Can the Media Spur Startup Activity? Evidence from the Television Show "Shark Tank"

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Abstract

We study how media exposure to entrepreneurship affects startup activity by connecting Nielsen ratings for the ABC show Shark Tank to numerous measures of entrepreneurial interest or intent. To instrument for ratings we exploit the fact that live NBA games are broadcast on television at the same time as Shark Tank, introducing episode-level random variation in viewership across markets. Viewership increases measures of entrepreneurial interest, such as seeking advice from an SBA training center or filing for patents, but has little measurable impact on new business formation. The number of women attending advice-seeking sessions at SBA centers increases when greater fractions of women contestants appear on the show. Also, more people seek advice when a larger percentage of contestants are successful in receiving funding. The findings indicate that increased media exposure to entrepreneurship nudges individuals down the path of launching a business, even if stronger nudges are required to increase new business formation.

JEL Codes: L26, L82, O30
Keywords: Entrepreneurship, media, innovation.

1 Introduction

The fact that entrepreneurship is so widely understood to be an engine of economic growth and job creation has spurred business leaders, educators, and policy makers to create more of it. Numerous strategies and mechanisms have been considered, most with limited success (see, for example, Fairlie et al., 2015). In this paper, we explore a potential mechanism for spurring entrepreneurship that has received relatively little attention: television media, which has already been shown to impact a wide range of social phenomena in other contexts (see DellaVigna and La Ferrara, 2015, for an excellent overview).

We use the ABC reality show *Shark Tank*, which first aired nationwide in August, 2009, as a test-bed for exploring the television's potential impact on startup activity.[1] The show features entrepreneurs who pitch their business plans to a panel of investor-judges (i.e., the sharks) in an attempt to raise money for their ventures. The sharks pepper the entrepreneur-contestants with questions about their business ideas, and each shark ultimately decides whether to invest in a venture. Sometimes sharks invest alone, other times they join together to invest in concert, but the pitch is considered a failure if the entrepreneur cannot get the sharks to invest a pre-committed amount in their venture on agreeable terms. The show is popular: to date, it has counted an average of 7 million viewers per season, winning the Primetime Emmy Award for Outstanding Structured Reality Program in all four years of that category's existence. "As Seen On Shark Tank" is now a product category on Amazon and at other retail outlets.

Our research design exploits both episode-level variation in the show's content as well as plausibly exogenous market-level variation in its viewership. We link a series of localized measures of entrepreneurial interest and activity to viewership levels and to the amount of entrepreneurial success portrayed on the show. Our central finding is that exogenous increases in viewership, especially for episodes portraying relatively more successful fundraising, are followed by increased entrepreneurial interest, especially by novices. These increases in entrepreneurial interest do not translate into measurable increases in new business formation.

More specifically, we rely on two aspects of the show's format to develop episode-level

[1] For more information see `http://abc.go.com/shows/shark-tank`.

variation. There are generally four contestants per episode, and while some contestants walk away victorious, other contestants depart empty-handed, sometimes seemingly demoralized by the interrogation they faced. Episode-level variation in the rate of success that entrepreneurs face on the show allows us to develop a measure of the degree to which positive portrayals of entrepreneurship induce entry to entrepreneurship through a mimicry effect.[2] Second, the show features contestants from a range of different demographic backgrounds. This allows us to use episode-level variation in contestant gender and race to explore whether role model effects are present in sub-populations with lower rates of employment, akin to Porter and Serra (2020).

Finally, we use lagged Nielsen ratings to capture variation in viewership across markets and over time.[3] Of course, the show's ratings are potentially endogenous to measures of entrepreneurship. To instrument for the show's popularity we use the fact that professional basketball (NBA) games sometimes air at the same time as Shark Tank episodes. Thus, in some markets, but not others, a televised professional sporting event diverts attention away from Shark Tank, lowering ratings for Shark Tank for reasons that are exogenous to entrepreneurial intentions. In addition, our measures relating to the entrepreneur-friendliness of the show and the variation in contestant demographics in a given episode are essentially surprises to the viewer; the interaction of these measures with the show's ratings offers a plausibly exogenous measure of the degree to which entrepreneurship seems easy or difficult.

We relate instrumented Nielsen ratings to a variety of measures of entrepreneurial activity that vary in terms of their degree of commitment to the task of starting a new business. Building on Bennett and Chatterji (2019), we measure (1) advice-seeking created from counseling and training records of the Small Business Administration (SBA), (2) patent application counts from the US Patent and Trademark Office (USPTO), and (3), firm creation based on the National Establishment Time-Series (NETS) data. These measures of entrepreneurial activity vary in terms of their commitment: an individual can seek advice from the SBA as a way of exploring one's suitability to entrepreneurship, without going further. Similarly,

[2]For other papers illustrating a mimicry effect on labor market choices, see LIST.

[3]Because Shark Tank was introduced nationwide, not randomly across different television markets at different times, we cannot rely on staggered introduction to identify the impact of the show's features on entrepreneurship outcomes.

filing a patent is a step along the path to starting an innovation-focused business, but this requires considerably less time and devotion to the task of entrepreneurship than starting a new business. As Bennett and Chatterji (2019) show, many individuals who state that they have an idea for a new business undertake some, but not all, of these steps before abandoning their idea. Measuring entrepreneurial intention as well as new business formation allows for us to measure the effects of media exposure at a finer level than would otherwise be possible if we were restricted to counts of startups in a region.

Lagged Nielsen ratings are positively associated with low-stakes actions such as advice-seeking and patent application, but not to new business formation. For example, increased Shark Tank ratings predict increases in new clients and new clients counseled and new clients who have received training at SBA training facilities. Using the SBA's measure of whether an individual is a novice or an experienced entrepreneur, we find that these results are more prevalent among novices–those who are first time visitors to SBA training centers and who have no prior entrepreneurial experience. Similarly, increased media exposure increases patent applications. However, there is no effect on new firm starts. Nevertheless, we find that variation in episode-level characteristics that is consistent with the idea that positive media portrayals lead to mimicry. Episodes with a larger fraction of successful entrepreneurs are associated with larger numbers of individuals subsequently attending entrepreneurship counseling sessions at SBA centers in markets where viewership is exogenously higher. Episodes with larger numbers of female contestants predict greater numbers of women sign up for training sessions in markets where viewership is exogenously higher.

This research belongs to a broader literature that explores the effects of media exposure on a variety of behavioral outcomes. That literature is to large to review in its entirety here, but DellaVigna and La Ferrara (2015) provide an excellent review highlighting the importance of the mimicry effect that we observe in our data. Perhaps the closest papers are Bjorvatn et al. (2020) and Peter and Pierk (2020). Bjorvatn et al. (2020) study the impact of an edutainment show on entrepreneurship by conducting a randomized field experiment among a sample of youth in Tanzania. They find some suggestive evidence that the show makes viewers more interested in entrepreneurship and business; however, their main finding is a negative effect – the show discouraged investment in schooling without convincingly replacing

it with some other valuable activity. Peter and Pierk (2020) relate national-level counts of new firms to the introduction of shows like Shark Tank (known variously as Dragon's Den, Lion's Den, Dragon's Nest in different markets) across a large number of different national markets throughout the world. Lacking measures of variation in both television ratings or show content, they find modest positive effects on startup activity broadly consistent with our findings using a staggered-introduction research design. One important challenge for their research design is the fact that entrepreneurs may occupy different social strata in different economic settings, clouding the channels through which media exposure would stimulate entrepreneurial activity.

Our work is also related to a large literature that evaluates mechanisms for stimulating entrepreneurship.[4] Somewhat consistent with this, prior work suggests that business training programs, which have been a go-to policy response, can have mixed effectiveness. Fairlie et al. (2015) assess the impact of a large randomized evaluation in the US and find a short-run effect on business ownership for those who were unemployed at baseline, but this effect dissipates at longer horizons. Moreover, they find no effects on business sales, earnings, or employees. Similarly, McKenzie and Woodruff (2014) survey the evidence on business training programs in developing countries and find that these impact business creation, but do not improve long-run survival. Finally, Howell (2021) explores application and judging data for new ventures in US competitions and finds that receiving negative feedback increases average venture abandonment by 13 percent. The effect appears to reflect feedback regarding the "business" aspects of a startup, rather than the quality of its technology.

The remainder of the paper is structured as follows. We begin in Section 2 with a description of the data. Section 3 discusses the empirical strategy. Section 4 presents our main findings. Finally, Section 5 concludes.

[4]See, for example, Shapero and Sokol (1985); Holtz-Eakin et al. (1994); Carpenter and Petersen (2002); Clementi and Hopenhayn (2006); Kerr et al. (2011); Chatterji and Seamans (2012); Frese and Gielnik (2014); Kerr et al. (2014); McKenzie and Woodruff (2014); Bernstein et al. (2015); Jayachandran (2020).

2 Data

We assemble data from a number of distinct sources to study how entrepreneurial intentions and outcomes are affected by media exposure. Data for this study come from Nielsen, from SBA training centers via Freedom of Information Act requests, from the USPTO Patent Registry, and from the National Establishment Time Series (NETS) database of new firms. The data are summarized in Table 1 and are described here in greater detail.

Table 1 here

2.1 Measures of Entrepreneurial Interest

The first step in our data collection process is to build measures of entrepreneurial interest. Bennett and Chatterji (2019), using nationally representative survey data, show that while around 1/3 of Americans claim to have considered starting a business in the last five years, fewer than half have taken even the simplest steps towards launching the business, such as talking to family and friends, or talking to an expert who they did not know personally. Their findings suggest that counts of startup activity would greatly understate the amount of entrepreneurial *interest* sparked by the show. To take this into account, we develop a spectrum of entrepreneurial action that requires increasing degrees of effort, as illustrated in Figure 1.

Insert Figure 1 here

Specifically, we focus on the following outcomes: advice seeking, applying for patents, and new business formation. The idea is that advice seeking represents a relatively low cost, early-stage step in the process of new business formation, while developing intellectual property or actually starting a business require greater levels of financial and time commitment.

2.1.1 Advice-seeking

One of the commonly observed ways of expressing entrepreneurial interest is to seek advice from a friend or from someone knowledgeable about the sector in which a proposed new business might operate (Bennett and Chatterji, 2019). While we cannot measure casual

social interactions, we obtained admission data from Small Business Development Centers, Women's Business Centers, and SCORE chapters. Through a Freedom of Information Act request, we obtained data for Form 641, which is the client in-take form submitted upon physical or virtual arrival at any of the above-mentioned centers.[5] These data enable us to identify (1) the number of people who are seeking advice from SBA centers in a given DMA on a weekly basis, (2) the types of services they require, and (3) the stage of business development they are in, i.e., new or experienced entrepreneurs. Table 1 reports both the number of startup-counseling intake forms in a region, as well as the number scaled by the local population. These counseling events are further subdivided by type (Startup, Business Plan, Marketing, Finance) as well as by Novice/Experienced and by race and gender.

2.1.2 Patent applications and grants

An alternative measure of entrepreneurial intention is to apply for a patent. Bennett and Chatterji (2019) report that relatively fewer individuals with an idea for a new business take the step of applying for a patent, or securing intellectual property, suggesting that this is a higher-cost, higher-commitment signal of entrepreneurial interest. This outcome is measured using USPTO's publicly available data from PatentsView (`https://www.patentsview.org/download/`), selecting on "all published patent applications." We use reverse geocoding on inventor location to create patent (application) counts by DMA at a weekly frequency, to be consistent with the variables on advice-seeking. This means that if one patent application has three inventors who live in the same DMA, that DMA receives a '1', but if the three inventors live each in separate DMAs, each DMA receives a '1'. In the regressions we report below, we count outwards for 8 weeks from the episode in question to account for the possibility that increases in patenting efforts take time to be measured as patent applications. Panel B of Table 1 reports total patent applications, as well as applications broken out by whether the patent was granted or not, both in raw count and scaled by DMA population.

[5]For more information, see `http://bit.ly/2ZpLV36`).

2.1.3 Firm creation

The strongest, most high commitment measure of entrepreneurial interest is of course creating a new business. To measure new firm creation, we acquired the 2014 release of the National Establishment Time-Series (NETS) database, created by Walls and Associates. NETS contains annual time-series information for over 58.8 million U.S. establishments from January 1990 to January 2013. We use these data to create new firm counts by DMA on an annual basis. An important limitation with this variable is that it is not measurable at the weekly level.

2.2 Independent Variables

2.2.1 Media exposure

Our main independent variable of interest is Shark Tank viewership, measured by the Nielsen ratings the show receives in a given week. While Shark Tank first aired in Fall 2009, Nielsen does not have ratings available prior to 2010. Thus, we exploit ratings for each telecast (episode) of Shark Tank from 2010 to 2016 for all markets. Nielsen defines markets using the designated market area (DMA) designation. A DMA comprises a collection of US counties. There are approximately 210 DMAs in total.[6] Viewership appears to vary significantly across the US/DMAs. This can be seen in Figures 2–8 in the Appendix, which show maps of annual viewership intensity at the DMA level across the nation.

We use the ratings share (SHR) as our measure of viewership. SHR captures the percent of households (or Nielsen respondents) *using their television* who are tuned to a specific program, station or network in a specific area at a specific time. In other words, the denominator accounts for whether the television is turned on at the time of the show. Households who are not watching television do not figure into the calculation; thus, it is a measure of the intensive margin of television viewing. Panel D of Table 1 contains this measure for the 24,440 DMA-weeks in our data.

Table 2 here

[6]See `http://www.nielsen.com/intl-campaigns/us/dma-maps.html` for additional information.

Table 2 explores the demographics of viewership. The dependent variable is the ratings share for a particular demographic group on a given week. Independent variables are dummy variables for whether the respondents in that ratings category are white, have household income above $60,000 (roughly median US income), are male, and are aged fifty or older. As the table shows, the program is more popular among white households, among females, and among older, lower income audiences. These demographics help shape our analysis below, because when we consider the differential impact of the show on traditionally underrepresented groups in entrepreneurship, we will focus primarily on gender due to the relatively small number of non-white viewers on average.

2.2.2 Demographics and other controls

To control for potentially confounding factors, we pull demographic data from the US Census. We focus on median household income, unemployment and home ownership as our control variables. Home equity is an important source of startup capital Adelino et al. (2015). Likewise, household income is correlated with wealth, both of which alleviate financial barriers to entry Fairlie and Krashinsky (2012). Finally, unemployment rates could be correlated with entrepreneurship through a variety of channels. On the one hand, individuals may be more likely to try self-employment as a remedy for unemployment; on the other hand, high rates of unemployment likely correlate with low levels of economic opportunity, which may dampen entrepreneurial intentions.

3 Empirical Strategy

The central identification challenge in our study stems from the fact that viewership in the show may itself reflect underlying interest in entrepreneurship, thus making variation in Nielsen ratings a consequence of variation in entrepreneurial intention, not a cause of it. Even a strategy based on staggered roll-out across television markets, as in Peter and Pierk (2020), is unable to address concerns that the show's early markets were chosen because of their strong local interest in entrepreneurship, thus potentially confounding measurement. Indeed, Shark Tank was not broadcast with any of these considerations in mind: it aired

nationwide on ABC beginning on August 9, 2009.

We take a number of steps to address this concern, which can be seen in our main equation of interest, as follows:

$$Y_{dt} = \beta_0 + \beta_1 * R_{dt-\tau} + \beta_2 * X_{dt} + \theta_t + \delta_d + \epsilon_{dt}, \tag{1}$$

This equation relates startup activity measures at time t to lagged measures of media exposure by exploiting variation in the intensity of viewership over space and time at the DMA level. Thus, Y_{dt} is a given outcome measure for DMA d at time period t; $R_{dt-\tau}$ represents Nielsen's ratings for DMA d at time $t - \tau$. This lag guards both against a reverse causality concern that changes in interest in entrepreneurship spurs increases in viewership, as well as a more mechanical, day-of-week problem, which occurs due to the fact that a show airing on a Friday evening would not generally generate measurable entrepreneurial interest until the subsequent or later weeks.

In addition to the lag structure introduced into Equation 1, we introduce a set of time-varying demographic controls X_{dt} to account for observable differences across DMAs. These include median household income, unemployment and home ownership, as discussed in the previous section. To aggregate these measures up to the DMA level, we take the weighted average of county-level data, weighting by the number of households in the county. Finally, to hold constant time-invariant, unobservable differences we introduce a set of DMA fixed effects, δ_d.

Of course, introducing lags does not fully purge the Nielsen ratings of endogeneity concerns. To identify exogenous variation in Nielsen ratings, we develop an instrument for viewership intensity by using the fact that during part of the year, the show's Friday night airtime overlaps with live broadcasts of NBA basketball games. The games air on different networks in different markets, but the overlap in air times means that the games pull viewers away from Shark Tank for reasons that are orthogonal to entrepreneurship intentions. Thus,

we estimate:

$$Y_{dt} = \beta_0 + \beta_1 \widehat{SHR}_{dt-1} + \gamma X_{d\tau} + \alpha_t + \alpha_d + \varepsilon_{dt} \tag{2}$$

$$SHR_{dt-1} = \pi_0 + \pi_1 NBA_{dt-1} + \gamma X_{d\tau} + \alpha_t + \alpha_d + \epsilon_{dt-1} \tag{3}$$

One potential shortcoming of this instrument is that not every DMA has a clearly identifiable home team. We can, however, clearly match the DMA to a home team for 27 DMAs—for example, matching Los Angeles to the LA Lakers or Clippers and the Washington, DC, market to the Washington Wizards.[7] These markets are considerably larger than many of the DMAs that Nielsen tracks, which potentially helps with concerns about restricting the sample to 27 DMAs.

Insert Table 3 here

Table 3 explores the first-stage of the equation system above. $SHR_{d(t-1)}$ is the average of DMA d's SHR ratings in week $t-1$. $NBA_{d(t-1)}$ is the number of ratings of DMA d in week $t-1$ where DMA d's NBA team played on the same day. The direction of NBA effect is negative, confirming the intuition that live NBA broadcasts draw viewers away from Shark Tank episodes. Column 2 removes DMA-year level controls (median income, home ownership, and unemployment)—the estimates changes very little. Columns 3 and 4 illustrate that the instrument is robust to different Nielsen ratings, $RTG_{d(t-1)}$ and $IMP_{d(t-1)}$, which are defined analogously to $SHR_{d(t-1)}$. (For $IMP_{d(t-1)}$, we scale by DMA d's number of households to make the 3 ratings more comparable.). Quantitatively, NBA effect is small. It lowers ratings by -0.1330, which is just 2.2% of the sample mean. Nevertheless, the F-statistic passes the Stock and Watson test.

The final component to our empirical strategy is to consider regressions with interaction terms between Nielsen ratings and episode- and demographic-level characteristics. In particular, we introduce indicator variables for whether a show has two "winners" (i.e., an entrepreneur who is able to successfully secure funding for his or her venture), fewer than two winners, or more than two winners. We also track the gender and race of contestants

[7] A complete list of the 27 DMAs and their matching teams is provided in the appendix.

based on work in Smith and Viceisza (2018). Introducing episode-level variation into our analysis is important for two reasons. First, it helps to address reverse causality concerns, because it would be difficult for a viewer to watch selectively based on anticipated content (the success rate of entrepreneurs and their demographic characteristics is only revealed as the show is aired). Second, variation in success rates and demographics constitutes variation in the degree to which the implicit desirability of entrepreneurship is portrayed on the show. This allows us to measure the impact of media exposure on entrepreneurship in terms of both the salience of the media message and the breadth of its impact.

4 Results

4.1 Advice Seeking

Table 4 presents our main results linking advice seeking to measures of viewership. We begin in Column (1) with an OLS regression of new client visits on lagged Nielsen ratings, using all 240 DMAs available. Here there is a modest, but statistically insignificant positive relation between ratings and advice-seeking. In column (2), we restrict the sample to the 27 DMAs which can be mapped to an NBA market. The results in this restricted sample are much larger than those in the full sample, with a point estimate that is statistically significant at the 5% level. A likely reason for this increase in effect size is that these are much larger television markets, and thus the scope for variability in week-to-week changes in the number of counseling cases is larger.

Table 4 here

Finally in Column (3) we repeat the specification in Column (2) but use the instrumented value of the Nielsen rankings. The increased value of the point estimate indicates that the instrument is purging negative correlation from the OLS estimate, which in turn indicates that those who are pulled away from the broadcast by the game had lower ex ante probability of seeking counseling.

Table 5 here

Table 5 digs deeper by breaking the type of advice seeking into various categories. All specifications mirror Column (3) of Table 4 but replace the dependent variable with a more fine-grained measure of advice-seeking. The different categories of advice-seeking are: startup, business plan, financing, marketing, accounting, buying or selling a business, cash flow management, and customer relations. Of these, all but Start-Up pertain to individuals who have already chosen to launch a business, and are seeking to refine their strategy. The table shows that the results only hold for start-up counseling visits, which supports the idea that the show works by encouraging those who have not tried to start a business to learn more about it.[8]

Table 6 here

To check that the instrument operates through the mechanism we posit, we construct a placebo test by altering the construction of the instrument. Column (1) uses our instrument: the predicted ratings of DMA d in week $w-1$ where DMA d's NBA team played on the same day. (This repeats Table 9 Column (3)). Columns (2) and (3) use placebo IVs. In column (2), we use the ratings for DMA d in the preceding week $w-1$, rather than the week of the game. In column (3) we use the number of NBA games that DMA d's NBA team played in week $w-1$. The independent variable $SHR_{d(w-1)}$ is the average SHR ratings of DMA d in week $w-1$. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. The fact that NBA games only work when applied directly to competing Shark Tank episodes indicates that the instrument is operating by exogenously pulling viewers away from Shark Tank episodes.

Table 7 here

Next we explore how episode-level variation is related to the uptake of advice. This is reported in Table 7. In the first column, the dependent variable is the population-scaled count of counseling cases in a DMA and independent variables measure entrepreneur-friendliness of the show with indicator variables for whether two, more than two, or fewer than two

[8]The SBA also tracks whether a client self-reports being a novice or an experienced founder. In unreported tables, we have regressed the fraction of novice/total clients visited on the lagged measures and find that the effect works through greater fractions of novice entrepreneurs showing up.

entrepreneurs were able to secure funding successfully. (Two is the median number of successes.) The point estimates show a clear pattern: below-median offers have a negative effect on counseling cases, while above-median offers have a positive effect. Although these are OLS estimates, it is important to bear in mind that this episode-level variation is a surprise to viewers. Because the funding outcomes are not discernible ex ante, it is hard to imagine that these point estimates are confounded by reverse causation to the same degree as the main point estimates that do not rely on episode-level variation. Also, the fact that below median success rates drive people away from seeking counseling while above median success rates drive people towards the counseling also helps to explain why the main effect in the full sample is essentially zero.

In the remaining columns we turn to gender- and ethnicity-based counts of counseling services and explore how these are explained by the presence of female and minority contestants on the show. In Column (2) the independent variables interact the ratings share with the number of women on the show, and the dependent variable is the number of women signing up for counseling sessions in the following week. The interaction term is positive and highly significant, indicating that an increased presence of women on the show spurs women to explore entrepreneurship. (Recall from Table 2 that women are frequent viewers of the show.) Likewise, the effect is stronger among white advice-seekers when a smaller number of minority contestants appear on the show. Taken together, these results imply that the salience of the media influence is more pronounced when there is an affinity between the viewer and the entrepreneur pitching for funding on that particular episode.

To conclude, these tables demonstrate that positive media portrayals of entrepreneurship, as proxied by entrepreneurial success in obtaining funding, help to spur interest in entrepreneurship. In the remaining subsections we explore whether this translates into higher commitment measures of entrepreneurial action and intent.

4.2 Patents

Table 8 reports regressions of patent applications on Nielsen ratings. In columns (1) and (2) we report OLS regressions of patent applications on lagged ratings shares for the full sample and for the NBA-only sample and find no statistically significant findings.

Table 8 here

Column (3) uses the instrumented Nielsen ratings. Here we find a modest positive effect, significant at the 10% level. In columns (4) and (5) we decompose this total applications into granted and non-granted applications and find that the bulk of this response comes from applications that are ultimately awarded.

4.3 New Firm Creation

Table 9 offers estimates of the relation between Shark Tank ratings and new firm creation, using annual-level new firm counts from NETS.

Table 9 here

Across specifications, there is no discernible relation between viewership and measures of new firm creation. This holds whether we use the full sample or restrict to the NBA-only sample. It also holds regardless of whether we instrument for Nielsen ratings, and for alternative clustering schemes. One possible explanation for this could be the fact that our dependent variable is only measured at the annual level, and average weekly ratings in a season are a poor measure for whether the media exposure was salient. We cannot rule out, however, that the interest it spurred was insufficient to translate into new firm starts.

5 Conclusion

Television media has been shown to influence a wide range of economic activities. Can positive media portrayals of entrepreneurship spur entrepreneurial interest and activity? We take up this question by studying how a popular reality television show, Shark Tank, affects a range of measures of entrepreneurship and innovation that vary in terms of their commitment to a new endeavor.

Shark Tank episodes vary in terms of the gender and ethnic background of the contestants who appear. Episodes also vary in terms of contestant success–on some episodes, a greater fraction of contestants are able to secure funding for their ventures. This episode-level

variation is tantamount to variation in treatment intensity. Because the same episode plays across all markets, variation over time and across markets in the show's Nielsen ratings then provides a measure of the variation in exposure to this treatment effect. Of course, Nielsen ratings are potentially endogenous to entrepreneurial interest, so to account for this we instrument for Shark Tank Nielsen ratings by using the fact that NBA games overlap with Shark Tank episodes in some markets, but not others.

We find that increases in viewership predict increases in entrepreneurial interest. More specifically, we find evidence of increased numbers of visits to SBA training centers, and more individuals file patents in the weeks after higher viewership, but these measures of interest do not translate into increased rates of new business formation.

In addition, our results are stronger when the entrepreneurship message is more positive; i.e., when greater numbers of contestants secure funding on the show. Moreover, the results are concentrated among those who are least familiar with entrepreneurship, such as first-time visitors to the training centers. Increased numbers of women apply for training in weeks after greater numbers of female contestants have appeared on the show. Taken together, these results indicate that we measure a mimicry effect: television viewers watch the show and think, "I can do that too."

Our findings raise a number of interesting questions for future work. Perhaps the most salient concerns the gap between entrepreneurial interest and entrepreneurial action. Why does increased entrepreneurial interest not manifest in more startup activity? One explanation is that because the show's purpose is not to promote entrepreneurship, but instead to provide entertainment, that the "treatment dosage" is small relative to that required to undertake the task of launching a new business. After all, the show highlights one step in the entrepreneurial process: negotiating outside financing. Demystifying the process of raising outside financing removes only one hurdle among many that entrepreneurs face.

An alternative explanation is that it spurs interest among a group of people who were not well suited towards entrepreneurship in the first place. For these individuals, the process of visiting a training center and learning more about the steps to launching a business dissuades them from continuing further. From a policy perspective, this explanation suggests that efforts to affect the extensive margin of entrepreneurship are probably much less effective

than efforts to affect the intensive margin of startup activity.

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Figure 1: Spectrum of startup activity

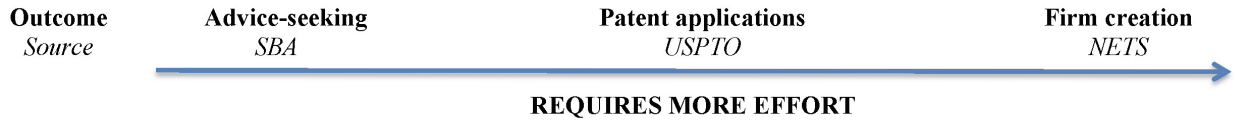

Table 1: Summary statistics

	N	Mean	Median	SD
Panel A: Start-up counseling				
# start-up counseling$_{dw}$	24,440	41.63	23.00	68.87
start-up counseling$_{dw}$	24,440	0.05	0.04	0.04
Panel B: Patent applications				
# patent applications$_{dw}$	24,440	38.43	10.00	88.04
# granted patent applications$_{dw}$	24,440	26.20	7.00	61.31
# non-granted patent applications$_{dw}$	24,440	12.24	3.00	27.27
patent applications$_{dw}$	24,440	0.03	0.02	0.02
granted patent applications$_{dw}$	24,440	0.02	0.01	0.02
non-granted patent applications$_{dw}$	24,440	0.01	0.01	0.01
Panel C: Creation of new firms				
# new firms$_{dy}$	770	17,133.30	5,564.00	36,523.65
new firms$_{dy}$	770	25.44	16.27	19.93
new firms growth$_{dy}$	770	13.84	-29.26	98.84
Panel D: Shark Tank ratings				
SHR$_{d(w-1)}$	24,440	6.26	6.00	3.61
Panel E: Local Demographic Characteristics				
# households	770	588606.11	323123.50	871685.45
home ownership rate	770	68.12	68.50	4.81
median income	770	51,709.13	50,032.12	9,161.42
unemployment rate	770	8.58	8.40	2.24

This table reports the summary statistics of key variables in our analysis. The data comprise weekly observations from 200 DMAs over the 2010-2016 period. Panel A, B, and C report the summary statistics of start-up counseling cases, patent applications, and creation of new firms, respectively. Panel D reports the summary statistics of Shark Tank ratings, which are the independent variables of interest in this paper. These variables are the dependent variables of interest in this paper. In panel B, C, and D, count variables are denoted with #, and corresponding variables without # are scaled by the number of households at the DMA in units of thousands. Panel E reports the summary statistics of key demographic characteristics used as control variables in our regressions. These vary at the DMA-year level.

Table 2: Who watches Shark Tank?

	SHR_{pmdt}	SHR_{pmdt}
White	0.9649***	0.9728***
	(0.0900)	(0.0905)
Income60K+	-0.2344***	-0.2402***
	(0.0490)	(0.0499)
Male	-1.1940***	-1.1966***
	(0.1585)	(0.1584)
Age50+	0.7960***	0.7995***
	(0.1651)	(0.1649)
DMAs	25	25
FE: DMA		X
FE: time	X	X
Cluster	Time	Time
N	39288	39288
Mean	3.493	3.493
SD	3.965	3.965
R^2	0.067	0.123

The dependent variable SHR_{pmdt} is the average SHR ratings of program p of demographic group m in DMA d in time period t. $White_{md}$ is a dummy variable that equals 1 if the race of demographic group is white, and 0 if the race is black. $Income60K+_{md}$ is a dummy variable that equals 1 if income of the demographic group is greater than or equal to \$60K, and 0 if the income is greater than or equal to \$25K. $Male_{md}$ is a dummy variable that equals 1 if gender of the demographic group is male, and 0 if female. $Age50+_{md}$ is a dummy variable that equals 1 if age of the demographic group is greater than or equal to 50, and 0 if the age is between 35 and 49. Above variables are available for 25 DMAs for the following time periods: 02/05/2010-12/31/2012, 01/01/2013-12/31/2013, 01/01/2014-12/31/2014, 01/01/2015- 12/31/2015, 01/01/2016-04/14/2018. The independent variables are winsorized at 5%. The coefficients are estimated using ordinary least squares (OLS). Standard errors are clustered at the time period level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Test of first stage

	SHR_{vpda}	$\text{SHR}_{d(w-1)}$	$\text{SHR}_{d(y-1)}$
NBA_{da}	-0.180***		
	(0.0581)		
# $\text{NBA}_{d(w-1)}$		-0.133***	
		(0.0415)	
% $\text{NBA}_{d(y-1)}$			-0.246
			(0.751)
DMAs	NBA	NBA	NBA
FE: DMA	X	X	X
FE: week	X	X	
FE: year			X
FE: day of week	X		
Controls		X	X
Cluster	Week	Week	Year
N	8718	6413	162
Mean	5.705	5.921	5.162
SD	2.605	2.321	1.976
F-Stat	9.547	10.163	13.629
R^2	0.692	0.698	0.921

The dependent variable SHR_{vpda} is the SHR rating of viewing source v of program p of DMA d at date a. $SHR_{d(w-1)}$ is the average of SHR ratings of DMA d in week $w-1$. $SHR_{d(y-1)}$ is the average SHR ratings of DMA d in year $y-1$. The independent variable NBA_{da} is a dummy variable that equals 1 if DMA d's NBA team had a game on date a, and 0 otherwise. $\#NBA_{d(w-1)}$ is the number of ratings of DMA d in week $w-1$ on which DMA d's NBA team played a game on the same day. $\%NBA_{d(y-1)}$ is the fraction of ratings of DMA d in year $y-1$ on which DMA d's NBA team played a game on the same day. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at the annual level. The coefficients are estimated using ordinary least squares (OLS). Standard errors are clustered at the week level for columns 1 and 2, and at the year level for column 3. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Does Shark Tank spur advice-seeking about entrepreneurship?

	(1)	(2)	(3)
$\text{SHR}_{d(w-1)}$	0.0001	0.0003**	0.0073**
	(0.0001)	(0.0001)	(0.0036)
Model	OLS	OLS	IV
DMAs	All	NBA	NBA
N	24440	6413	6413
Mean	0.052	0.044	0.044
SD	0.038	0.025	0.025
R^2	0.671	0.744	-0.482

The dependent variable start-up counseling_{dw} is the number of counseling cases where the primary area of assistance is 'start-up assistance' for clients at DMA d on week w per thousand HHs of DMA d. The independent variable $SHR_{d(w-1)}$ is the average SHR ratings of DMA d in week $w-1$. Each specification includes DMA-level and calendar-week fixed effects. All columns include control variables for DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the week level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Does Shark Tank spur advice-seeking about other business activities?

	start-up	Bus. Plan	Finance	Mktg.	Acctg.	Buy/Sell Bus.	CF Mgmt.	Cust. Rel.
$SHR_{d(w-1)}$	0.0073**	-0.0003	-0.0000	-0.0008	0.0005	-0.0002	0.0004	0.0002
	(0.0036)	(0.0020)	(0.0019)	(0.0020)	(0.0007)	(0.0005)	(0.0005)	(0.0002)
Model	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
DMAs	NBA	NBA	NBA	NBA	NBA	NBA	NBA	NBA
FE: DMA	X	X	X	X	X	X	X	X
FE: year								
FE: week	X	X	X	X	X	X	X	X
Controls	X	X	X	X	X	X	X	X
Cluster	Week	Week	Week	Week	Week	Week	Week	Week
N	6413	6413	6413	6413	6413	6413	6413	6413
Mean	0.044	0.022	0.020	0.020	0.004	0.003	0.003	0.001
SD	0.025	0.013	0.012	0.012	0.004	0.002	0.004	0.001

Start-up is the number of counseling cases where the primary area of assistance is 'start-up assistance' for clients at DMA d on week w per thousand HHs of DMA d. Other dependent variables are defined analogously for different areas of counseling: business plan, marketing/sales, financing/capital, business accounting/budget, buy/sell business, cash flow management, and customer relations. The independent variable $SHR_{d(w-1)}$ is the average SHR ratings of DMA d in week $w-1$. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the week level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Placebo test

	(1)	(2)	(3)
$\text{SHR}_{d(w-1)}$	0.0073**	0.0006	0.0120
	(0.0036)	(0.0025)	(0.0148)
Model	2SLS	2SLS	2SLS
IV	# ratings ∩ NBA games	# ratings	# NBA games
DMAs	NBA	NBA	NBA
FE: DMA	X	X	X
FE: year			
FE: week	X	X	X
Controls	X	X	X
Cluster	Week	Week	Week
N	6413	6413	6413
Mean	0.044	0.044	0.044
SD	0.025	0.025	0.025

Start-up Counseling_{dw} is the number of counseling cases where the primary area of assistance is 'start-up assistance' for clients at DMA d on week w per thousand HHs of DMA d. Column 1 uses as IV the number of ratings of DMA d in week $w-1$ where DMA d's NBA team played on the same day. Columns 2 and 3 use placebo IVs: the number of ratings of DMA d in week $w-1$, and the number of NBA games that DMA d's NBA team played in week $w-1$. The independent variable $SHR_{d(w-1)}$ is the average SHR ratings of DMA d in week $w-1$. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the week level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7: What are the mechanisms?

	start-up counseling$_{dw}$	women$_{dw}$	black$_{dw}$	asian$_{dw}$	latin$_{dw}$
SHR$_{d(w-1)}$[# with offers$_{w-1}$<2]	-0.00035**				
	(0.00017)				
SHR$_{d(w-1)}$[# with offers$_{w-1}$=2]	0.00012				
	(0.00015)				
SHR$_{d(w-1)}$[# with offers$_{w-1}$>2]	0.00025**				
	(0.00010)				
SHR$_{d(w-1)}$		-0.00000	0.00005***	0.00001**	0.00002**
		(0.00007)	(0.00002)	(0.00001)	(0.00001)
X # women$_{w-1}$		0.00005**			
		(0.00002)			
X # black$_{w-1}$			-0.00002		
			(0.00002)		
X # asian$_{w-1}$				-0.00000	
				(0.00001)	
X # latin$_{w-1}$					-0.00006***
					(0.00002)
Model	OLS	OLS	OLS	OLS	OLS
DMAs	All	All	All	All	All
FE: DMA	X	X	X	X	X
FE: year					
FE: week	X	X	X	X	X
Controls	X	X	X	X	X
Cluster	Week	Week	Week	Week	Week
N	14963	14963	14963	14963	14963
Mean	0.056	0.023	0.006	0.001	0.004
SD	0.040	0.020	0.007	0.002	0.005
R^2	0.673	0.602	0.501	0.267	0.560

The dependent variable start-up counseling$_{dw}$ is the number of counseling cases where the primary area of assistance is 'start-up assistance' for clients at DMA d on week w per thousand HHs of DMA d. $women_{dw}$ is that for women clients, $black_{dw}$ for black clients, $asian_{dw}$ for asian clients, and $latin_{dw}$ for hispanic or latino clients. The independent variable $SHR_{d(w-1)}$ is the average SHR ratings of DMA d in week $w-1$. [# with offers$_{w-1}$<2] is a dummy variable that equals 1 if the number of teams on Shark Tank show that receive at least 1 offer from Sharks on week $w-1$ is less than 2, and 0 otherwise. [# with offers$_{w-1}$=2] and [# with offers$_{w-1}$>2] are defined analogously. $\#women_{w-1}$ is the number of women entrepreneurs featured on Shark Tank on week $w-1$. $\#black_{w-1}$, $\#asian_{w-1}$, and $\#latin_{w-1}$ are defined analogously. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the week level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Does Shark Tank spur patent applications?

	applications_{dw}	applications_{dw}	applications_{dw}	granted_{dw}	non-granted_{dw}
$\text{SHR}_{d(w-1)}$	-0.0001	0.0002	0.0144*	0.0123**	0.0021
	(0.0001)	(0.0002)	(0.0079)	(0.0061)	(0.0023)
Model	OLS	OLS	2SLS	2SLS	2SLS
DMAs	All	NBA	NBA	NBA	NBA
FE: DMA	X	X	X	X	X
FE: year					
FE: week	X	X	X	X	X
Controls	X	X	X	X	X
Cluster	Week	Week	Week	Week	Week
N	24440	6413	6413	6413	6413
Mean	0.111	0.152	0.152	0.103	0.048
SD	0.094	0.088	0.088	0.063	0.025
R^2	0.930	0.945	-0.732	-0.956	-0.112

The dependent variable $applications_{dt}$ is the number of patent applications by inventors at DMA d from week t to $t+3$ per thousand households at DMA d. $granted_{dt}$ and $non-granted_{dt}$ decompose this variable into patent applcations that are eventually granted and those that are not. The independent variable $SHR_{d(t-1)}$ is the average SHR ratings of DMA d in week $t-1$. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the week level. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Does Shark Tank spur creation of new businesses?

	new firms$_{dy}$	new firms growth %$_{dy}$	new firms$_{dy}$	new firms growth %$_{dy}$	new firms$_{dy}$	new firms growth %$_{dy}$
% SHR$_{d(y-1)}$	0.2346	0.9364	-0.2381	-2.6739	3.3369	20.0691
	(0.1084)	(0.3579)	(0.4076)	(1.3047)	(46.2688)	(232.4449)
Model	OLS	OLS	OLS	OLS	2SLS	2SLS
DMAs	All	All	NBA	NBA	NBA	NBA
FE: DMA	X	X	X	X	X	X
FE: year	X	X	X	X	X	X
FE: week						
Controls	X	X	X	X	X	X
Cluster	Year	Year	Year	Year	Robust	Robust
N	571	571	81	81	81	81
Mean	15.537	-38.610	19.400	-37.428	19.400	-37.428
SD	8.675	24.198	10.011	24.868	10.011	24.868
R^2	0.870	0.654	0.902	0.699	-0.400	-0.945

The dependent variable New firms$_{dy}$ is the number of new firms created in year y at DMA d. We identify initial location of each firm by the location of its headquarter at the firm's inception. The dependent variable New firms growth %$_{dy}$ is the growth rate of the number of new firms at DMA d in year y. The independent variable $SHR_{d(y-1)}$ is the average SHR ratings of DMA d in year $y-1$. In columns 5 and 6, the instrument is the fraction of ratings of DMA d in year $y-1$ that are taken when DMA d's NBA team is playing. Control variables are DMA d's median income, unemployment rate, and home ownership rate, all defined at all annual level. Standard errors are clustered at the year level for columns 1 to 4. For columns 5 and 6, we use robust standard errors. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Shark Tank Viewership Over Time

The following figures depict spatial variation at the DMA level in Shark Tank episodes year-by-year beginning in 2010 through 2016.

Figure 2: Shark Tank viewership based on Nielsen ratings by DMA, 2010

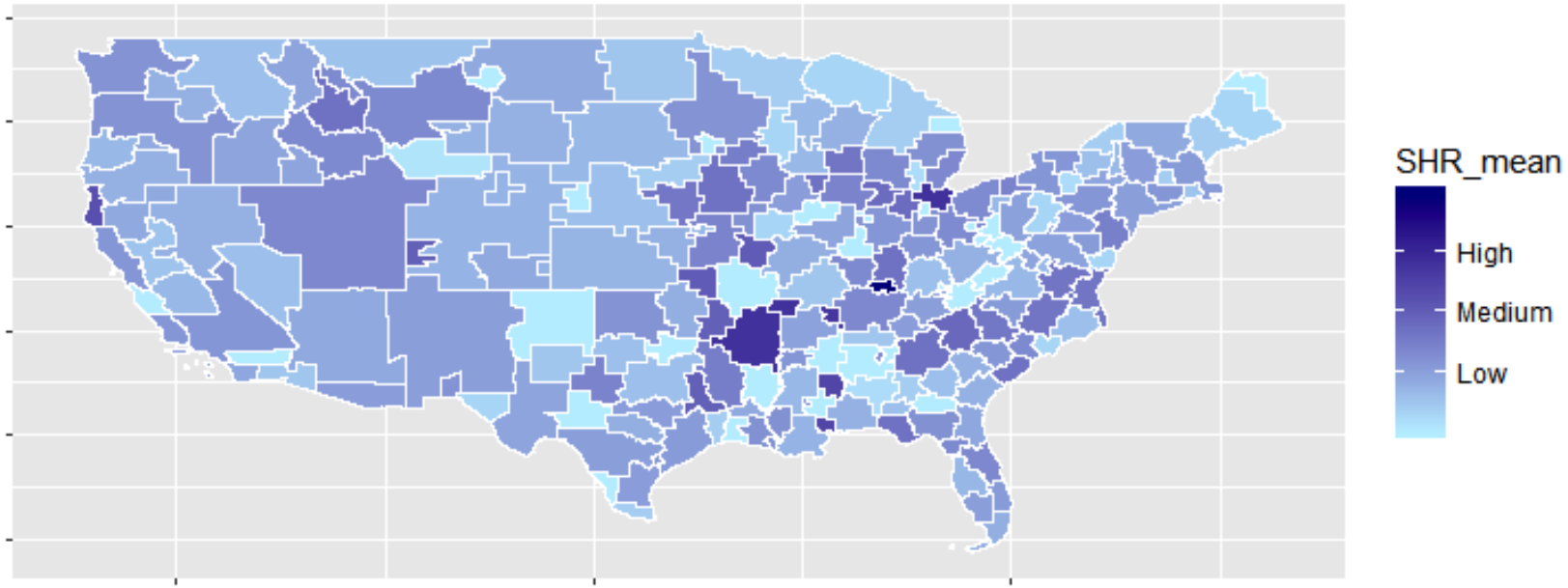

Figure 3: Shark Tank viewership based on Nielsen ratings by DMA, 2011

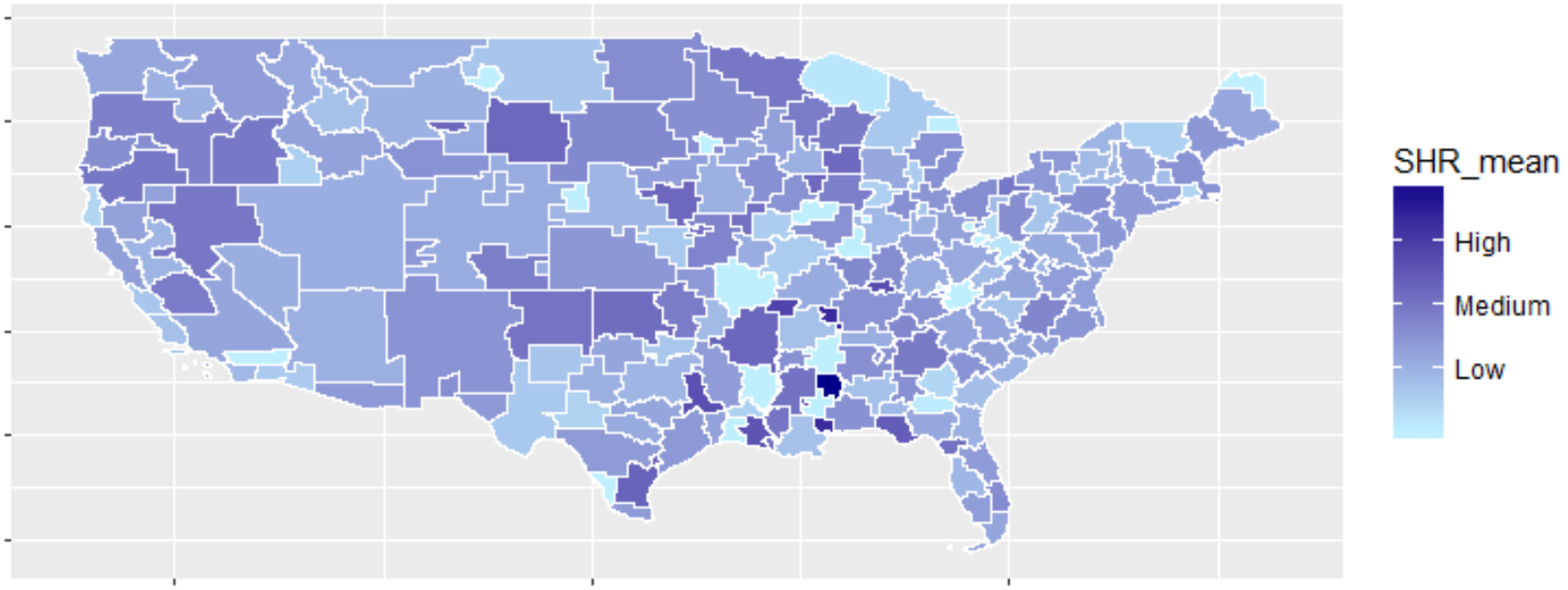

Figure 4: Shark Tank viewership based on Nielsen ratings by DMA, 2012

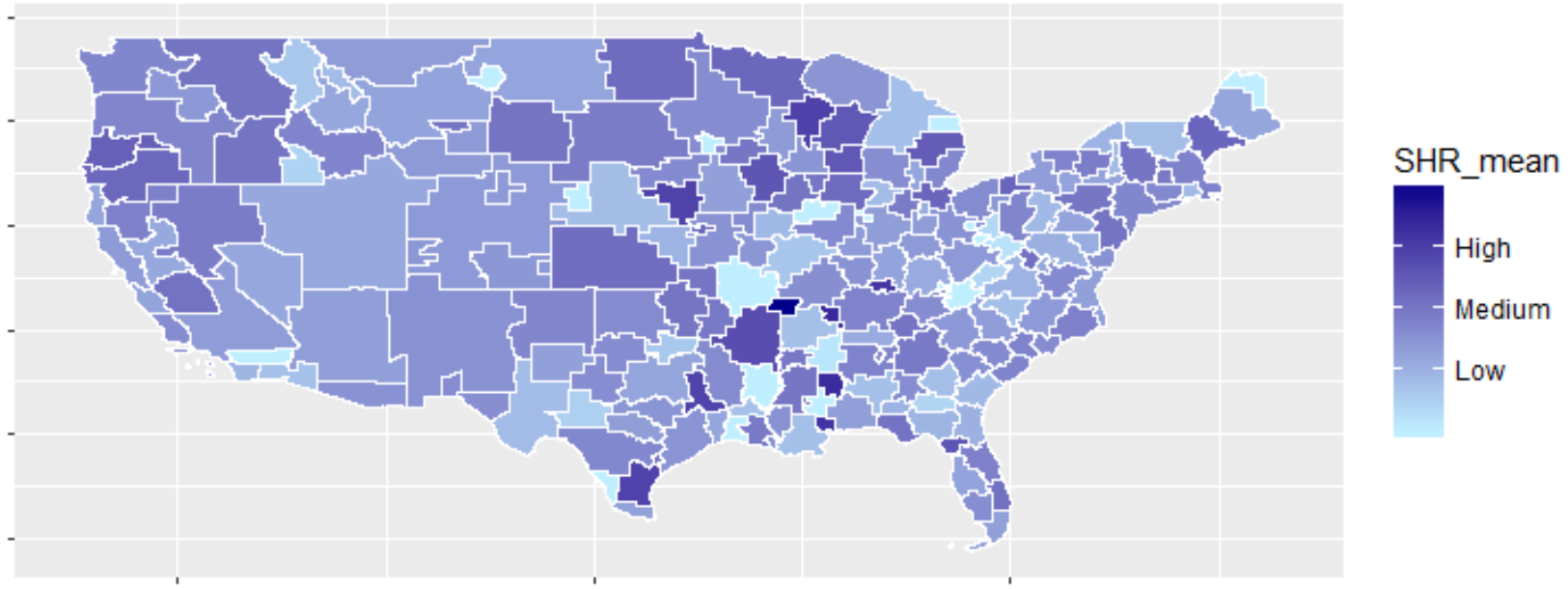

Figure 5: Shark Tank viewership based on Nielsen ratings by DMA, 2013

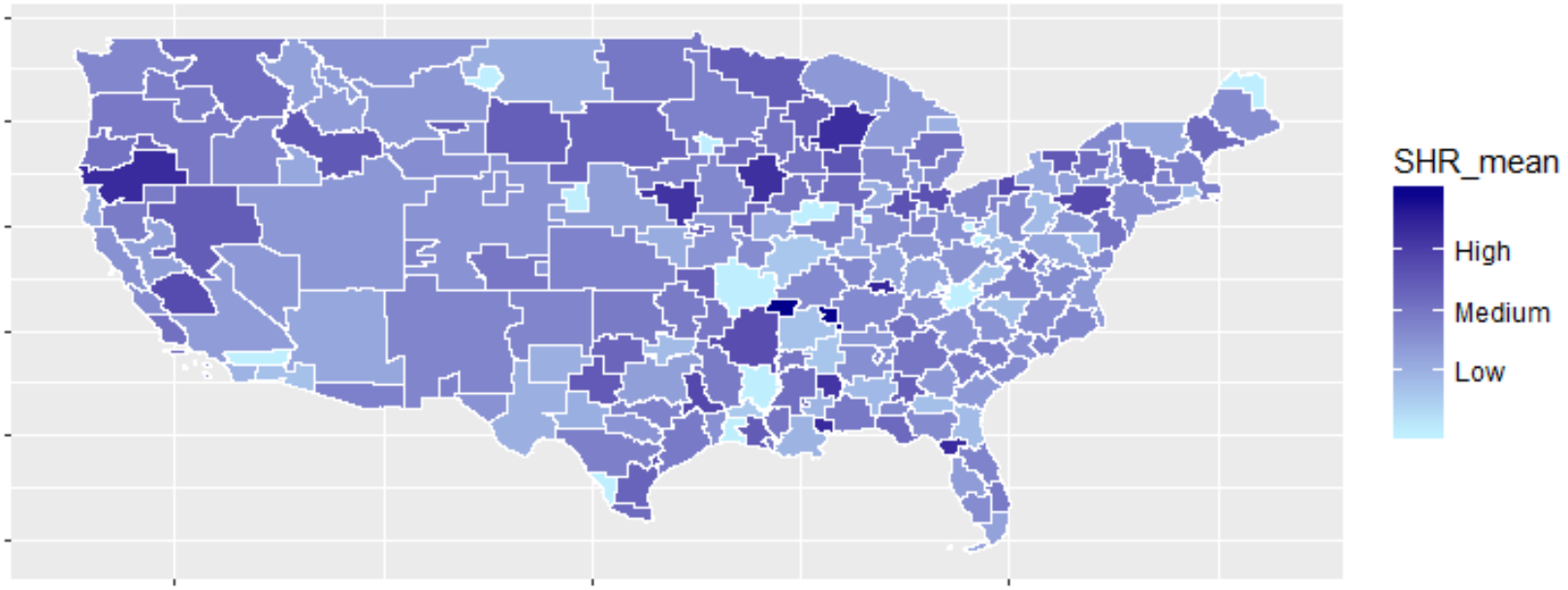

Figure 6: Shark Tank viewership based on Nielsen ratings by DMA, 2014

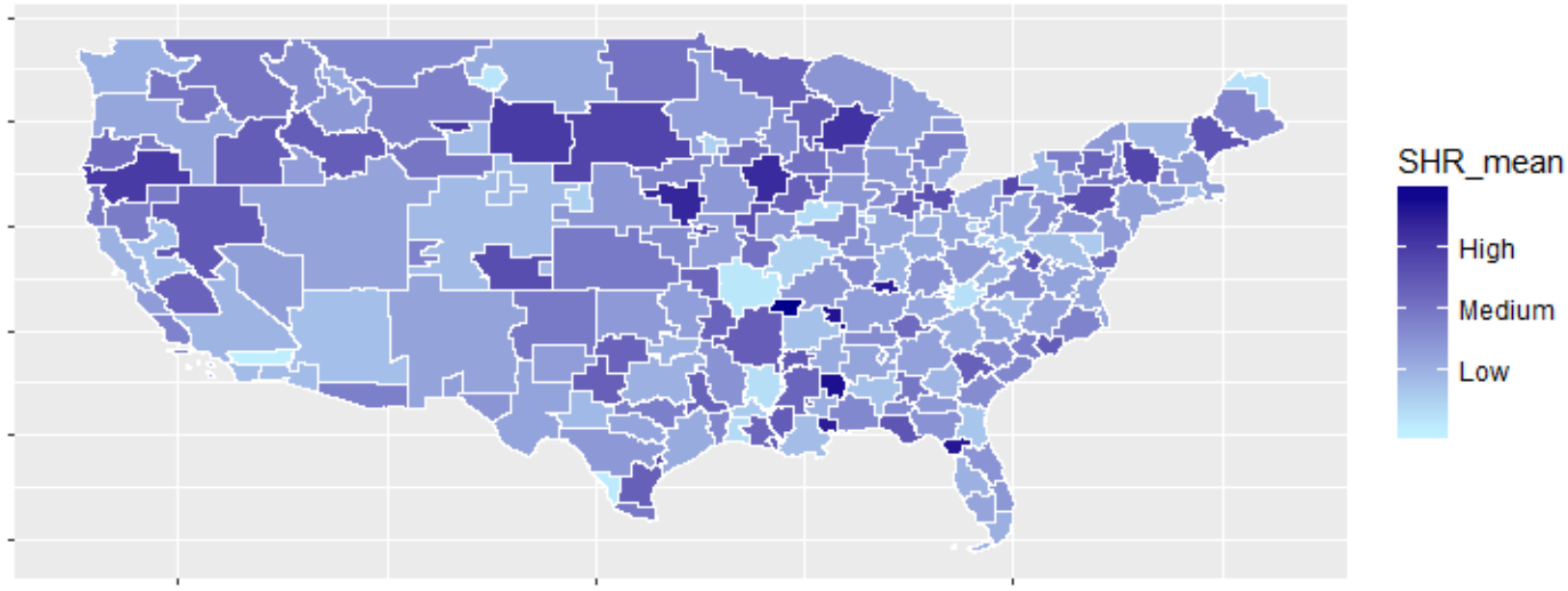

Figure 7: Shark Tank viewership based on Nielsen ratings by DMA, 2015

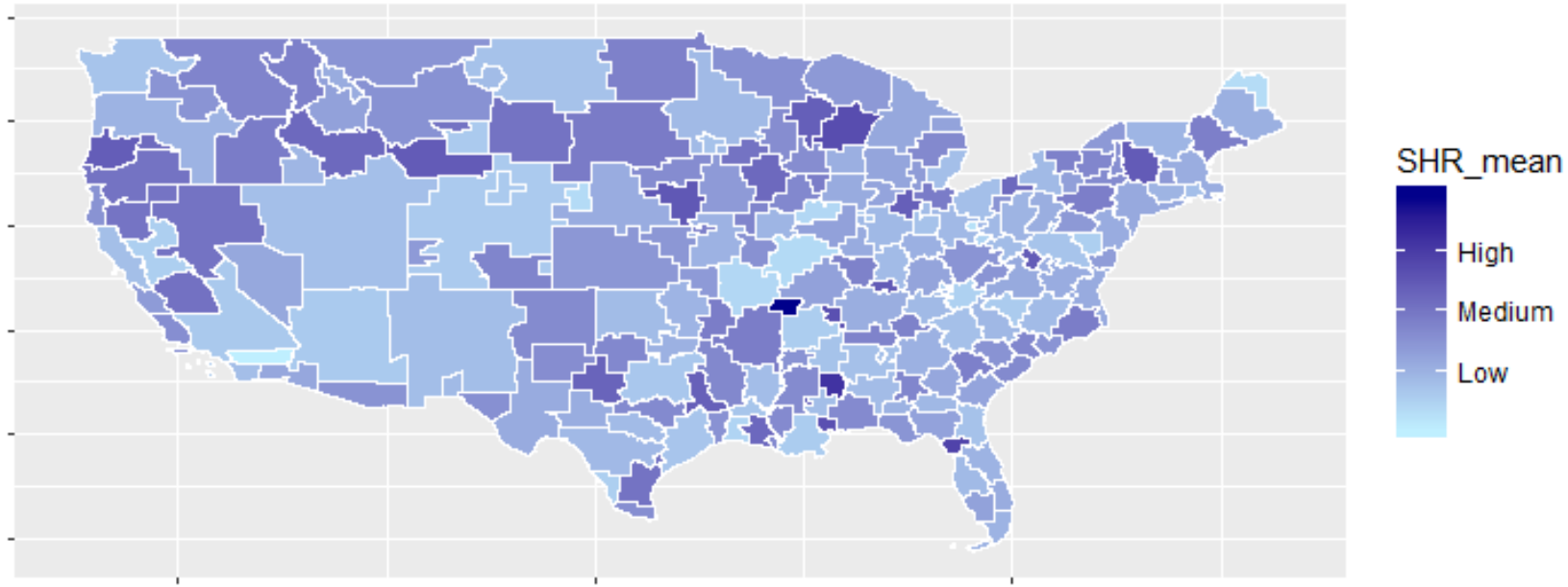

Figure 8: Shark Tank viewership based on Nielsen ratings by DMA, 2016