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**Technology Shocks in Multi-Sided Markets:
The Impact of Craigslist on Local Newspapers**

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Abstract

Theories of multi-sided markets suggest that a platform's pricing strategies on different sides of the market are closely linked, and in particular, an increase in competition on one side may lead to an increase in price on other sides. We empirically examine platforms' pricing strategies by exploiting the gradual expansion of Craigslist, a website providing classified ads services, into local newspaper markets. We adopt a differences-in-differences approach by comparing the pricing strategies of local newspapers for which classified ads are likely to be a significant portion of their revenue to others before and after Craigslist's entry. We find that these newspapers drop their classified ad rates significantly more after Craigslist's entry. We also find that the impact of the entry of Craigslist propagates to other sides of the newspaper market. These newspapers increase their subscription rates relative to others, and consequently, their circulation also drops more. Finally, lower circulation also leads to lower display ad rates for these newspapers. Our study helps build an understanding of how incumbent media platforms respond to technologically disruptive entrants in multi-sided markets.

1. Introduction

Many markets in today's economy are multi-sided. In these markets, an intermediary, often referred to as a "platform," provides a product or a service to two or more sides of the market, and the utility that agents on each side of the market derive from accessing the platform depends on other sides of the market (e.g., Rochet and Tirole, 2003; Caillaud and Jullien, 2003; Armstrong, 2005; Katsamakas and Economides, 2006). Examples of such platforms include payment cards (card holders and merchants), newspapers (subscribers, classified advertisers, and display advertisers[1]), media players (content providers and users), dating clubs (men and women), and sponsored search engines (users and advertisers). Because of the interdependency across different sides of the market, a platform's pricing strategies to each side are often closely linked. Studies on markets with two sides have shown that a platform often subsidizes one side and makes money from the other side. For example, newspapers often subsidize readers and make money out of advertisers and video game manufacturers frequently sell their consoles below manufacturing cost and charge game publishers royalties.

Recent studies extend this line of work to examine how platforms adjust their prices in response to competition. In general, theoretical studies of markets with two sides have found that when the competition on one side of the market becomes more intense, the price on the other side may increase. For example, Hagiu (2009) studies how competition between producers on one side of the market can reduce the need for the platform to reduce prices to consumers on the other side of the market. In a similar vein, Godes, Ofek

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[1] Display ads are used by businesses to promote their products and services and are displayed alongside regular editorial content. In contrast, classified ads typically have a separate section.

and Sarvary (2009) find that media platforms may charge higher content prices in a duopoly than in a monopoly. These results share a similar intuition. For example, in the case of media platforms, if a new platform enters a market and the number of advertisers remain fixed, the number of advertisers available to any incumbent platforms drops. Since part of the value of attracting consumers is that it allows the platform to raise price to advertisers, the return per customer decreases as the number of advertisers goes down, making these platforms less willing to under-price content to increase demand. These findings are in sharp contrast to those in a regular one-sided market where competition typically lowers prices. Anecdotal evidence supports these theoretical predictions. For example, most newspaper websites in the 1990s offered their content away for free and financed themselves exclusively by advertising revenues. As the number of online content sites increased, many newspapers such as the New York Times decided to switch to subscription-based business models (Casadesus-Masanell and Zhu 2010).[2]

We empirically test these theoretical predictions by studying how local newspapers respond to changes in the intensity of competition in one of their markets. We accomplish this by exploiting the geographic and temporal expansion of Craigslist, a website providing classified ads services, into local newspaper markets. Craigslist offers classified ads for free in most cases.[3] In addition, ads on Craigslist are easy to search, and are updated in real time, unlike a newspaper. Because of the competition for classified advertisers, we expect the number of classified advertisers for newspapers to decrease significantly after Craigslist's entry. We adopt a differences-in-differences approach that compares the

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[2] See http://paidcontent.org/article/419-taking-the-plunge-how-newspaper-sites-that-charge-are-faring/ for a partial list of newspaper sites charging fees to readers.
[3] Craigslist charges for job listings in a small number of cities, and for apartment listings in New York City. Source: http://www. craigslist.org/about/factsheet, accessed May 2010.

pricing strategies of local newspapers for which classified ads are likely to be a significant fraction of their revenue to others before and after the entry of Craigslist. We identify such newspapers by whether or not the newspaper has a classified ad editor. We find that these newspapers drop their classified ad rates significantly more post-entry. We next examine how Craigslist entry to the classified ad market impacts the other sides of the newspaper market: the subscriber side and the display advertiser side. Consistent with theoretical predictions, newspapers with classified editors increase their subscription rates relative to others. Because of this increase in subscription rates, their circulation also drops more. Finally, the lower circulation makes these newspapers less attractive to display advertisers, leading to lower display ad rates.

Several other papers empirically evaluate multi-sided markets. Gandal, Kende and Rob (2000), Nair, Chintagunta and Dubé (2004), Clements and Ohashi (2005) and Rysman (2007) quantify the strength of indirect network effects in DVD, personal digital assistant , video game and payment card market, respectively. Derdenger (2010), Lee (2010) and Corts and Lederman (2009) evaluate exclusive contracting in the video-game market. Cantillon and Yin (2008) study tipping in financial exchanges. Genakos and Valletti (2007) show that lower call termination revenue for cellular phone providers as a result of government regulations leads to higher fees to subscribers. In the context of the media markets, Rysman (2004) quantifies indirect network effects for Yellow Pages, where platforms charge only the advertisers and readers get the products for free. Kaiser and Wright (2006) and Argentesi and Filistrucchi (2007) study pricing in the German magazine market and the Italian newspaper market, respectively, and find that media platforms are likely to subsidize the consumer side using revenues from the advertiser side because of

indirect network effects. Chandra and Collard-Wexler (2009) study Canadian newspaper mergers and show that increased concentration in two-sided markets need not lead to higher prices. A few studies show that newspapers may reposition themselves as competition increases. For example, George and Waldfogel (2006) show that increased competition from the *New York Times* leads local papers to shift away from national or foreign news, areas in which the *New York Times* has a comparative advantage, to more local news stories. Chandra (2009) shows that competition may lead newspapers to do better targeting, allowing the newspaper to raise prices to advertisers. Our study of Craigslist's entry differs from other newspaper studies in that competition is intensified mostly on the classified ad side of the market as Craigslist does not provide any content. Moreover, Craigslist's entry asymmetrically impacts newspapers with greater reliance on revenue from classified ads.[4]

Of the existing empirical work, our paper most closely resembles recent work by Jin and Rysman (2010) and Kroft and Pope (2008). Jin and Rysman (2010) study sportcards conventions to show that prices to consumers rise and prices to dealers drop as competition between platforms (the conventions) increases. Their paper uses variation in geographic distance between conventions to infer asymmetric degree of competition for consumers and dealers. Our paper finds similar results – that prices fall on one side of the platform and rise on another side following an increase in competition – but extended to a three-sided market setting. In addition, we take advantage of panel data on newspaper characteristics as well as Craigslist's geographical and temporal entry patterns to employ a

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[4] Arguably, many of the newspaper's subscribers read the newspaper for news and editorial content, in addition to searching classified ads. On the other side of the market, however, classified advertisers are really only interested in the rates newspapers charge, and compare this price to alternatives (such as the zero price charged by Craigslist).

differences-in-differences research design. The research design's focus on Craigslist is similar to a paper by Kroft and Pope (2008) which studies the effect of Craigslist's expansion on rental vacancy rates and unemployment rates. Unlike Kroft and Pope, our study focuses on outcomes for newspaper firms rather than outcomes for the population that uses either type of platform.

The rest of the paper is organized as follows. Section 2 presents background information on Craigslist. Section 3 presents a simple model to illustrate the impact of Craigslist's entry. Section 4 presents our empirical analysis. We conclude in Section 5.

2. Craigslist's Expansion

Craigslist is a website that specializes in online classified listings. It began the service in 1995 as an email distribution list of friends in the San Francisco Bay Area, before becoming a web-based service in 1996. Craigslist expanded into 9 more U.S. cities in 2000, 4 in 2001 and 2002 each, 14 in 2003, and many more cities in recent years. It selects cities based on user requests. As of 2010, Craigslist is available for more than 700 local sites in 70 countries.[5] The site serves over twenty billion page views per month, and is the 7th most visited web site in the United States.[6] With over fifty million new classified advertisements each month[7] and about sixty million unique visitors in the US each month[8], Craigslist is the leading classifieds service in any medium. As revenues from classified ads account for 40%

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[5] http://www. craigslist.org/about/factsheet, accessed July 2010.
[6] http://www.alexa.com/siteinfo/craigslist.org, accessed July 2010.
[7] http://www. craigslist.org/about/factsheet, accessed July 2010.
[8] http://siteanalytics.compete.com/craigslist.org/, accessed July 2010.

of a newspaper's total revenues on average,[9] the introduction of Craigslist into a newspaper's local market has the potential to be incredibly disruptive, leading to an almost immediate drop in a large portion of revenue. Indeed, Craigslist has been criticized for stealing a massive chunk of the classified market from established local newspapers, and is frequently referred as a "newspaper killer."[10]

Our empirical setting has several advantages in testing platforms' pricing behavior. The theoretical result that price on one side of a two-sided market increases is contingent on the condition that the competition increases more significantly on the other side. In our setting, we expect to see significant increase in competition on the classified ad side relative to the subscriber side. Hence, our setting is ideal for testing the direction of price changes.

Second, one of the empirical challenges of studying multi-sided markets is collecting price data on all sides of the market. For example, video games are a canonical example of a two-sided market, but researchers do not observe the contractual agreement on ies between console providers and game publishers. In the newspaper market, while the market is three-sided, we are able to collect prices on all three sides.

Third, the gradual expansion of Craigslist into different regions allows us to establish causal relationship. The environment is a complex one: many technological changes, in particular, the diffusion of the Internet, have affected the newspaper industry.

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[9] See Swarts, Will. "Craigslist: Stopping the Presses?" at *Smart Money*, September 7, 2005. Source: http://www.smartmoney.com/investing/stocks/craigslist-stopping-the-presses-18189/, accessed December 2009.

[10] See, for example, http://www.sfbg.com/40/18/x_editors_notes.html, http://nymag.com/nymetro/news/media/internet/15500/, http://sfist.com/2004/12/29/craigslist_newspaper_killer.php, and http://www.forbes.com/2006/12/08/newspaper-classifield-online-tech_cx-lh_1211craigslist.html, accessed July 2010.

For example, websites such as eBay.com and monster.com also attract classified advertisers, and content sites such as blogs and Google news attract many newspaper readers away. Unlike Craigslist, all these sites started by serving consumers in all regions in the US. As a result, we are able to use year dummies and their interactions with newspaper types to control for their overall effects on newspapers and disproportionate effects on different types of newspapers.

3. A Simple Model

Here we present a simple stylized model to illustrate the impact of Craigslist's entry. Our model extends Armstrong (2006) to consider three-sided interactions. Consider a situation where a newspaper charges a fixed fee of α to each classified advertiser, β to each display advertiser and p to each subscriber.

Assume that there are m classified advertisers. Classified advertisers are identified by parameter θ which is uniform distributed in [0, 1]. The type-θ advertiser makes profit θ when a reader of the newspaper sees its ad. Hence, if the circulation of the newspaper is D, only classified advertisers with type $\theta \geq \alpha/D$ will be willing to pay to advertise. Then the number of classified advertisers that advertise to the newspaper will be $m(1-\alpha/D)$ and $\alpha m(1-\alpha/D)$ is the profit from classified ads.

The setup is similar on the side of display advertisers. Assume the size of display advertisers is n. We similarly obtain that the newspaper profit from display advertisers will be $\beta n(1-\beta/D)$.

On the subscriber side, we assume that the market size is S and the demand for the newspaper, i.e., circulation, is $D = S(1-p)$. Hence, the newspaper subscription profit will be Dp.

The total profit of the newspaper is thus:

$$\pi(\alpha, \beta, p) = \alpha m(1 - \alpha / D) + \beta n(1 - \beta / D) + Dp,$$

where $D = S(1-p)$. The newspaper maximize its profit by setting α, β and p simultaneously. Taking the first order conditions with respect to α, β and p, we have:

$$p = \frac{1}{8}(4 - m - n) \text{ and } \alpha = \beta = \frac{1}{2}S(1-p).$$

The equations are intuitive. As the number of potential classified advertisers or display advertisers increases, the newspaper is more willing to lower the subscription price to increase its subscription. In addition, the classified ad rate and display ad rate increase as price decreases because a lower price increases subscription, making the newspaper more attractive to advertisers.

We now consider the impact of Craigslist'e entry. After the entry, Craigslist attracts classified advertisers away and thus reduces the number of potential classified advertisers, m, for the newspaper. As m decreases, p increases, and α and β decrease. In addition, the circulation share, D/S, decreases.

The result is consistent with findings in Godes, Ofek and Sarvary (2009) and Jin and Rysman (2010). An increase in the competition in the classified ads market decreases the classified ad rate and thus reduces the return per reader. As a result, the newspaper has a lower incentive to subsidize the subscriber side. The subscription price thus increases. The increase in turn leads to lower circulation, making the newspaper less attractive to display

advertisers. Display ad rates drop as a consequence. Our results differ from the prior literature in that we have three sides. We find that an increase in competition on one side does not necessarily increase prices on other sides. The direction of price change depends on the interdependency across different sides. In our case, the display ad side does not interact directly with the classified ad side; they are linked to each other through the subscriber side.

4. Empirical Analysis

4.1 Empirical Approach

Our goal is to study how local newspapers respond to entry by Craigslist. The empirical design relies on a differences-in-differences approach that compares prices and rates after craigslist's entry to prices and rates before Craigslist's entry for newspapers with a classifieds editor to those without. The basic specification will be of the following form:

(1) $y_{it} = \beta_0 + \beta_1 craigslist\_entry_{it} + \beta_2 craigslist\_entry_{it} * classified_{it} + \beta_3 classified_{it} + X_{it}\delta + \gamma_i + \eta_t + \varepsilon_{it,}$

where y_{it} is one of the outcome variables, such as classified rate, display advertising rate, subscription price or circulation share (i.e., the percentage of population subscribing to the newspaper), for newspaper i at time t. The variable $craigslist\_entry_{it}$ is a dummy variable which equals one in all years after Craigslist enters the newspaper's local market and zero otherwise. We define the relevant market to be the county in which the newspaper is

based. Other papers have defined the relevant market at the zip code (Chandra, 2009) or MSA level (George and Waldfogel, 2006). We use county to be consistent with Craigslist's product offerings, which sometimes vary by county or by state region. For example, Craigslist has separate pages for La Salle County, Illinois, Fairfield County, Connecticut, Western Maryland and Eastern North Carolina, to name a few. The variable *classified$_{it}$* is a dummy indicating whether newspaper *i* had a classifieds editor in year *t*. We use this variable to indicate those newspapers which rely heavily on classified ads, and hence we expect those newspapers to be *even more* affected by the entry of craigslist. *X$_{it}$* is a vector of other market control variables, γ_i is a newspaper fixed effect and η_t is a year fixed effect.

Inclusion of the newspaper fixed effect controls for any fixed differences across newspapers and the year dummies control for common macroeconomic shocks. However, one concern would be that unobserved market level changes that are correlated with Craigslist entry decision are driving the newspaper's pricing decision. Hence, regression (1) includes market level controls *X$_{it}$* to control for factors that vary within market over time. These include controls for levels of competition and changes in Internet penetration, and are described in more detail below. Throughout all of our specifications the error terms are clustered at the level of the newspaper to account for autocorrelation in the data across newspapers and over time. This clustering relaxes the assumption of independence of the error terms of newspapers that are in close proximity to one another, and insures that the standard errors are not underestimated (Bertrand et al, 2007).

An additional concern is that changes in strategy by firms such as monster.com or Google at the national level may affect the local newspaper's pricing decisions. Such changes may have an asymmetric effect on those newspapers which are particularly reliant

on classified ads for revenues. We include the interactions between *classified$_{it}$* and year dummies in some regressions to control for these effects.

One benefit of studying newspaper responses to Craigslist is that the product is very similar across markets in a given year. For example, the Craigslist webpage for Atlanta in February 2003 is nearly identical to the Craigslist webpage for Chicago in February 2003 (see Figures 1 and 2). Of course, heterogeneity in population tastes or in ease of access to the Internet across markets means that Craigslist may be more popular in some areas than others. In order to account for this, we provide robustness tests that use the number of posts on Craigslist, a continuous variable, in place of the dummy variable, *craigslist_entry$_{it}$*. The variable *num_craigslist_posts$_{it}$* equals zero in all years before Craigslist enters a county and is some positive number in all years after Craigslist enters.

4.2 Data

The data are combined from several sources. Information on the date of Craigslist's entry into different market is from Craigslist, with additional details on dates from older versions of the Craigslist website.[11]

Information on each newspaper's circulation, subscription price, display ad rate and positions in the advertising sales management team is from *Editor & Publisher International Yearbooks* (E&P) for years 1999, 2001, 2003, 2004, 2006 and 2008. The yearbooks contain data on virtually every newspaper in the U.S. and such data are also used by the US census to compile summary statistics for the annual *Statistical Abstract of the United States.* Information published in these yearbooks is current as of the year prior to publication.

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[11] The company lists the dates and locations of its expansion here: http://www. craigslist.org/about/expansion. From November 2006, the site only lists the number of cities entered, so we supplemented with information from older Craigslist websites found on the Internet Archive.

Information on classified ad rates is from the *SRDS Newspaper Advertising Source* (SRDS) for years 2000-2006. SRDS does not provide the same newspaper characteristics as E&P, so we match newspaper characteristics from the E&P database. Using information on the location of each newspaper in our sample we construct a measure of competition within the newspaper's home county by counting the number of other newspapers and use this measure to control for changes in the newspaper's market structure that might affect its pricing strategy.

We collect information on the number of high speed internet service providers (ISPs) at the zip code for each year from the Federal Communications Commission. This information is then averaged across all the zip codes in the county to create a variable representing the average number of ISPs in each county. This variable is included to control for diffusion of the Internet within the relevant market, which may affect newspapers' strategies. We also collect county level demographic data, including *age*, *high school drop-out rate*, *poverty rate*, *population* and *income*, from the U.S. Census Bureau. The population data is used to transform the circulation variable into a share.

We use internetarchive.org to access historical pages of Craigslist for each year of all of the markets in our sample, and from these pages we gather counts of the numbers of posts in each category. For example, in Atlanta on February 7 under the category "sale/wanted" there were 302 posts listed under "general for sale" and 63 posts listed under "items wanted" (see Figure 1). These category counts are then aggregated up to the market level to create a variable *number_of_posts$_{it}$* which we use in robustness checks. Over the years, Craigslist added new categories such as personals. To ensure that we can compare the number of posts on Craigslist in different years, we only aggregate counts in

four categories (community, housing, jobs and sales/wanted) that Craigslist had since its inception. When internetarchive.org archives the same Web page multiple times in a single year, we take the average of these counts.

Table 1 provides summary statistics of variables that have been collected. We have different numbers of observations for these variables because our data are collected from several sources. Table 2 displays the means of selected demographic variables at the county level broken out into those counties that experienced entry by Craigslist and those that did not. Results from t-tests of the means are also displayed in this table. Note that the t-tests are all insignificant, except in one case (*age*), suggesting that Craigslist's entry into different counties is likely to be uncorrelated with the errors in regression equation (1).

4.3 Results

Tables 3-6 report the regression results based on equation (1). Table 3 reports regression results on log classified ad rates. All the models include newspaper and year fixed effects. Model 1 includes only the dummy variable for *craigslist_entry$_{it}$*, the coefficient of which is positive, but not significant, indicating that, on average, newspapers did not change classified ad rates following entry by Craigslist. Model 2 adds in a dummy for *classified$_{it}$*, an interaction between *classified$_{it}$* and *craigslist_entry$_{it}$* and the number of newspapers. The coefficients on *craigslist_entry$_{it}$* and *classified$_{it}$* are positive but insignificant, whereas the coefficient on their interaction is negative and significant. This result indicates that newspapers with classified editors were on average more likely to lower classified ad rates following entry by Craigslist. Model 3 replicates Model 2 and adds the interactions between year dummies and *classified$_{it}$*, Model 4 replicates Model 2 and adds the number of ISPs as another control, and Model 5 replicates Model 4 and adds the

interactions between year dummies and *classified$_{it}$.* The results across Models 3 – 5 are similar to the ones in Model 2; namely, newspapers with classified editors were on average more likely to lower classified ad rates following entry by Craigslist. It is worth noting that while the coefficient on *classified$_{it}$ * craigslist_entry$_{it}$* is only significant at the 10% level, the point estimate does not vary much across the different Models, suggesting that the relationship is robust. The mean log classified ad rate is 1.1; the coefficients on *classified$_{it}$ * craigslist_entry$_{it}$* are close to -0.2 suggesting close to a 20% drop in classified ad rates, on average, for affected newspapers.

Tables 4 – 6 present similar Models as in Table 3, but with different dependent variables. Table 4 focuses on (logged) subscription price; Table 5 focuses on circulation share; and Table 6 focuses on (logged) display ad rate. In Table 4, the coefficient on *classified$_{it}$ * craigslist_entry$_{it}$* is positive and significant across most specifications, indicating that newspapers with classified editors were on average more likely to raise price following entry by Craigslist. It might seem counterintuitive that entry by a newspaper's rival can lead to an increase in price. However, this accords well with theoretical predictions that prices in one of the newspaper's markets can rise when entry has an asymmetric competitive effect on the newspaper's markets. As a result of the drop in demand from classified advertisers, the newspaper had less incentive to continue to keep subscription price low. The mean log price is 4.8; the coefficients on *classified$_{it}$ * craigslist_entry$_{it}$* range between 0.02 - 0.05 across the Models, suggesting less than a 1% increase in subscription price, on average, for affected newspapers.

In Table 5, the coefficient on *classified$_{it}$ * craigslist_entry$_{it}$* is negative and significant across all specifications, indicating that newspapers with classified editors were on average

more likely to experience a decrease in circulation following entry by Craigslist. It is unclear the extent to which this result is due to subscribers' substitution away from newspapers to other forms of media, such as Craigslist, or due to a drop in subscribers' demand following from higher prices charged by the newspaper. The mean circulation share is 0.17; the coefficients on *classified$_{it}$* * *craigslist_entry$_{it}$* range between negative 0.007 - 0.012 across the Models, suggesting a 4-7% drop in circulation share, on average, for affected newspapers.

In Table 6, the coefficient on *classified$_{it}$* * *craigslist_entry$_{it}$* is negative, but only significant in two of the specifications, indicating that newspapers with classified editors were on average more likely to decrease display ad prices following entry by Craigslist. The mean display ad rate is 3.48; the coefficients on *classified$_{it}$* * *craigslist_entry$_{it}$* range between negative 0.015 - 0.041 across the Models, suggesting about a 0.5 – 1% drop in display ad rates, on average, for affected newspapers.

Table 7 provides robustness checks that use the *number_of_posts$_{it}$* in place of the *craigslist_entry$_{it}$* variable for each of the four dependent variables described above. The signs on the coefficient *classified$_{it}$* * *craigslist_entry$_{it}$* match the signs described in Tables 3 – 6, and the results are significant in all cases except for that of log classified rates (p-value = 0.25).

5. Conclusions

The foregoing sections provide evidence that newspapers with a classifieds editor were more likely to experience a decrease in classified ad rates, increase in subscription price, decrease in circulation share and decrease in display at rates following entry by

Craigslist. The response matches the predictions from a simple model of a three-sided market. The response is consistent with existing theoretical literature showing that an increase in competition can result in a decrease in price on one side of the platform and an increase in price on another side of the platform.

We are able to take advantage of geographic and temporal variation in Craigslist's entry patterns to employ an empirical design that helps to rule out alternative explanations. While our empirical approach helps rule out a number of alternative explanations, a number of limitations remain. For example, while we observe that newspapers with classifieds editors are more likely to experience a decrease in display ad rates, we cannot identify whether this is due to the decrease in newspaper subscribers, as suggested by our model, or due to some small display advertisers substituting away from higher priced display ads to simple online classified ads after Craigslist's entry. In any case, we expect the effect from the latter case to be very small.

Perhaps more importantly, our approach so far has assumed that *craigslist_entry$_{it}$* and ε_{it} are uncorrelated. The inclusion of market level fixed effects controls for unobservable characteristics of the market that might affect entry into that market. However, the assumption would be violated if there were unobserved changes to market *i* characteristics that affect entry into that market. Our inclusion of time-varying, market-specific variables such as the average number of ISPs and the number of other newspapers control for some of the likely alternative explanations. We plan to further explore the robustness of our results in future work through two-stage econometric methods that predict Craigslist's entry in the first stage.

It is worth noting that the peculiar nature of Craigslist's corporate mission make the assumption on exogeneity of entry more plausible than if we were studying entry patterns of a typical profit maximizing firm. Craigslist is incorporated as a for-profit company, but is not necessarily a profit maximizing company. For example, it still uses the ".org" domain, whereas a for-profit company would typically use the ".com" domain. The reason the company does so is that the ".org" domain "symbolizes the relatively non-commercial nature, public service mission, and non-corporate culture of craigslist."[14] In addition, the CEO Jim Buckmaster is self described as "anti-establishment, a communist, and a socialistic anarchist."[15] The fact that the company does not actively work to maximize profits is well documented in the press. For example, in its annual ranking of top private digital companies, Silicon Alley Insider estimates that Craigslist generated about $150M in ad revenue in 2009, but could have generated at least $1B.[16] Thus, given that the company does not try to maximize profits, it is plausible that Craigslist's entry into newspaper markets is orthogonal to profit characteristics of the newspapers in those markets.

In addition to providing a sharp empirical test of pricing theory for multi-sided markets, our study has broader implications for competition between different types of firms. Our study helps build an understanding of how incumbent media platforms respond to technologically disruptive entrants from different industries. This issue is important as the boundaries between media industries are blurred for many advertisers that can reach relevant consumers through a variety of media (e.g., radio, TV, and the Internet).

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[14] http://www.craigslist.org/about/factsheet, accessed May 22, 2010.
[15] http://www.craigslist.org/about/jim_buckmaster, accessed May 22, 2010.
[16] http://www.businessinsider.com/sai-50-2009#5-craigslist-5 Last accessed August 3, 2010.

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Table 1:

Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Log Classified Rate	2693	1.38	0.85	-2.21	4.96
Log Annual Subscription Price	6761	4.84	0.40	1.81	6.22
Circulation Share	7535	0.17	0.12	0.00	0.88
Log Display Ad Rate	4864	3.48	0.88	1.62	6.35
Dummy for Craigslist Entry	7820	0.12	0.33	0.00	1.00
Dummy for Classified Editor	7820	0.35	0.48	0.00	1.00
Number of Newspapers	7818	1.57	1.41	1.00	13.00
Average Number of ISPs	6511	3.14	2.02	0.00	16.00
Log Number of Posts	7747	0.96	2.76	0.00	12.60

Table 2:

Comparison of Counties Entered or Not Entered by Craigslist.org			
Demographic Variable	Not Entered	Entered	T-Test
Poverty Rate	0.13	0.13	-0.67
HS Drop Out Rate	0.16	0.16	-0.91
Age	35.24	34.49	2.10
Income	38119	38759	-0.87
Population	526370	705557	-1.20

Table 3:

Determinants of Log Classified Ad Rates (OLS Models)

Dependent Variable	(1) Classified Rate	(2) Classified Rate	(3) Classified Rate	(4) Classified Rate	(5) Classified Rate
Craigslist Entry	0.028	0.139	0.134	0.136	0.132
	(0.063)	(0.097)	(0.100)	(0.099)	(0.101)
Craigslist Entry*Classified		-0.198*	-0.187*	-0.197*	-0.187*
		(0.101)	(0.106)	(0.101)	(0.106)
Classified		0.021	0.047*	0.021	0.047*
		(0.016)	(0.024)	(0.016)	(0.024)
Number of Newspapers		0.143*	0.142*	0.143*	0.142*
		(0.077)	(0.078)	(0.078)	(0.079)
Average ISPs				0.003	0.002
				(0.010)	(0.010)
Newspaper Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies*Classified			Yes		Yes
Observations	2,682	2,682	2,682	2,682	2,682
Number of Newspaper IDs	962	962	962	962	962
Adjusted R-squared	0.01	0.03	0.03	0.03	0.03

Table 4:

	(1)	(2)	(3)	(4)	(5)
	Price	Price	Price	Price	Price
Dependent Variable					
Craigslist Entry	-0.013	-0.028*	-0.034**	-0.024*	-0.031**
	(0.011)	(0.015)	(0.016)	(0.014)	(0.014)
Craigslist Entry*Classified		0.033*	0.054**	0.022	0.048**
		(0.017)	(0.022)	(0.014)	(0.019)
Classified		0.002	-0.009	0.008	-0.013
		(0.012)	(0.028)	(0.007)	(0.011)
Number of Newspapers		-0.005	-0.005	-0.015	-0.016
		(0.011)	(0.011)	(0.011)	(0.011)
Average ISPs				-0.006*	-0.007**
				(0.003)	(0.003)
Newspaper Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies*Classified			Yes		Yes
Observations	6,758	6,758	6,758	5,688	5,688
Number of Newspaper IDs	1,817	1,817	1,817	1,783	1,783
Adjusted R-squared	0.03	0.03	0.03	0.07	0.08

Determinants of Log Price (OLS Models)

Table 5:

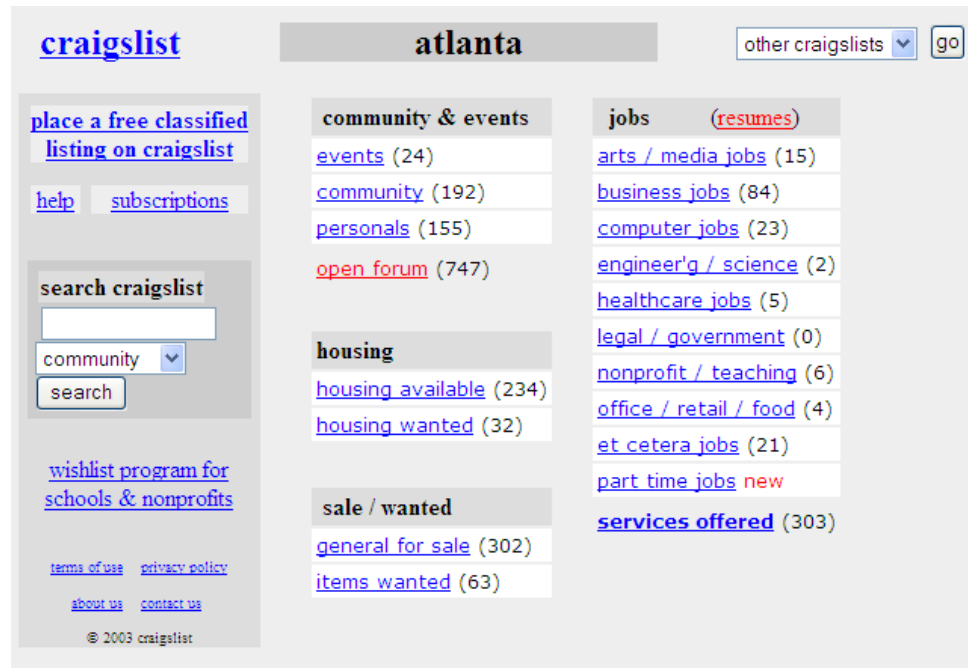| Dependent Variable	Determinants of Circulation Share (OLS Models)				
	(1) Circ Share	(2) Circ Share	(3) Circ Share	(4) Circ Share	(5) Circ Share
Craigslist Entry	-0.004**	0.003	0.001	0.002	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Craigslist Entry*Classified		-0.014***	-0.007**	-0.012***	-0.007**
		(0.003)	(0.003)	(0.003)	(0.003)
Classified		0.002	0.008***	0.001	-0.006**
		(0.001)	(0.002)	(0.002)	(0.002)
Number of Newspapers		0.000	-0.000	0.001	0.001
		(0.001)	(0.001)	(0.001)	(0.001)
Average ISPs				0.000	0.000
				(0.001)	(0.001)
Newspaper Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies*Classified			Yes		Yes
Observations	7,534	7,534	7,534	6,261	6,261
Number of Newspaper IDs	1,893	1,893	1,893	1,854	1,854
Adjusted R-squared	0.10	0.10	0.11	0.09	0.10

Table 6:

Determinants of Log Display Ad Rates (OLS Models)

Dependent Variable	(1) Ad Rate	(2) Ad Rate	(3) Ad Rate	(4) Ad Rate	(5) Ad Rate
Craigslist Entry	0.021*	0.028*	0.036**	0.015	0.023
	(0.011)	(0.015)	(0.016)	(0.015)	(0.016)
Craigslist Entry*Classified		-0.015	-0.040**	-0.015	-0.041**
		(0.017)	(0.020)	(0.017)	(0.020)
Classified		-0.004	-0.019	-0.010	-0.005
		(0.008)	(0.013)	(0.009)	(0.014)
Number of Newspapers		-0.022*	-0.022*	-0.026**	-0.026**
		(0.012)	(0.012)	(0.013)	(0.013)
Average ISPs				0.004	0.004
				(0.004)	(0.004)
Newspaper Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes
Year Dummies*Classified			Yes		Yes
Observations	4,846	4,846	4,846	4,060	4,060
Number of Newspaper IDs	1,345	1,345	1,345	1,300	1,300
Adjusted R-squared	0.07	0.08	0.08	0.05	0.05

Table 7

Robustness Test: log Number of Posts instead of Craigslist Entry (OLS Models)

Dependent Variable	(1) Classified Ad Rate	(2) Price	(3) Circ Share	(4) Display Ad Rate
Num of Posts	0.012	-0.003*	-0.000	0.003*
	(0.009)	(0.002)	(0.000)	(0.002)
Num of Posts*Classified	-0.011	0.005**	-0.001*	-0.005**
	(0.009)	(0.003)	(0.000)	(0.002)
Classified	0.002	-0.018	-0.007***	-0.023*
	(0.034)	(0.018)	(0.002)	(0.012)
Number of Newspapers	0.135	-0.015	-0.001	-0.026**
	(0.083)	(0.012)	(0.001)	(0.013)
Average ISPs	-0.005	-0.007**	0.000	0.004
	(0.010)	(0.003)	(0.001)	(0.004)
Newspaper Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Year Dummies*Classified	Yes	Yes	Yes	Yes
Observations	2,504	5,649	6,205	4,021
Number of Newspaper IDs	903	1,776	1,847	1,291
Adjusted R-squared	0.03	0.08	0.10	0.05

Figure 1:

Atlanta Craigslist from February 2003.

Source: http://web.archive.org/web/20030207142251/http://atlanta.craigslist.org/

Figure 2:

Chicago Craigslist from February 2003.

Source: http://web.archive.org/web/20030205062029/http://chicago.craigslist.org/