

One way in which imperfect competition can occur is through spatial market power. Bekkerman and Taylor (pending publication) find that only 8% of wheat harvested in Kansas is stored on-farm, while the rest is delivered to elevators. Meanwhile, much of this grain is often delivered to locations within a short distance from the farm. Harvest is a busy time for most producers and speed is of the utmost importance; thus, many producers may simply deliver their grain to a nearby elevator to same on travel time (Clark et al, 2003). As a whole, the need for Kansas wheat farmers to use off-farm storage and the need to harvest quickly means farmers are heavily reliant on nearby elevators. In Nebraska and Kansas wheat markets, Vachal and Tolliver (2001) find that over 50% of wheat received by elevators was delivered from a distance no greater than 15 miles while around 75% was delivered from within 30 miles.[17] This reliance on nearby elevators could create the conditions for elevators to exert market power. In fact, Davis and Hill (1974) find that local partial monopsonies may exist during harvest periods of corn. Thus, the pressure on farmers to harvest quickly and the necessity of using local elevators for storage highlights the importance of local grain markets.

In the past, authors have found a positive effect on basis—the difference between the local cash price and the next futures contract at the closest national market—from the introduction of ethanol plants (McNew and Griffith, 2005; Gallagher et al, 2005). Moreover, these effects reverberated for tens of miles around the ethanol plant, but they decreased as the distance to nearby ethanol plants increased (McNew and Griffith, 2005). Thus, impacts on local grain markets from policy changes—even national policy changes—may have spatially heterogeneous effects that depend on local conditions such as transportation distances.

Furthermore, any effects on local grain prices may depend on the density of local elevator competition. If economies of scale exist in the local markets served by agricultural cooperatives, as some studies have indicated (Schroeder, 1992), then local path dependencies may keep new firms from entering the local market. In fact, these economies of scale may encourage local cooperatives or local IOFs to merge and take advantage of these economies of scale. If only a few elevators are competing against each other, then any positive price effects from policy or technological may not pass through to the producer. Bekkerman and Taylor (pending publication) find that the use of a new technology to load grain on trains had a larger positive effect on grain prices in Kansas than in Montana, as Kansas has a much higher density of grain elevators than Montana. In the context of Section 199, any potential market distortions from changes in cooperatives' and/or producers' behaviors caused by Section 199 and the IRS letter rulings may be exacerbated by a lack of local competition.

Data description and empirical model

If Section 199 and its IRS letter rulings did indeed increase the value of marketing grain to cooperatives, then this change in value should cause changes within local grain markets that can be observed. The most direct means of measuring the impact of the IRS letter ruling on Section

[17] Clark et al (2003) find that in Washington 63% of wheat is delivered to elevators within 10 miles of the harvest site, and 85% is delivered to elevators within 20 miles.

199 are cooperative patronage payments. If the IRS letter ruling induces cooperatives to pass through their Section 199 deduction to producers, then this pass-through may appear on their financial statements, enabling a direct calculation of the value of Section 199. Furthermore, the IRS letter ruling may give an advantage to qualified patronage distributions over non-qualified (Royer, 2017). Thus, cooperatives may increase their use of qualified distributions as a percentage of total patronage, ceteris paribus. However, data on cooperative patronage payments are proprietary information. Since almost no cooperatives are publicly traded, patronage data are rarely available to the public.

An alternative approach of measuring impacts of the Section 199 ruling is by assessing differences in pricing strategies among cooperatives and IOFs. If the IRS letter ruling reduces the tax liability of producers delivering to cooperatives, then we would expect the decrease in tax liability to have a similar effect as a decrease in marginal costs: a reduction in price. Furthermore, if the letter ruling incentivizes producers to switch some of their sales from IOFs to cooperatives, it will incentivize IOFs to increase their prices to compete with cooperatives. Both of the above cases would be expected to widen the basis between cooperatives and IOFs.

This alternative approach to measuring Section 199 impacts is particularly useful because local cash price data for individual elevator locations—which would be required to measure differences in cooperative and IOF basis—are readily available. For example, Kansas State University's AgManager database provides weekly basis data for elevator locations throughout the Midwest including North Dakota, South Dakota, Nebraska, Kansas, Colorado, Wyoming, Missouri, Oklahoma, and Texas. In addition, it has data for 1997-2018, which provides the ability to sufficiently account for any ongoing differences in pricing behavior before and after Section 199. The database also provides elevator information on location names and the nearest city.

Basis Data

This study focuses on winter wheat markets for several reasons. First, while U.S. winter wheat acres planted have decreased in the last decade, it is still a widely grown crop throughout the entire Midwest and Great Plains regions. Second, wheat is only indirectly effected by the Renewable Fuels Standard (RFS), reducing possibly conflation effects of policies passed during similar time periods. The RFS is a policy change that significantly affects the basis for corn (McKnew and Griffith, 2005; Carter, Rausser, and Smith, 2017). Furthermore, the RFS may affect soybean prices as well, as it also incentives soy biofuels (Smith, 2018). While the policy may have affected winter wheat prices (ibid), there is no reason to expect that these indirect effects would be different between cooperatives and IOFs, preserving any previous differences in trends. In light of these arguments, winter wheat has distinct advantages over corn and soybeans markets for policy analysis other than RFS.

Using the original data collected from AgManager, we first create a pooled cross-section of weekly elevator-level basis values by using the first and last year firms appear in the dataset to filter them.[18] We exclude firms if they first appear in the dataset after the end of the year 2000 and, also, if firms no longer appear in the dataset after the year 2009. For a firm to remain in the dataset, it must have basis data point during or before the year 2000 and during or later than the

[18] Some firms do not have data for every week observed, and some do not have data points for all years outside of the year boundaries discussed above.

year 2010.[19] This filtering facilitates the creation of more accurate pre- and post-policy trends without the use of firm-specific fixed effects by excluding firms that do not appear throughout all portions of the policy periods. We will also show the results of the unfiltered dataset as a robustness check.[20]

Table 1 presents the summary statistics for the original and filtered. The filtered dataset includes 124 firms of which 98 are cooperatives.[21] The data show that, on average, cooperatives have a weaker overall basis than independently-owned firms by over 10 cents. The standard error is almost the same for both groups, and it is below both means. The range, however, is rather wide as it is almost $3 for both groups. The wide range reflects the time period of the main dataset. The data include points from 2000 to 2017. This year range includes the wide commodity price swings caused by production conditions documented futures market conversion issues, and possible indirect effects of biofuel policies. Table 1 shows that the unfiltered dataset has similar summary characteristics, providing evidence that the filtering does not cause any immediately obvious concerns.

As the summary statistics in Table 1 indicate, the filtered dataset has far more cooperatives than IOFs.[22] The unfiltered dataset is also characterized by more cooperatives than private firms. This disparity is reflective of the competitive landscape in the Midwest, as most firms were started in the early 1900s when producers were attempting to counteract the market power of up-stream buyers.

While the AgManager database has data for several states across the Midwest, we only use data from firms in Nebraska and Kansas. The data for firms in other Great Plains states such as South Dakota and Texas are very sparse once the year restrictions are employed, as can be seen in Table 2. With the imposed year restrictions, no data for firms in Missouri, North Dakota, South Dakota, and Wyoming are available. States like Texas and Oklahoma only have 1 or 2 firms. Such a small number of firms is clearly not going to be reflective of those states as a whole, so all firms outside of Nebraska and Kansas are only used for calculating the number of competing firms within a specific distance for the NE and KS locations (e.g., NE firms that may have competitions across the state border).

Figure 1 presents the average basis by firm type for each year for the filtered dataset. The data show that before the passing of Section 199 in 2004, cooperatives consistently offer a slightly larger basis. After the passing of Section 199 and before the IRS letter ruling in 2008, the difference in basis by firm type appears to hold relatively steady with no large deviation from the difference in the pre-policy period. However, the post-2008 difference in basis does appear to increase, with cooperatives offering even less after the IRS letter ruling is implemented. Furthermore, Figure 3 shows the average basis by policy period for each firm type. The figure

[19] A firm that only appears in the dataset for a week or a year may have unique characteristics that can only be accounted for through firm-specific fixed effects. However, since cooperatives rarely switch to IOFs and vice versa, the cooperative designation is will not change throughout the time frame of the dataset. Thus, any firm-specific fixed effect will negate the calculation of the cooperative coefficient.

[20] We use robustness checks to determine to what extent various data management decisions potentially affect the results. See Swanson (2019) for results.

[21] The ratio of cooperatives to IOFs is similar to the findings of other papers (Bekkerman and Taylor, pending publication).

[22] Details on how firm types are identified can be found in Section 5 of Swanson (2019).

supports the supposition that the IRS letter ruling on Section 199 may have affected the difference in basis between cooperatives and non-cooperatives.

Firm Location Data

The original data only provide the name, city, and state of firms. To determine the specific location of firms, we find the latitude and longitude of the city centroid of the city name where an elevator is located.[23] While the city centroid may not be the most precise approach, it should still be fairly accurate as most elevators are located within city limits on railroad lines.[24] Using the provided elevator city location, we located the city center and then collected its latitude and longitude. Figure 3 shows a map of the firms within the filtered dataset.

Figure 4 displays the locations of the firms in the unfiltered dataset. In Kansas, firms are spread throughout the entire state while in Nebraska firms are clustered towards the southeastern third of the state. The clustering in Nebraska is representative of the wheat growing regions in that state, as fewer farms in the northwestern region grow grains because of the local climate and soils. Nevertheless, the map reveals that cooperatives tend to be more isolated than IOFs, especially in Nebraska where IOF presence is lower than Kansas. Thus, any empirical model will need to account for spatial competition.

After assigning latitude and longitude coordinates for each firm, we calculate how many other firms are within a certain radius of a firm's city centroid. A competing firm is classified as a distinct elevator location within our full, original data (prior to filtering). The competing location may be owned by the same company or the same parent company (primarily because we do not have info to accurately identify ownership). Furthermore, we use firm locations in the states surrounding Nebraska and Kansas—when available—as some firms are clearly on the border of either state. This approach ensures that we are using all possible firms as competitors. The possibility exists that a firm may be operating throughout the entire time frame of our dataset, but it only appears in our dataset for one month. We, therefore, include firms that do not meet our year restrictions as competitors within our dataset. We use radii of 10, 20, and 30 miles (Clark et al, 2003; Vachal and Tolliver, 2001).

Table 3 shows that the vast majority of all the firms have competitors within 10 miles of their city centroid—for both datasets. In fact, with the filtered dataset, there are only 4 firms that do not have a competitor within 20 miles of their city center. This high spatial elevator density is another reason for excluding firms not located in Kansas and Nebraska. Firms in our dataset from other Great Plains states by nature do not have as many firms within 10 to 20 miles as firms in Nebraska and Kansas.[25] In the agricultural regions of states such as Colorado, Texas,

[23] We first attempted to use Google Earth, the elevator names, and the provided city to find the exact location of each elevator. Many remote elevators, however, do not have a location pinpointed on Google Earth, so any algorithmic approach would substantially misidentify the location of some firms. Furthermore, some firm locations are acquired by rival companies, or they are currently out of use, meaning their address is no longer provided on the company's website. While some firms can be located through a visual inspection of Google Earth, this approach is rife with the potential for error.

[24] See map of firm locations in Bekkerman and Taylor (pending publication).

[25] This is mainly because of the lower density of the towns in the other states. See image at the end of this section for reference.

Oklahoma, and South Dakota producers regularly driver farther to deliver their grain than producers in Nebraska or Kansas (Vachal and Tolliver, 2001).

Table 3 shows that cooperatives have slightly fewer firms on average within 10 miles of their city centroid than independently-owned firms. This slight disparity, however, tilts towards cooperatives as the radius of competition expands to 20 miles. If the radius of competition is 20 miles, both types of firms have almost 10 firms on average within that distance from their city centroid. This amounts to an almost four fold increase in the average number of competing locations as the radius of competition doubles from 10 to 20 miles. This increase in the number of firms then doubles from roughly 10 to around 20 competing firms as the competition radius changes from 20 to 30 miles. These statistics further demonstrate the intense elevator competition in Nebraska and Kansas. Most producers should have multiple options to deliver their grain within an approximately 30 minute commute of their fields.

Empirical Model

The IRS letter rulings represent an exogenous policy change within the U.S. grain merchandising landscape—a decision made separate from actions of producers, cooperatives, and private grain merchandisers. This is especially the case because firm-type decisions—such as deciding to be a cooperative or IOF—were made long before the policy came into effect. Thus, self-selection and reverse causality will likely not be significant issues in the empirical analysis. Additionally, this type of policy change lends itself to the use of a well-known difference-in-difference class of models. A difference-in-difference model will facilitate the testing of differences in trends in basis between cooperatives and IOFs.

The major assumption of a difference-in-difference model is parallel trends between the treatment and the control groups prior to the treatment taking effect. In this case, the assumption is that prior to 2004, there is no discernible difference in basis trends between cooperatives—the treatment group—and IOFs—the control group. The two groups may have different baseline levels for the dependent variable, but the baseline levels must be trending in the same direction and at relatively the same rates. In the context of this paper, this assumption implies that the basis trends of cooperatives and IOFs must be similar prior to the passing of Section 199 in 2004 and the IRS letter rulings in 2008. As seen in Figure 1, there appears to be no real differences in trends between cooperatives and IOFs prior to the 2004 law. The Section 199 law may have caused some widening of the basis differential between 2005 and 2008, but after the 2008 IRS letter rulings went into effect, the basis differential appears to widen even more.

Equation (1) presents the basic difference-in-difference model. BS_{icswt} represents the basis observed for firm *i* located in county *c* and state *s* during week *w* and year *t.* The model accounts for differences between average IOF and average cooperative basis before the Section 199 policy change ($Coop_i$), differences in the average basis of IOFs after the passing of Section 199 in the year 2004 and the pre-policy period (Law_t), differences in the average basis of IOFs after the IRS letter ruling in 2008 and the pre-policy period (IRS_t), differences in the average basis between cooperatives and IOFs during the period after the passing of Section 199 but before the IRS letter rulings ($Coop_i * Law_t$), and the differences of basis between cooperatives and IOFs after the issuing of the IRS letter rulings ($Coop_i * IRS_t$). Equation (2) has the same basic model as (1), but it also controls for the number of competing firms within a defined radius of the city centroid of firm i (CM_i).

$$BS_{icswt} = \beta_0 + \beta_1 Coop_i + \gamma_1 Law_t + \gamma_2 IRS_t + \delta_1 Coop_i * Law_t + \delta_2 Coop_i * IRS_t + \epsilon_{icswt} \quad (1)$$

$$BS_{icswt} = \beta_0 + \beta_1 Coop_i + \sigma_0 CM_i + \gamma_1 Law_t + \gamma_2 IRS_t + \delta_1 Coop_i * Law_t + \delta_2 Coop_i * IRS_t + \epsilon_{icswt} \quad (2)$$

In reference to the above equations, if cooperatives tend to have a different basis on average than IOFs – perhaps because of cash dividend payments – then this difference will be captured by the cooperative coefficient estimate β_1. If Section 199 and/or the IRS letter rulings caused cooperatives to lower their cash price offers, then this effect will be captured in the differential δ_2. These two coefficients will be the primary coefficients of interest to test the hypothesis about the impacts of Section 199.

Spatial Competition

As other authors have noted (Clark et al, 2003; Vachal and Tolliver, 2001), wheat producers in high production regions rarely travel more than 50 miles to deliver their grain. In fact, 70-80% grain is delivered inside of 30 miles for Nebraska and Kansas (Vachal and Tolliver, 2001). Thus, spatially isolated firms may possess some market power, as producers may be unwilling to pay the extra expense in time and monetary costs to truck their grain over distances greater than 30 miles. Moreover, as can be seen Table 3, only 4 firms do not have a competitor within 20 miles for the filtered dataset, and for the unfiltered dataset, only 13 firms do not have a competitor within 20 miles. Most producers should have several options to deliver their grain within a 20 mile distance. Thus, for producers to deliver their grain longer than 20 miles, the price difference may have to be more than a few cents (Edwards, 2017).

We measure the interaction of spatial competition with Section 199 policy effects using both the intensive and the extensive margins. The intensive margin of spatial competition measures how intense—in the sense of the number of firms—the competition is within a certain radius. The extensive margin measures the effect of the exist—whether competition exists—within a certain radius.

As it may be the case that only a small portion of grain is delivered outside of 25 miles, this study will focus on intensive effects within a distance of 30 miles with competition radii of 10, 20, and 30 miles for the intensive margin. In equation (2), (CM_i) counts the number of firms within a specific radius of firm *i's* city centroid, with (σ_0) measuring the effect.

As can be seen in Table 3, very few firms do not have competitors within 20 miles of their city centroid, and a radius smaller than 10 miles may not capture competition from firms in another town down the highway. Furthermore, most grain may not be trucked within a distance of 10 miles (Vachal and Tolliver, 2001). Thus, a radius of 10 miles will be the primary cutoff point to determine the effect the extensive margin of competition. This model will not in any way change equations (1) or (2); it will simply change the subsample. The effect of extensive margin will be examined by comparing the intercept β_0 and the cooperative coefficient β_1 of both subsamples to each other.

Fixed Effects and Clustering of Standard Errors

The dataset discussed in the previous subsections contains relatively few controls because the AgManager database does not collect information about elevator location characteristics. The lack of controls creates the possibility of coefficient bias caused by factors omitted from the regressions such as distance to processors, railroad access, and seasonal variation. However, fixed effects could be included in equations (1) and (2) to account for many of these time-dependent or location-dependent factors.

All of the models include week fixed effects to control for variation due to sources such as harvest and planting season and year fixed effects to control for sources of variation such as drought and large Canadian harvests. State fixed effects control for factors such as the Kansas City Board of Trade's presence in Kansas City. County fixed effects control for factors such as railroad access or the presence of flour mills. The state fixed effect is a time invariant control and the year fixed effect is a state invariant control. While both of these fixed effects can control for a number of unobserved factors, they are both too broad to control for factors such as a flour mill shutting down for several months in Kansas or a drought only affecting half of Nebraska. These sources of variation need to be controlled by fixed effects that can vary by time and region, which the state-by-year fixed effect does.

The primary fixed effects model is the state-by-year model for several reasons. First, the state fixed effects model is too broad of a measure. It is a reasonable assumption that the fixed effects in each specific state varies from year to year, as the supply and demand dynamics in each state change from year to year. Year and state fixed effects by themselves are not enough to pick up this variation. On the other hand, the county fixed effects model may be too narrow of a specification. Many rural counties in Kansas and Nebraska have very few if any private firms that we observe. Thus, the county specific fixed effect may absorb some basis variation that should be attributed to a differential with a cooperative dummy variable. In a perfect world, we would observe every firm for every week of the year. In that case, a county-by-year fixed effect model would be the best model, provided it does not remove so much variation as to make it impossible to identify the impacts of the Section 199 legislation. With the data we observe, however, the state-by-year fixed effects is the best model available, as it allows for year specific local supply and demand changes. These year specific changes will partially account for broad changes across each state such as a gradual decrease in the number of firms, changes in land use, technological adaptation, and more localized weather conditions.[26]

For the dataset used in this paper, firms directly competing against each other are likely to have similar idiosyncratic error terms. If one firm increases its basis for some uncontrollable reason, then the firm competing against it 5 miles down the road is more likely than other firms to also increase its basis by the same amount. Thus, their error terms are likely to be correlated. The correlated idiosyncratic errors within groups may lead to standard errors being smaller than they should be, increasing the likelihood of a Type I error—i.e. reject a true null hypothesis (Angrist and Pischke, 2009).

[26] Using agricultural districts in lieu of counties or states as the geographic region for fixed effects is another possibility. However, we find that neither county nor state-by-year fixed effects models differ from each other by a substantial margin from each other. Thus, agricultural districts may not provide any new information.

While fixed effects will account for omitted variable bias, fixed effects, in and of themselves, may not fully control for correlated error terms within groups, (Angrist and Pischke, 2009). As such, this may not mitigate the possibility of a Type I inference error. One approach to reduce the Type I error possibility is to cluster according to competition groups. For example, if one group of five firms compete against each other for the business of producers in their area but not against a group of three other firms thirty miles away, then we would need to cluster the error term by each group. However, we do not observe these competition groups. A second-best alternative is to cluster at the smallest regional level possible as producers are unlikely to truck their grain across distances more than 50 miles (Clark et al, 2003; Vachal and Tolliver, 2001). Thus, the county level is the best available option for clustering standard errors to eliminate the possibility of a Type I error.[27]

We also employ White robust standard errors. While we are much more concerned about correlation within observed groups than, the possibility still remains that the value idiosyncratic errors could be dependent on values of the explanatory variables. This again creates the possibility of a Type I error—Type II error is also a possibility—(Wooldridge, 2009). White robust standard errors will account for this serial correlation, minimizing the chance of a Type I error (ibid.).

Results

We developed a model of cooperatives' grain purchasing decisions. The model assumes that a cooperative seeking to maximize the net returns to its patrons will weigh the benefits of paying higher prices to its members—and possibly buying more quantity—with the costs of a decrease in the available dividend payment to its patrons. Producers will make production decisions based on their marginal costs, the offered price, the size and structure of the patronage payment, and the tax liability from the patronage payment. The model generated two testable hypotheses. First, Section 199 and its IRS letter rulings will lead to a decrease in the cash price offered by cooperatives. Second, the effects of this decrease in price will be partially mitigated by the presence of competing firms. We test the two hypotheses by a difference-in-difference model to a historical weekly dataset of basis value at cooperatives and independently-owned firms (IOFs).

All marginal effect estimates refer to changes in basis as measured in cents per bushel. For a proper interpretation of the results, a practical context is necessary. As more fully discussed in Sections 1 and 2, cooperatives play an important role in the marketing strategies for many agricultural producers across the rural Midwest. Any consistent action taken by agricultural cooperatives will affect tens of thousands of producers, and past research lacks empirical studies comparing the pricing behavior of agricultural cooperatives to independently-owned firms (IOFs). Furthermore, as noted by Russo et al. (2011), imperfect competition in agricultural markets can affect the welfare enhancing effects of public policy. These issues provide the context for determining the policy and economic significance of the following results section.

[27] One other option would be to cluster by firm type as the error terms of cooperatives may be correlated because of similar legal and regulatory factors. However, it is this author's opinion that while there may be some correlation by firm type the correlation from firms competing within the same county is likely to be much stronger. That is, a cooperative near Garden City, Kansas is much more likely to have correlated errors with a private firm in the same town than a cooperative outside Omaha, Nebraska. Thus, clustering at the county level versus by firm type is more appropriate.

Base Difference-in-Difference Model

Table 4 presents the parameter estimates of the difference-in-difference model that use the filtered data. The cooperative coefficient compares the average price offered by cooperatives to the average price offered by IOFs before the enacting of Section 199 in 2005. This coefficient estimate indicates an economically and statistically significant 4-8 cents per bushel lower average bid at cooperatives relative to IOFs. The lower price could have several explanations. First, the lower cooperative price could be the result of cooperatives issuing patronage either in the form of equity or cash. Second, the price difference could reveal cooperatives to be a higher cost marketer of grain than the independently-owned firms. Third, as Table 3 shows, cooperatives tend to have fewer competitors within 10 miles than private firms. This isolation could allow some cooperatives to exercise market power through lowering prices.

A 4 to 6 cent decrease is economically significant. For example, if a producer averages 50 bushels per acre and farms 1,000 acres, an 8 cent price difference represents $4,000 less in revenue while a 4 cent decrease would be $2,000 in less revenue. However, this possible loss in revenue could be compensated by an equal value of patronage in the cooperative in the form of equity and cash payments, but the level and type of compensation will depend on the individual cooperative.

Results in Table 4 also show that the first Section 199 and cooperative differential reveals no statistically discernible difference between the price trends at cooperatives and independently-owned firms from 2005 to 2008—the years after the original passing of the law in 2004 and before the IRS letter rulings—as compared to the years prior to 2005. This result indicates that while the original tax break may have affected local grain prices, it did not affect cooperatives and IOFs in a consistently distinct manner. This result makes intuitive sense. During this period, Section 199 was relatively small—3% for 2005 and 2006 then 6% from 2007 to 2009. Furthermore, many cooperatives were unsure of the proper application of Section 199 until the IRS letter rulings in 2008.[28] Any change in the differential between cooperatives and IOFs would be relatively small in this period because of the size of the deduction and the uneasiness about the application of Section 199 until the IRS letter rulings.

For all three specifications, the second cooperative and Section 199 term is negative and statistically significant at least at a 10% level. Since this term is a differential, the result does not necessarily mean that basis has been trending downwards at cooperatives in absolute terms. Rather, compared to IOFs, cooperatives have offered on average at least a 4 cent lower price bid during the time period of 2009-2017. This difference is in addition to a possible difference in basis between cooperatives and independently-owned firms in the pre-treatment period of the years prior to 2005. It should also be noted that part of this widening of the basis between cooperatives and IOFs could be explained by IOFs increasing their cash price to counter the lowered tax liability for cooperative patrons. If producers are shifting grain sales to cooperatives, IOFs would then need to increase their own price to maintain the same level of volume.

A 4 cent decrease amounts to $2,000 in lost grain sale revenue for a producer farming 1,000 acres and averaging 50 bushels of winter wheat per acre. This lost revenue, however, could be offset by a commensurate increase in equity and cash dividend payments at the cooperative if the

[28] Tidgren, personal communication, 2018

lost revenue occurred because of changes in the patronage tax rate. However, it is still unclear whether any potential benefits are large enough to fully offset the decrease in price.

If cooperatives issue more patronage as a result of the lower prices, then some of the negative side-effects of the lower price effects would be mitigated. However, there is no empirical literature discussing cooperatives members' preferemces on higher patronage in lieu of higher cash prices. The lower prices imply that some of the benefits of Section 199 are accruing at the cooperative level in the form of more equity. Whether this is a beneficial trade-off for producers depends on how the cooperative invests the greater amounts of equity. This is especially true given the fact that equity in cooperatives does not accrue interest nor is it transferable among members. These limitations on equity must be offset by investments with strong rates of return for the increased equity to offset the negative effects of lower prices. However, additional detailed financial data from cooperatives and their members are needed to precisely perform a full cost-benefit analysis.

Furthermore, it should be noted that the presence of patronage payments would not necessarily imply the presence of economic profits for cooperative members, as is generally suggested in the cooperative literature (LeVay, 1983; Sexton, 1984; Royer, 2001). The lack of interest on and the non-transferability of cooperative equity would imply a possible discounting of equity in cooperatives by cooperative members. Moreover, it is possible that any economic profits are eliminated through non-price competition such as queueing for grain deliveries.[29] Therefore, the presence of persistent patronage payments may not be a theoretical anomaly as some authors believe.

Table 5 shows parameter estimates for data that include all elevator locations in Nebraska and Kansas from the years in 1998-2017. With this data specification, the cooperative differential is statistically distinct from zero for all of the models, but its magnitude is slightly less than the cooperative differential in Table 4. For the cooperative and Section 199: IRS differential, the results of the filtered dataset in Table 4 match the results of the unfiltered dataset in Table 5 with the results of Table 5 being slightly larger in magnitude than Table 4. Thus, it appears some of the differences in the cooperative differential between the two specifications may be influencing the slight differences in the Section 199: IRS differential, as adding the cooperative differential to the cooperative and Section 199 differential yields the same value—respective to each model—for both data specifications. Nevertheless, with either dataset, the result remains the same: a persistent widening of the price difference between cooperatives and IOFs following the IRS letter rulings in 2008. [30]

Expected Basis by Firm Type and Competition Level

While Tables 4 and 5 appear to provide evidence that the IRS letter rulings of Section 199 may indeed have caused a widening of the basis between cooperatives and IOFs, a more thorough analysis of the effects of spatial competition shows the importance of spatial market power in possibly determining the magnitude of the effects of Section 199. To study the importance of spatial market power, we not only use an intensive competition control, but we also subsample

[29] See Barzel (1976) for a dissipation of economic profits by non-price competition.
[30] For more model specifications including different competition radii, dropping Section 199: IRS or Section 199: Law variables, leading and lagging Section 199: IRS variable. See Swanson (2019) for the results of these robustness checks.

the filtered dataset by whether an elevator location has a competing elevator within 10 miles of its location.

Figures 5 and 6 help to illustrate the heterogeneous effects possibly caused by the presence of local spatial market power. Both figures are representations of in-sample predicted values from regressions that utilized subsamples of the filtered dataset by whether or not an elevator location has another elevator location within 10 miles.[31] The in sample predicted values for each observation are averaged by firm type and policy period. Even though these figures are not the regressions themselves, they still illustrate the greater market distorting effects of the IRS letter rulings on elevator locations lacking a competing location within 10 miles.

Figure 5 shows the predicted basis for elevator locations that have a competitor within 10 miles of the locations city-centroid. The basis differential in Figure 5 follows the typical path observed throughout the results section: a nearly 9 cents difference between cooperatives and IOFs before any policy change, a slight widening of 1 to 2 cents after the passing of Section 199 in 2004, and an even greater of widening of 4 to 5 cents after the IRS letter rulings in 2008—with cooperatives paying less in all cases. However, Figure 6 tells a different story. Figure 6 shows that, before the passing of any policy, cooperatives offered a stronger basis of roughly 5 cents per bushel. Furthermore, this difference increased by a few cents after Section 199 was passed in 2004; however, after the IRS letter rulings were issued in 2008, cooperatives then pay a few cents per bushel less than IOFs. Thus, the IRS letter rulings may have caused a reversal in which firm type offers a stronger basis for the subsample of grain elevators that do not have a competitor within 10 miles of their location.

This reversal in the differential in Figure 6 appears to be driven by the actions of cooperatives and IOFs. The decrease in average basis for cooperatives after 2008 does appear to be a few cents less for cooperatives that do have a competitor than those that do not. However, after 2008, non-cooperatives that do not have a competitor within 10 miles of their location do not lower basis as much as the non-cooperatives that do have a competitor within 10 miles of their location. These results together mean that the effects of the IRS letter rulings appear to have a greater impact on the difference between the cooperative and the IOF price for elevator locations do not have a competitor within 10 miles than those that do.

Tables 6, 7, and 8 can be used to help further substantiate this result. These tables present the expected basis—adding relevant differentials to the intercept plus the average of the year fixed effects for each policy period—by firm type, policy period, and competition level. For example, the Pre-Policy value for cooperative firms in Table 6 is the intercept term plus the cooperative differential from Table 4—using Model 3.[32] The tables also include the difference between the basis offered by cooperatives and the basis offered by IOFs—defined as the IOF basis minus the cooperative basis. This difference is equivalent to the cooperative term plus any relevant policy differential. Although the tables do not provide any new analysis, they help to show the differentials from the cooperative and policy terms within the context of the market as a whole.

Table 6 presents the expected values associated with the model and results presented in Table 4. Although the average basis across both firm types increases by almost 20 cents during the first Section 199 period, the difference in basis between cooperatives and IOFs hardly changes. While

[31] The actual results of these regressions can be seen in Tables 6.14 and 6.15 of Swanson (2019).
[32] The results for the other regressions can be found in Tables 6.14 and 6.15 of Swanson (2019).

in the second policy period, the average difference between firm types grows even as the baseline level decreases. There may be a slight trend towards a widening of the basis between cooperatives and IOFs; however, the IRS's letter rulings on Section 199 appear to exacerbate this trend.

Tables 7 and 8 show the expected values of basis for firms with competitors within 10 miles and firms without competitors within 10 miles, respectively. Throughout all of the policy periods, the difference between IOFs with competitors within 10 miles and IOFs without competitors within 10 miles is close to 20 cents. However, for cooperatives, the difference is only a few cents with cooperative elevator locations that do not have a competitor within 10 miles consistently offering a slightly weaker basis than those that do. Thus, the results indicate that cooperatives may not exert their spatial market power in the same manner as IOFs.

This result can be seen in the opposite signs of the difference columns in Tables 7 and 8. In Table 7, the sign is positive, meaning that IOFs, on average, offer a stronger basis than cooperatives when there is a competing grain elevator location within 10 miles. However, in Table 8, the sign is negative, meaning that—for elevators that do not have a competitor within 10 miles—cooperatives offer a stronger basis on average than IOFs.

Furthermore, before the IRS letter rulings, it appears the basis spread between IOFs and cooperatives trends in different directions, depending on the spatial competition level. Table 7 shows the positive spread between cooperatives and IOFs increasing by 1 cent per bushel during the policy period when Section 199 was in effect, but Table 8 shows the negative spread increasing by almost 5 cents in magnitude.[33] Thus, there appears to be non-parallel trends before the IRS letter rulings were issued in 2008 depending on the competition level.

In light of these possible differences in trends, comparing the basis spreads of the last two policy periods—when the Section 199 was in effect but before the IRS letter rulings were issued to the time period after the IRS letter rulings were issued—reveals that the IRS letter rulings may have caused a greater impact for cooperative elevator locations without a competitor within 10 miles. On Table 7, the difference between the second policy period and the last policy period is 4 cents per bushel, but on Table 8, the difference is 7.4 cents per bushel.[34] Thus, the effect of the IRS letter rulings on the basis spread between cooperatives and IOFs appears to be almost twice as large for cooperative elevator locations that do not have a competitor within 10 miles than those that do. A lack of spatial competition leaves more profits for patronage and, thus, an increase in the size of the tax cut caused by the passing through of Section 199. This larger tax cut means an even greater decrease in the price for cooperatives after 2008 and an even greater increase in the price of IOFs after 2008. Thus, a greater widening of the basis differential of cooperatives and IOFs for elevator locations that do not have a competitor within 10 miles than locations that do.

Conclusion

Section 199 remains an important policy in the U.S. grain marketing landscape. The histrionics of 2017 notwithstanding, Section 199 is also a relatively significant policy that has largely been unremarked on by economists. This paper is the first systematic work analyzing the impacts of

[33] Neither the 5 cent nor the 1 cent differentials are distinct from zero at a 10% level when compared to the pre-policy period. Nevertheless, they still indicate that the raw data may contain distinct trends depending on the level of spatial competition.

[34] Both the 4 cent difference and the 7.4 cent difference are significant at the 10% using an F-test.

Section 199 and the management responses by firms directly affected by the policy—cooperatives—as well as privately-owned firms, which are indirectly affected through market competition.

Section 199 legislation has had important price-distorting effects in the U.S. grain marketing landscape. That is, because Section 199—especially after the 2008 IRS letter rulings—provided a disproportionate marketing advantage to cooperatives over independently-owned firms, we show that one or both types of firms altered their price management strategies. Specifically, we use a difference-in-difference analysis to measure possible changes in the price spread between cooperatives and non-cooperatives for winter wheat markets in Nebraska and Kansas caused by Section 199 and its complementary IRS letter rulings. The analysis shows that Section 199 itself may not have caused a divergence in basis spreads between cooperatives and non-cooperatives; however, the IRS letter rulings that increased the value of Section 199 to the patrons of agricultural cooperatives may very well have. We find that the IRS letter rulings are associated with an increase in the price spread between cooperatives and non-cooperatives of roughly 5 cents on average.

Because prices provide critical market signals for grain producers and elevator managers, the distortions may affect the effectiveness and efficiency of operations in U.S. grain markets. Therefore, we provide the first evidence that, even though Section 199 may very well have created real, tangible benefits for farm businesses and cooperatives, these benefits to cooperatives and their patrons also may have come with costs in the form of distorted prices.

It is important to note that while there is strong and robust evidence of price-distorting effects of Section 199, the full welfare effects of Section 199 on all parties—producers and processors, cooperatives and private firms, and taxpayers—is difficult to assess without additional patronage and grain sales data. It may be the case that Section 199—on net—is indeed welfare enhancing, as a simple supply-and-demand undergraduate tax analysis would suggest. However, an important question needs to be raised as well: Who gets the benefits? Rogers and Sexton (1994) present evidence of oligopsonies in multiple agricultural markets. Saitone et al (2008) find that in regards to the Renewable Fuels Standard farm businesses may only receive 25% of the subsides. If Section 199 and its IRS letter rulings do indeed weaken the basis offered by cooperatives, then part of the tax break may be flowing back to cooperatives in the form of lower prices. This is especially true in local markets served by a few or perhaps only one grain marketing firm. We find that elevators without a competitor within 10 miles experienced a wider price spread between cooperatives and non-cooperatives after the IRS letter than elevator locations with at least one competitor within 10 miles. If some of the benefits of Section 199 are flowing back into cooperatives, then future research may be needed to explore how cooperatives are investing their funds and whether these investments truly benefit their members.

This work also provides important new insights for economists conducting policy and marketing research of cooperatives. While several authors have explored the relations of taxes to the net present values of producers' equity in cooperatives (Junge and Ginder, 1986; Royer, 1987; Royer, 2001; Kenkel et al, 2014), this paper is the first work to empirically assess how changes in the tax rate affect cooperatives' price bidding behaviors. Regardless of the accounting profitability of the farm business, farm businesses must always pay income taxes on their received qualified patronage. If farm businesses incorporate patronage payments into their decision making, then the tax on qualified patronage becomes, in effect, a tax on output. The

increase in the price spread between cooperatives and non-cooperatives after the IRS letters increased the effective size of the Section 199 deduction provides evidence in support of the output tax. Any future work that assesses cooperatives' management decisions needs to account for the effects of the patronage tax.

More broadly, this paper is also one of the only empirical works—along with Katchova (2010)—that assesses differences in price bidding behaviors by cooperatives and independently-owned grain marketing firms. The possibility of patronage payments from cooperatives means that cooperatives and IOFs provide benefits in distinct manners to farm businesses. These differences should be reflected in prices. We find that before any policy changes cooperatives on average were offering almost 9 cents less than IOFs. This difference in price raises questions about the theoretical hypothesis that cooperative patronage payments should be zero in the long-run (LeVay, 1983; Sexton, 1984). It may be that grain marketing cooperatives use capacity levels, producer expectation models (Royer and Smith, 2007), or some combination of the two to create positive patronage payments in the long-run. However, the persistent presence of patronage payments does not necessarily imply that cooperative patrons are earning economic profits because non-price competition such as queueing at grain elevators may offset any value above marginal costs.

Finally, it should be noted that Section 199 and its letter rulings are still in effect today. This policy continues to affect grain markets, and the 2017 controversy over Section 199A revealed that cooperative lobbying groups continue to have strong influence on policy makers. Policy makers, however, need to be informed of the full costs and full benefits of their decisions. The results of this paper add a dose of reality to the benefits-only arguments of Section 199 proponents, and will hopefully lead to more enlightened debate when another version of Section 199A or other similar tax incentive policies are proposed in the future.

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Table 1: Summary Statistics by Firm Type

	Filtered by Year		Unfiltered by Year	
Statistic	Firm Type		Firm Type	
	Cooperative	IOF	Cooperative	IOF
Number of Firms	98	26	604	150
Number of Observations	70, 992	14,232	157,380	30,664
Average Basis	-0.510	-0.391	-0.610	-0.471
SE Basis	0.334	0.337	0.361	0.378
Maximum Basis	0.635	1.198	0.690	1.198
Minimum Basis	-2.171	-1.845	-2.425	-1.958

Note: Filtered by year dataset excludes all firms without data points before the year 2000 or without data points after the year 2010. Unfiltered dataset contains no year restrictions. IOF stands for independently-owned firm. Both datasets only include firms in Nebraska and Kansas.

Table 2: Number of Each Firm Type by State

	Filtered by Year		Unfiltered by Year	
State	Firm Type		Firm Type	
	Cooperative	IOF	Cooperative	IOF
CO	4	3	26	26
KS	49	18	409	105
MO	0	0	10	23
ND	0	0	65	40
NE	49	8	195	45
NM	1	1	2	1
OK	1	1	83	53
SD	0	0	98	38
TX	1	0	76	29
WY	0	0	1	0
Total	105	31	965	360

Note: Filtered by year dataset excludes all firms without data points before the year 2000 or without data points after the year 2010. Unfiltered dataset contains no year restrictions. IOF stands for independently-owned firm.

Table 3: Competition Statistics by Firm Type

	Filtered by Year		Unfiltered by Year	
Statistic	Firm Type		Firm Type	
	Cooperative	IOF	Cooperative	IOF
Number of Firms:	98	26	604	150
With Competitors within 10 Miles	84	22	517	126
With Competitors within 20 Miles	94	26	595	145
Average Number of Competitors:	Cooperative	IOF	Cooperative	IOF
Within 10 Miles	2.57	2.92	3.02	3.28
Within 20 Miles	9.98	8.96	10.82	8.80
Within 30 Miles	21.12	18.81	22.94	18.77

Note: Filtered by year dataset excludes all firms without data points before the year 2000 or without data points after the year 2010. Unfiltered dataset contains no year restrictions. IOF stands for independently-owned firm. Both datasets only include firms in Nebraska and Kansas.

Table 4: Difference-in-Difference Controlling for Competitors within 30 Miles: Subsampling by Years

Variable	Model 1	Model 2	Model 3
Cooperative	-0.083***	-0.041*	-0.088***
	(0.031)	(0.021)	(0.031)
Additional Firm within 30 Miles	0.004***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)
Cooperative & Section 199: Law	-0.006	-0.012	-0.004
	(0.028)	(0.018)	(0.030)
Cooperative & Section 199: IRS	-0.064**	-0.046*	-0.042*
	(0.025)	(0.025)	(0.024)
Intercept	-0.502***	-0.517***	-0.508***
	(0.037)	(0.029)	(0.035)
R-Square	0.715	0.758	0.723
Observations	72,715	72,715	72,715
Week Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Fixed Effects	Yes	No	Yes
County Fixed Effects	No	Yes	No
State by Year Fixed Effects	No	No	Yes

Note: Coefficient values are listed parallel to their respective independent variable name while the respective standard errors are listed below their coefficients in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. All firms with starting years greater than 2000 or with ending years greater than 2010 were excluded from the data set. Section 199: Law represents the treatment effect of the passing of Section 199 in the American Jobs Creation Act of 2004. Section 199: IRS represents the issuing of the IRS letter rule in 2008.

Table 5: Difference-in-Difference Controlling for Number of Competitors within 30 Miles: No Subsampling of Firms

Variable	Model 1	Model 2	Model 3
Cooperative	-0.051*	-0.039**	-0.058**
	(0.026)	(0.017)	(0.026)
Additional Firm within 30 Miles	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Cooperative & Section 199: Law	-0.024	-0.01	-0.022
	(0.025)	(0.019)	(0.025)
Cooperative & Section 199: IRS	-0.079***	-0.056**	-0.066**
	(0.029)	(0.027)	(0.028)
Intercept	-0.549***	-0.537***	-0.560***
	(0.029)	(0.027)	(0.027)
R-Square	0.693	0.723	0.698
Observations	188,044	188,044	188,044
Week Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State Fixed Effects	Yes	No	Yes
County Fixed Effects	No	Yes	No
State by Year Fixed Effects	No	No	Yes

Note: Coefficient values are listed parallel to their respective independent variable name while the respective standard errors are listed below their coefficients in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Section 199: Law represents the treatment effect of the passing of Section 199 in the 2004 American Jobs Creation Act. Section 199: IRS represents the issuing of the IRS letter rules in 2008.

Table 6: Expected Values by Firm Type and Policy Period

Policy Period	Firm Type		Difference
	Cooperative	IOF	
Pre-Policy	-0.550	-0.474	0.076
Section 199: Law	-0.733	-0.650	0.083
Section 199: IRS	-0.544	-0.426	0.118

Note: Pre-Policy period is before the passing of the American Jobs Act of 2004. Section 199: Law is the period following the passing of the American Jobs Act, but before the IRS letter rulings in 2008 while Section 199: IRS is the period after IRS letter rulings. Difference is the average IOF price minus the average cooperative price for each policy period. "IOF" stands for independently-owned firm. Only firms with data before 2000 and after 2010 are included in the dataset.

Table 7: Expected Values for Firms that have at least One Competitors within 10 Miles

Policy Period	Firm Type		Difference
	Cooperative	IOF	
Pre-Policy	-0.544	-0.444	0.100
Section 199: Law	-0.725	-0.613	0.112
Section 199: IRS	-0.538	-0.386	0.152

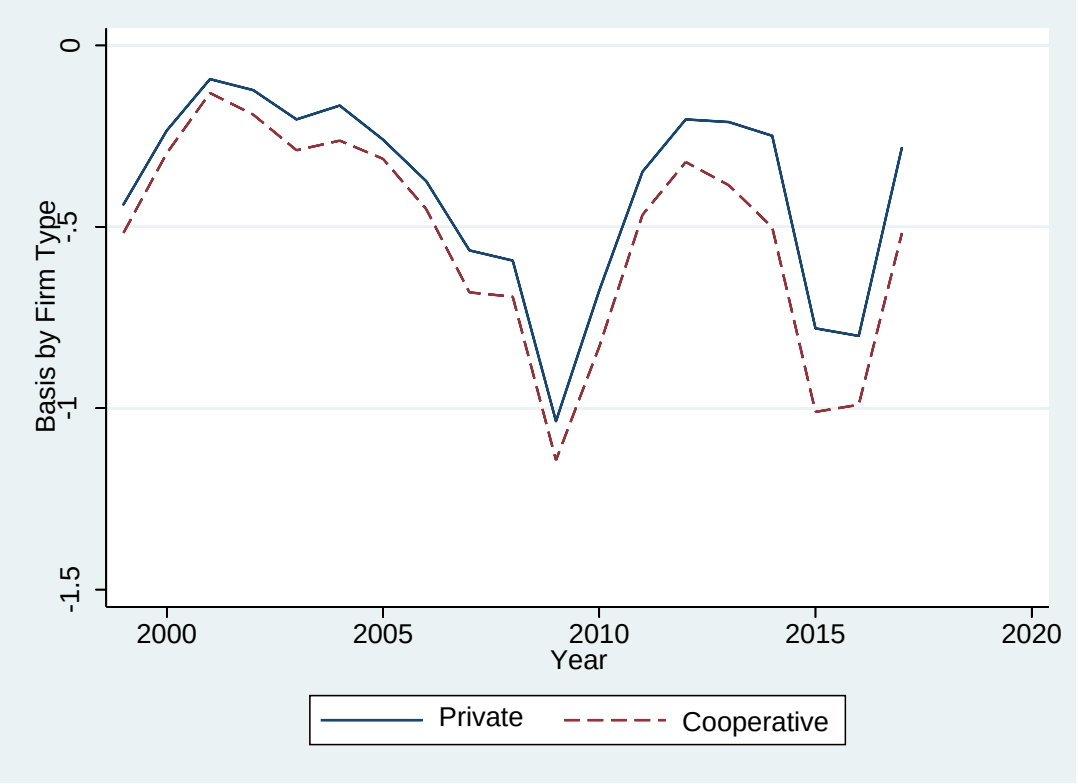
Note: Pre-Policy period is before the passing of the American Jobs Act of 2004. Section 199: Law is the period following the passing of the American Jobs Act, but before the IRS letter rulings in 2008 while Section 199: IRS is the period after IRS letter rulings. Difference is the average IOF price minus the average cooperative price for each policy period. "IOF" stands for independently-owned firm. Only firms with data before 2000 and after 2010 are included in the dataset.

Table 8: Expected Values for Firms that have No Competitor within 10 Miles

Policy Period	Firm Type		Difference
	Cooperative	IOF	
Pre-Policy	-0.532	-0.632	-0.100
Section 199: Law	-0.745	-0.896	-0.151
Section 199: IRS	-0.562	-0.639	-0.077

Note: Pre-Policy period is before the passing of the American Jobs Act of 2004. Section 199: Law is the period following the passing of the American Jobs Act, but before the IRS letter rulings in 2008 while Section 199 Part 2 is the period after IRS letter rulings. Difference is the average IOF price minus the average cooperative price for each policy period. "IOF" stands for independently-owned firm. Only firms with data before 2000 and after 2010 are included in the dataset.

Figure 1: Basis by Firm Type with Filtered Dataset

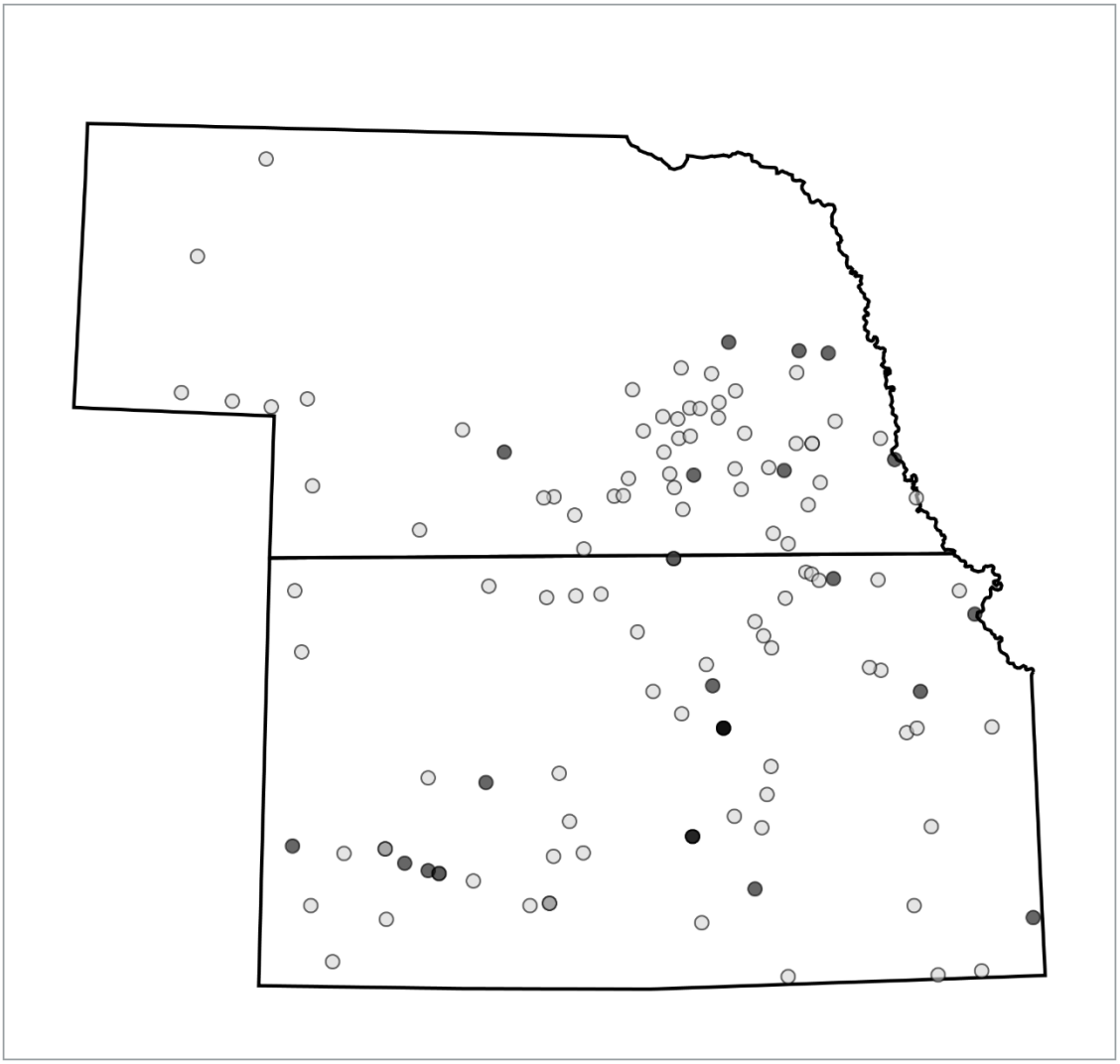


Note: Private is used equivalently to IOF. Filtered dataset excludes all firms without data points before the year 2000 or without data points after the year 2010. Only firms in Nebraska and Kansas are included.

Figure 2: Basis by Firm Type and by Policy Period with Filtered Dataset

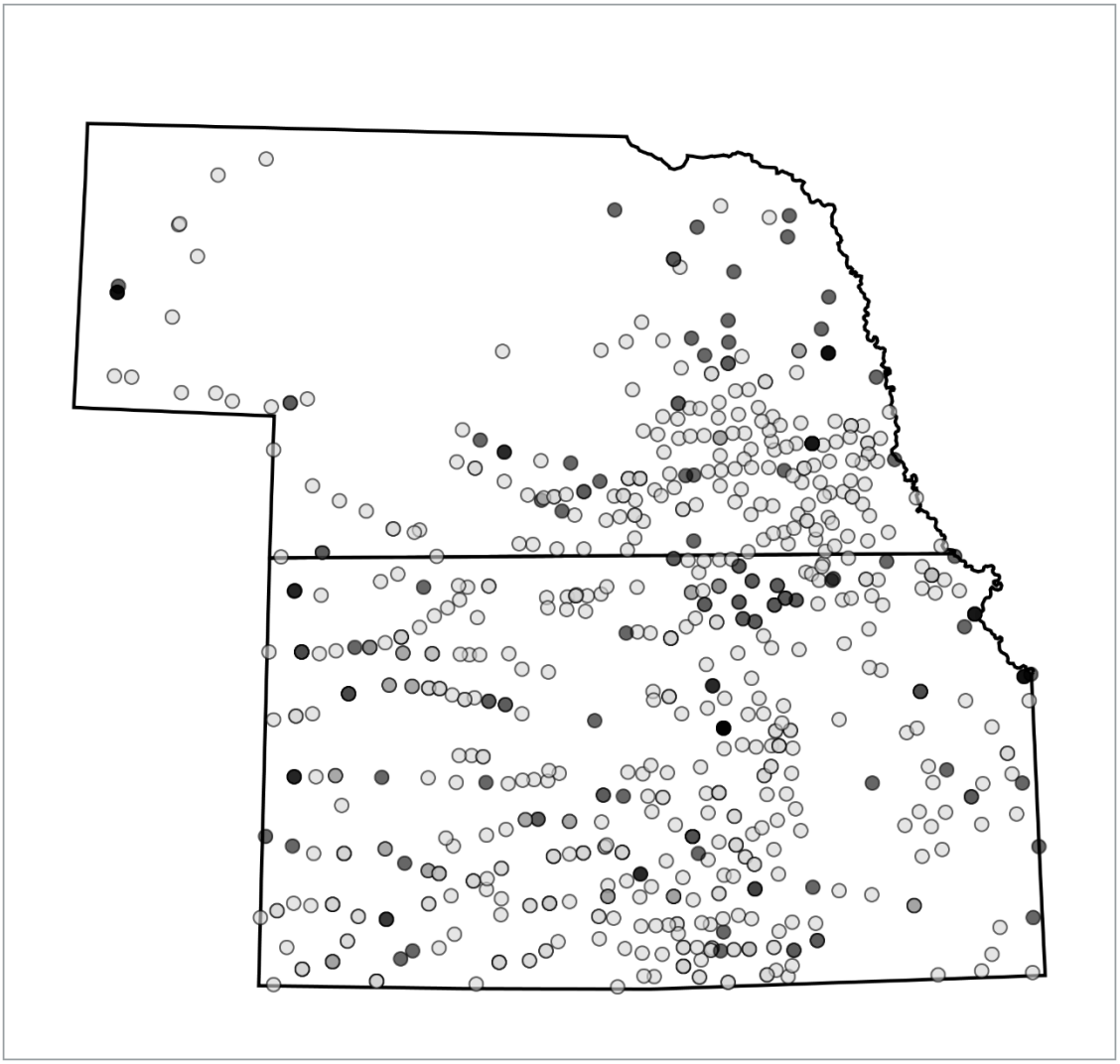
Note: Private is used equivalently to IOF. Filtered dataset excludes all firms without data points before the year 2000 or without data points after the year 2010. Only firms in Nebraska and Kansas are included. Section 199 was passed in 2004, and the IRS letter ruling was issued in 2008.

Figure 3: Firm Locations of Filtered Dataset



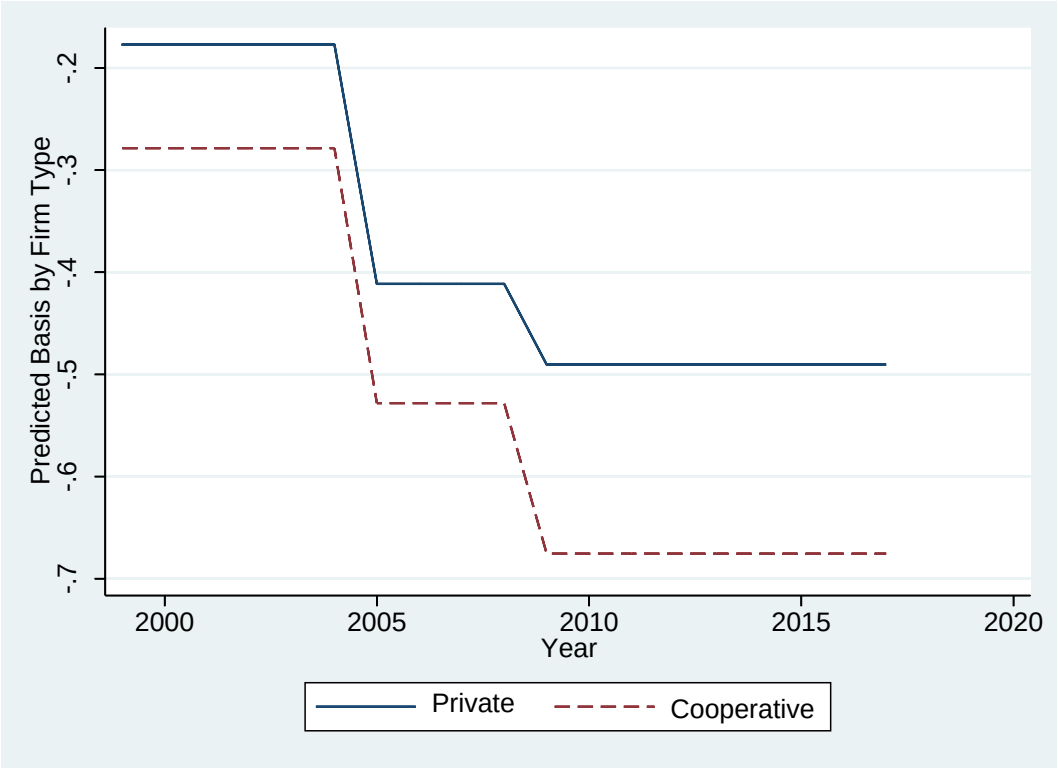
Note: Light-colored dots are cooperatives while black-colored dots are IOFs. Gray-colored dots indicate locations with both IOFs and cooperatives.

Figure 4: Firm Locations for Non-Filtered Dataset



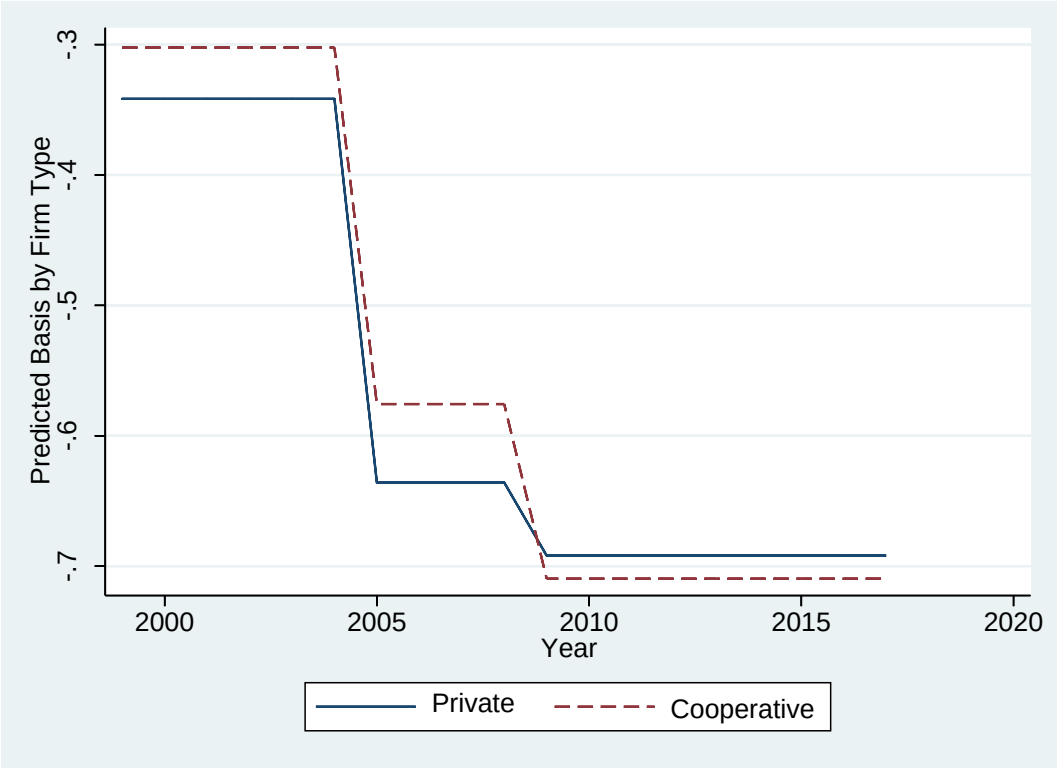
Note: Light-colored dots are cooperatives while black-colored dots are IOFs. Gray-colored dots indicate locations with both IOFs and cooperatives.

Figure 5: Predicted Basis by Firm Type: Competitors within 10 Miles



Note: Predicted basis values are calculated from averaging the predicted basis values of each observation in the dataset by policy period. The data subsample only includes elevator locations that have a competitor within 10 miles of their city centroid.

Figure 6: Predicted Basis by Firm Type: No Competitors within 10 Miles



Note: Predicted basis values are calculated from averaging the predicted basis values of each observation in the dataset by policy period. The data subsample only includes elevator locations that do not have a competitor within 10 miles of their city centroid.