Sequential Auctions of Israeli Cable Television Licenses: The Morning Effect

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Abstract

In Israel, area cable television (CATV) licenses were auctioned sequentially. This paper empirically finds a "morning" effect, that is, greater competition in later rounds of the auction. While three factors (interdependencies among neighboring licenses, interdependencies among all licenses, and cautious bidding in early rounds) likely contributed to the "morning" effect, the evidence suggests that interdependencies among neighboring licenses were the primary cause.

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1. Introduction

One of the most important developments in the Israeli Telecommunications sector was the decision to establish a Cable Television (CATV) industry in the country. The original decree, passed in 1986, and subsequent amendments led to the establishment of the Cable Broadcasting Council (CBC). This body was given the responsibility of allocating franchises and regulating the industry via the Cable Television Division (CTD) of the Ministry of Communications.

The CBC divided the country into 31 areas (see figure 1) and some of the areas were linked together into a single license. For the most part, less populated areas in the north and south of the country were linked with more populated areas in the center of the country, in order to insure that these outlying regions would be served. The CBC elected to auction the licenses in sequential blocks. Within each block, the licenses were offered on a “license-by-license" basis, that is, combinatorial bidding for groups of licenses was not allowed.

This paper empirically tests whether competition for licenses was more intense in the early or later rounds of the auction. While there are no formal theoretical models that examine the path of prices in sequential auctions when there are interdependencies among licenses, there are several reasons why competition might have intensified over time in this auction:

- It is likely, due to economies of scale in infrastructure development, that the values of neighboring cable television are interdependent. Further, this auction had the following properties. (i) neighboring licenses were auctioned sequentially, (ii) some of the licenses auctioned in later rounds shared a border with several other licenses in major metropolitan areas, and (iii) no one firm held all relevant “neighboring" licenses at the time of the bidding. In particular, for each “interdependent" license that was auctioned during the later rounds, there were at least two firms that held bordering licenses.[1]

- More generally, it is possible that the values of all licenses are interdependent due to economies of scale in purchasing programming (movies), billing, etc.

[1] If one firm had obtained all relevant “border" licenses, it is likely that interdependencies among neighboring licenses would have been resulted in diminished competition in later rounds.

- Since there had been no previous auctions of cable television licenses in Israel, it is likely that most bidders were not well informed about the values of the licenses. Thus, the bidders may have elected to bid cautiously in the early rounds, in order to avoid the winner's curse.

On the other hand, there is a reason why competition might have been more intense in early rounds:

- Because of the potential interdependencies among licenses, the competitors may have concluded that losers in the "early" rounds would be less likely to bid for interdependent licenses offered late. This could have encouraged aggressive bidding early in the hope of facing less competition in later rounds.

I find compelling evidence that competition for licenses offered in early rounds was less intense than competition for licenses offered in later rounds, that is, there was a "morning" effect. While it is likely that all three factors (interdependencies among neighboring licenses, interdependencies among all licenses, and cautious bidding in early rounds) contributed to the "morning" effect, the evidence suggests that interdependencies among neighboring licenses were the primary cause.

This paper builds on a small but growing literature on the auctioning of multiple objects.[2] A theme common in this literature is that competition will be more intense in the early rounds of a sequential auction. This phenomenon is known as the "afternoon" effect.

In Hausch (1986), bidders have correlated valuations for identical objects which are auctioned sequentially, using first-price sealed bids. He shows that informed bidders with high valuations have incentives to underbid in early rounds. This signal jamming can lead less informed bidders to conclude that the value of the objects is low, which reduces price competition in later rounds. Pitchik and Schotter (1988) show that when some bidders face budget constraints, other bidders (without budget constraints) may bid aggressively in early rounds. By depleting the resources of their cash-constrained rivals, bidders with deep pockets reduce price competition in the later rounds.

McAfee and Vincent (1993) show that risk averse bidders are more likely to bid more aggressively in early rounds of sequential auctions. The intuition is that losing early in

[2] Chakravorti et al (1994) provide a nice survey of the recent literature.

order to try to win in future rounds is a gamble and risk averse bidders are willing to pay a premium to avoid gambles. Finally Krishna (1993) shows that prices may fall in a setting in which bidders' valuations are independent and there is full information. The intuition for her result is that a high valuation bidder, who could win in each auction, may prefer to lose in early rounds because her rival may be relatively uninterested in acquiring more than one unit. If such a rival wins in an early round, he may not even participate in the later rounds; hence competition will be reduced in later rounds.

Empirical support for price declines over time in sequential auctions comes from Milgrom and Weber (1982), Ashenfelter (1989), and Ashenfelter and Genesove (1992). Milgrom and Roberts (1982) found that late winners obtained more attractive leases on telecommunications transponders, while Ashenfelter (1989) found that prices for identical lots of wines were twice as likely to fall as they were to rise. Ashenfelter and Genesove (1993) found that "face-to-face" buyers obtained discounts relative to prices paid in sequential auctions of identical condominiums and that these discounts were larger for condominiums purchased earlier in the auction.

In all of the above papers, the value of each object was independent of all other objects to be auctioned. In many multiple auctions, however, the values of the objects are interdependent. Hendricks and Porter's (1988) study of auctions for drainage leases is an example. They find that firms holding neighboring tracts to drainage tracts that were auctioned were better informed about the value of the drainage tracts than firms that did not hold neighboring tracts; as a consequence, the informed firms earned higher rents on the drainage tracts they obtained than did the non-informed firms. In the auction of Israeli Cable Television licenses, there is also evidence that neighboring licenses were interdependent and that these interdependencies contributed to the "morning" effect.

2. Background

Recall that the CBC elected to auction the licenses in sequential blocks. Bids were solicited for each license area according to the schedule shown in Table 1 below. A bid was considered acceptable if the potential licensee could finance the development of the infrastructure and had the knowledge to operate and maintain service. Additionally, minimum infrastructure standards were established.

LicenseArea	*Tender*	*BidDue*	*WinnerAnnounced*	*Block*	Group
A18	December 1987	March 1988	July 1988	One	IE
A4, A22	December 1987	March 1988	July 1988	One	IE
A29	December 1987	March 1988	August 1988	One	NI
A10, A11, A24	January 1988	April 1988	October 1988	One	IE
A21	December 1987	April 1988	October 1988	One	IE
A27	January 1988	April 1988	November 1988	One	NI
A13, A14	September 1988	December 1988	January 1989	Two	NI
A9, A26	September 1988	December 1988	February 1989	Two	NI
A8, A20	September 1988	December 1988	February 1989	Two	IL
A7, A19	September 1988	December 1988	February 1989	Two	IL
A1, A2	September 1988	December 1988	March 1989	Two	NI
A3, A5, A23	March 1989	June 1989	August 1989	Three	IL
A25	March 1989	June 1989	August 1989	Three	IL
A17, A28, A30, A31	March 1989	June 1989	December 1989	Three	IL
A15	March 1989	June 1989	May 1990	Three	IE
A12	July 1989	November 1989	March 1990	Three	IL
A6, A16	June 1990	August 1990	January 1991	Four	IL

Table 1: Bid and License Dates

Each bidder had to specify the number and type of services that would be offered in the basic tier and the (real) maximum monthly basic service prices that would be charged.[3] The CBC chose among acceptable bids by comparing maximum prices for basic service and the number and variety of offerings in the basic tier. The maximum monthly service price was binding on the winner. Monopoly licenses were issued in each franchise area for an initial period of twelve years.

The price to be paid by the winning licensee was set at $25,000 and $ 6250 each year for the following eleven years. Additionally the licensees pay royalties: In the second (third) year of the license, these royalties were set at three (four) percent of gross revenues; From the fourth year, licensees pay five percent of their gross revenues.

Table 1 shows that the outcomes of the first six licenses (block one) were announced

[3]If premium channels were also offered, maximum prices for these services also had to be specified.

before bids were due for the following five licenses. Similarly, the winners in the second block were announced before bids were due for the remaining licenses. The original plan of the CBC was to auction 18 licenses in three blocks. A separate tender for Eilat (A31) was put out along with the other block one tenders in January 1988, with a final bid date of April 1988. However, a license was not awarded since no acceptable bids were received. This tender was put out again in block two with the same results. Finally, this area was added to the A17, A28, & A30 license and auctioned in block three. Similar to the case of Eilat, there were three tenders for the A6 & A16 license. In this case, however, the third tender was successful and the winner of this final license was announced in January 1991.[4] The original licenses were awarded to seven different firms. The bidders (1) and the winner (1*) in each license area are shown in Table 2 below.

There was consolidation in the industry because two of the firms awarded licenses were unable to begin operations. CableNet (CN) was originally awarded licenses to serve Haifa (A13 & A14) and Hadera (A15). After the failure of CableNet, these licenses were offered by the CBC to the only other bidder: Matav.[5] Similarly Telem was awarded the A17, A28, A30,& A31 license, but Golden Channels took over (as a majority stockholder) due to Telem's financial difficulties. Golden Channels was offered the option of acquiring the license by the CBC because its bid was more attractive than that of the only other firm (Goshen) that bid for the license. In each case, the *bid* of the winning firm was binding on the firm that obtained the license.

Cable television has been remarkably successful. By June 1994, the operators had achieved a 64 percent penetration rate[6] and fully 54 percent of the households in the country had CATV service. As of June 1994, Golden Channels had 383,000 subscribers, Matav had 375,000, and Tevel had 321,000 subscribers; at the same point in time, ICS and Gvanim had 175,000 and 140,000 subscribers respectively.

[4]The auction for the A12 license was slightly delayed so that it took place after some of the block three winners were announced. Nothing in the analysis changes if this license is classified as block four.

[5]This license was acquired by Matav following the awarding of the A12 license, but before the final auction took place.

[6]The penetration rate is defined as the number of subscribers divided by the number of homes passed.

Licenses	Golden	Matav	Tevel	ICS	Gvanim	CN	Telem	Other	Total
A18	1*	1	1	0	0	1	0	0	4
A4, A22	0	1*	0	0	0	0	0	1	2
A29	0	0	1	1*	0	0	0	0	2
A10, A11, A24	0	0	1	0	1*	0	0	0	2
A21	1	1	1*	0	0	1	0	1	5
A27	0	0	1*	1	0	0	0	1	3
A13, A14	0	1	0	0	0	1*	0	0	2
A9, A26	0	0	0	1*	0	0	0	0	1
A8, A20	1	0	1*	0	0	0	0	0	2
A7, A19	1*	0	1	0	0	0	0	0	2
A1, A2	1*	0	0	0	0	0	0	0	1
A3, A5, A23	0	1*	0	0	1	0	0	0	2
A25	0	0	0	0	1*	0	0	0	1
A17, A28, A30, A31	1	0	0	0	0	0	1*	1	3
A15	0	1	0	0	0	1*	0	0	2
A12	0	0	0	0	1*	1	0	0	2
A6, A16	1	1*	0	0	0	0	0	0	2
Total	7	7	7	3	4	5	1	4	38

Table 2: Bidders and Winners in Each Area

3. Data

The data used for this “event study" are cross-sectional. For the case of more than one area in a license, the data are for the major metropolitan area included in the license. We now describe the data available for the study.

1. PRICE - The (real) maximum price in March 1988 New Israeli Shekels for basic service offered by the winning bidder.[7]

2. NUMBER - The number of basic channels offered by the winning bidder. These include over-the-air channels, satellite services, and self-broadcast channels. All

[7]The exchange rate in March 1988 was 1.6 New Israeli Shekels = $ 1.00.

winning bids offered the five over-the-air channels (Israel 1, Israel 2, Jordan 1, Jordan 2, and Middle East Television).

3. PRICE/CHANNEL (P/C) - The real maximum price per channel offered by the winning bidder.

4. DENSITY - The number of potential subscribers divided by the number of kilometers of cable needed to serve the license area.

5. AUTOMOBILES - The number of automobiles per 1000 residents.[8] These data are collected periodically; we use the latest figures, which are for the 1992/1993 period.

6. TOTAL - the number of firms that bid on each license. Although the number of bidders and their identities are available, price and channel data on losing bids are unavailable.

7. PBIDS - the *potential* number of bidders on each license. The definition of this variable is provided in section 4.2.

8. GROUP - This variable takes on the value one if the license is in the set of interdependent licenses auctioned late (IL); it takes on the value two if the license area is not interdependent (NI), and takes on the value three if the license area is in the set of interdependent licenses auctioned early (IE). (See section 4.1 for group definitions).

9. EARLY - This is a dummy variable that takes on the value one if the license is in the set of interdependent licenses auctioned early (IE) and zero otherwise.

10. BLOCK - This is a variable that takes on the value 1 if the license was auctioned in block one, 2 if the license auctioned was in block 2, etc. (See table 1.)

11. LINKED - This is a dummy variable that takes on the value 1 if the main area was linked with one or more other service areas.

The following table contains descriptive statistics on the above variables.

[8]Data on income is not disaggregated by license area, but the number of automobiles per 1000 residents is delineated according to license area. This variable is the best available proxy for income.

Variable	Mean	Std. Dev.	Maximum	Minimum
PRICE	30.5	4.24	40.0	25.94
NUMBER	20.41	7.91	39.00	6.00
PRICE/CHANNEL (P/C)	1.83	1.04	4.87	0.80
EARLY	0.29	0.47	1.00	0.00
GROUP	1.88	0.86	3.00	1.00
BLOCK	2.06	0.97	4.00	1.00
LINKED	0.53	.51	1.00	0.00
TOTAL	2.24	1.03	5.00	1.00
PBIDS	2.59	0.87	5.00	1.00
DENSITY	200.2	69.96	308.82	103.63
AUTOMOBILES	218.8	52.3	304	148

Table 3: Descriptive Statistics

4. Analysis

Recall that the CBC chose among acceptable bids by comparing the maximum price for basic service and the number of channels offered in the basic tier. Although the exact relationship between these two variables was not specified by the CBC, a natural measure of the degree of competition during the bidding process is the maximum price per channel offered by the winning bidder for each license.

Although all channels are not identical, careful examination of each of the winning bids reveals that the channels offered in the basic tier during the bidding process were over-the-air broadcast stations, satellite services, superstations, and non-premium self broadcast channels.[9] This corresponds to the types of offerings included in the basic cable tier in the U.S. Because of the relative uniformity within a tier, the price per channel within a tier is often used to measure competition in the cable television industry.[10]

[9] In the case of A18 and A6 & A16, a premium movie channel was included in the basic service bid. In order to be consistent, this channel was excluded and the basic service price was reduced by the average price of a premium movie channel offered by bidders in the premium tier. Nothing in the analysis changes if the premium channel is simply counted as another channel and the price of basic service is not adjusted.

[10] A 1993 U.S. FCC Report, for example, showed how CATV rates per channel (within a tier) varied by the

We now discuss how the independent variables used in the study are expected to affect the degree of competition (the winning price per basic channel) during the bidding process:

If a “morning" effect exists due to interdependencies among neighboring licenses, the winning price per basic channel should be higher for IE licenses than for other licenses; in a regression with PRICE/CHANNEL as the dependent variable, the coefficient on EARLY should be positive.

If a “morning" effect exists due to interdependencies among neighboring licenses and if there was also very intense competition for the IL licenses, the winning price per basic channel should be higher for licenses in group IE than licenses in group NI, and the winning price per channel should be higher for group NI than for group IL; given the definition of GROUP, its coefficient should be positive.

If a “morning" effect exists due to a winner’s curse, so that competitors bid conservatively in early rounds, competition should be greater for the licenses auctioned later. Of course, a “morning" effect due to the presence of interdependencies among all licenses should also lead to more conservative bidding in early rounds. Hence, it will not be possible to distinguish between these two factors. In both cases, the winning price per basic channel should decline over time as BLOCK increases.[11]

An increase in the number of bidders should increase competition for the following two reasons: (1) Vickrey (1961) showed that when a single object is auctioned, bidders are symmetric, risk neutral, and have independent private values, the expected revenue of the seller is the same regardless of the auction format and equal to the valuation of the second highest bidder. Hence as the number of bidders increases, the expected valuation of the second highest bidder increases. (2) In our setting, there is a significant cost to making a bid;[12] hence only firms with high valuations and hence high probabilities of winning will be inclined to enter the bidding. Therefore, the winning price per basic channel should be lower for areas in which more bidders participated.

Clearly, the areas are not homogeneous; ignoring potential interdependencies, the

degree of competition in the area.

[11]It is possible that the over time competitors learned more about how the regulatory authority chose the winning bids; this would also result in more competitive bids over time; hence the effect would also be captured by the variable BLOCK and would be indistinguishable from the other two factors.

[12]These costs included providing detailed technical specifications for the CATV system, conducting market research, obtaining financing, etc.

marginal cost per channel of providing service was expected to vary across license areas. Empirical studies suggest that there are some economies of density and scale in the CATV industry.[13] If the operators expected that more densely populated areas had lower marginal costs, the winning price per basic channel should be lower for more densely populated license areas.

The expected effect of LINKED on the winning price per basic channel is unclear. On the one hand, major areas that are linked with sparsely populated areas may have been less attractive to bidders and on the other hand, since the winner of a linked license receives multiple areas, the linked areas might have been viewed as a bonus.

Rubinovitz (1993) also found that per capita income was a proxy for factor costs in an area and that higher factor costs would lead to higher marginal costs. AUTOMOBILES (the best available proxy for income) was hence included as an explanatory variable. If this is the case, winning bids should be higher in areas with more automobiles per capita.

4.1 Initial Tests for a “Morning" Effect due to Interdependencies among Neighboring Licenses

In order to initially test for a “morning" effect, due to interdependencies among neighboring licenses in a metropolitan area, the sample was split into three groups. The first group consisted of interdependent licenses that were auctioned early (denoted IE), the second group consisted of licenses that were not interdependent (NI), and the final group consisted of interdependent licenses that were auctioned late (IL). Licenses were considered interdependent if they met both of the following criteria:

- The license areas physically shared a common border in a metropolitan area.
- The license areas had similar demographic characteristics, including population, and potential subscribers.

Using the above criteria, one obtains five IE licenses, five NI licenses and seven IL licenses.[14] The licenses are shown in Table 4 below with the pairs of interdependent licenses grouped together.

[13] See Jaffe and Kantor (1990) and Rubinovitz (1993).

[14] It is possible that licenses A15 and A6 & A16 could have been classified as NI, rather than IE and IL respectively. Nothing in the analysis changes under the alternative classification. Region A12 includes Haifa’s northern suburbs. Since the population of A12 is much smaller than the population of the Haifa metropolitan

Licenses	Price	Channels	P/C	Block	Bidders	Group	Winner
A18	31.2	12	2.60	1	4	IE	Golden
A7, A19	30.1	15	2.00	2	2	IL	Golden
A17, A28, A30, A31	31.9	23	1.39	3	3	IL	Telem-Golden
A4, A22	29.5	9	3.28	1	2	IE	Matav
A3, A5, A23	27.2	30	0.91	3	2	IL	Matav
A10, A11, A24	29.2	6	4.87	1	2	IE	Gvanim
A25	27.6	20	1.38	3	1	IL	Gvanim
A12	25.9	23	1.13	3	2	IL	Gvanim
A15	32.0	16	2.00	3	2	IE	CN-Matav
A6 & A16	31.1	39	0.80	4	2	IL	Matav
A21	26.5	22	1.20	1	5	IE	Tevel
A20, A8	29.6	22	1.34	2	2	IL	Tevel
A29	40.0	20	2.00	1	2	NI	ICS
A27	26.5	22	1.20	1	3	NI	Tevel
A13, A14	26.4	24	1.10	2	2	NI	CN-Matav
A9, A26	34.0	28	1.21	2	1	NI	ICS
A1, A2	39.8	15	2.66	2	1	NI	Golden

Table 4: Winning Bids in Each Area

area (A13, A14), the value of the Haifa license was most likely independent of whether the A12 license was received or not. On the other hand, the value of the A12 was probably higher for the winner of the Haifa license than for firms that did not hold neighboring licenses. Indeed CableNet did bid on the A12 license.

Table 4 provides support for the hypothesis that competition for the group of the interdependent licenses that were auctioned in later periods was greater than competition for the interdependent licenses that were auctioned early. In particular, the price per basic channel is significantly lower for the second license in each group and the number of channels offered is significantly higher for each of the first four groups in the above table.

In the case of the Tel Aviv licenses, both the price per channel and the number and variety of offering are nearly identical. Note that the first Tel Aviv license was contested by five firms. Since the first Tel Aviv license was not linked, and since Tel Aviv is the economic hub of the country, it is not surprising that there was fierce competition in the early round.

If one only looks at the first four groups of interdependent licenses, the data are consistent with the alternative hypothesis that it (exogenously) became less costly to offer additional channels over time as the auction progressed and that hence the increased competition may not be due to the interdependencies among neighboring licenses. The two Tel Aviv licenses and all the five interdependent licenses provide strong evidence against this alternative hypothesis.[15] In particular, in six of these license areas, the number of channels offered by the winning bidder remained in a narrow range (from 20 to 28) and there is no discernable trend in the number of channels over time. Indeed, the lowest number of offerings in this group is for the Jerusalem (A1, A2) license, which took place in the second block.

4.2 Further Tests for a “Morning" Effect

Despite the fact that there are only 17 license areas, we now conduct a more formal analysis by running several regressions. The dependent variable in both of these regressions is the winning price per number of basic channels in each license area.

The first regression in table 5 (6) uses the variable EARLY (GROUP) to test for a “morning" effect due to interdependencies among neighboring licenses, while the second regression in the table uses the variable GROUP. The BLOCK variable is also included in these regressions in order to determine which of the factors (GROUP/EARLY or BLOCK)

[15] Shortly before the final auction, four of the five Israeli cable operators formed a joint venture called ICP in December 1989 to jointly acquire programming. The CBC supported the venture in exchange for the addition of several premium channels to the basic tier. It is clear that the ICP affected the number and types of services offered for this license.

In particular, this bid was the only one to offer “ICP" channels. Hence, the marginal cost of offering additional channels did fall in that case.

was more important in terms of explaining the “morning" effect. The first regression in tables 5 and 6 is estimated by ordinary least squares (OLS) using the variable TOTAL.

Since the total number of bidders (TOTAL) is probably endogenous, the exogenous variable PBIDS is employed as an instrument for TOTAL in the second regression in tables 5 and 6. For licenses that were auctioned in blocks 2,3 and 4, the *potential* number of bidders in a license area (PBIDS) is simply the number of firms that hold licenses in adjacent major metropolitan areas.[16] In the case of the block one licenses, the potential number of bidders is simply the average number of bidders (three) in the block one license areas with the exception of the first Tel Aviv license. In this case, the potential number of bidders is set equal to the actual number (five) of bidders. The generally held view at the time was that this was by far the most valuable license auctioned in the initial block and it was expected that this license would be attractive to most bidders. The correlation between TOTAL and PBIDS is 0.53.

Comparing the regressions, there is little difference between the OLS and instrumental variable (IV) estimates, suggesting that the simultaneity bias is quite small. Since there are so few observations, only the variables that are moderately significant are included in the regressions. In particular, the variables AUTOMOBILES, LINKED and DENSITY are all insignificant and hence not included in the regressions.[17]

Despite the relatively high degree of collinearity between GROUP and BLOCK (-0.67) and EARLY and BLOCK (-0.63), the GROUP and EARLY variables are statistically significant in the regressions of Tables 5 and 6. BLOCK is statistically significant in the regressions in Table 5, and non-negligible in the regressions in Table 6. The signs of these coefficients are as expected.[18] The EARLY/GROUP variables are consistently more significant that the BLOCK variable; this provides additional evidence that the “morning effect" is primarily due to interdependencies among neighboring licenses.

[16]This is similar to the strategy employed by Hendricks and Porter (1988).

[17]These variables are insignificant even in regressions for which TOTAL is excluded.

[18]Further, the coefficient on the total number of bidders is negative and significant in all regressions, suggesting that the winning price per basic channel was lower when more firms participated.

	Model One: OLS		Model Two: IV	
Variable	Coefficient	T-Statistic	Coefficient	T-Statistic
CONSTANT	3.68	5.77	3.86	3.36
EARLY	1.56	3.82	1.59	3.00
BLOCK	−0.48	−2.56	-0.49	-2.37
TOTAL	−0.59	−3.30	−0.67	−1.57
Adjusted R^2	.64		.63	
Std. Err.	0.63		0.63	

Table 5: Regression Results: EARLY used to test for “morning" effect due to interdependencies.

5. Conclusion

Although there are data limitations due to the fact that only seventeen cable television licenses were awarded in Israel, there is relatively strong empirical support for the hypothesis that a “morning" effect exists and that interdependencies among neighboring licenses in a metropolitan area were the primary cause. Additional support for the hypothesis that interdependencies among neighboring licenses (increasing returns to scale) led to the “morning" effect comes from the bidding pattern for the seven interdependent licenses that were auctioned late. In five of these cases (A8 & A20, A7 & A19, A3 & A5& A23, A12, A6 & A16), there were two bidders and each of the bidders held licenses in bordering areas. In the other two cases (A25, [A17, A28, A30, & A31],) one of the two firms that held a neighboring license elected to bid. Further, no bids were submitted for any of the IL licenses from license holders who did not have neighboring licenses.[19]

References

[1] Ashenfelter, O., 1989, “How Auctions Work for Wine and Art," *Journal of Economic Perspectives*, 3: 23-36.

[19] In the case of A17, A28, A30 & A31, bids were received by firms who bid only once during the whole auction.

	Model One: OLS		Model Two: IV	
Variable	Coefficient	T-Statistic	Coefficient	T-Statistic
CONSTANT	2.23	1.89	2.71	1.65
GROUP	0.66	2.07	0.70	1.99
BLOCK	-0.35	-1.25	-0.40	-1.28
TOTAL	−0.41	−1.92	-0.62	-1.15
Adjusted R^2	.42		.38	
Std. Err.	0.80		0.87	

Table 6: Regression Results: GROUP used to test for “morning" effect due to interdependencies.

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