Abstract

Contributing to a more nuanced and detailed understanding of media effects on crime, this paper presents empirical evidence that detailed media coverage of homicides, influences the probability that criminals use similar murder styles, but does not change overall crime rates. We tracked 31,676 homicides carried out by drug cartels operating at the US-Mexico border, its stylistic characteristics, and the detail with which the media covered each of them. With this uniquely detailed and large dataset, we estimated reaction functions to determine the Granger causality between the quality of media coverage, crime rates and crime style. Our estimates show that media coverage does not encourage criminal acts, but may strongly influence the modality under which crimes are conducted. The use of credit-taking banners or the exposition of tortured bodies becomes more frequent after media has covered similar crimes in detail.
The implementation of public policies that aim to reduce crime by controlling media contents is common in developing countries. In 2010, for example, Zimbabwe’s government attempted to regulate international news outlets and prevent negative media portrayals that might encourage violent uprisings against it (Surette and Gardiner-Bess 2013). Likewise, during the nineties, Colombia convinced 35 top communication outlets to sign the “Discretion Agreement” and reduce the coverage of violent paramilitary groups by appealing to potential violence reduction (Rios and Rivera 2017). Mexico followed a similar path in 2011, when the Federal government proposed an “Agreement on Media Coverage of Violence” with 700 media outlets to reduce coverage of drug-related crimes (Phillip and Berruecos 2012).

These policies assume that detailed media coverage of criminal acts influences criminality, a quite popular assumption. For example, some believe that at least 30 separate occurrences of gun violence were inspired by the Russian Roulette scene from the movie The Deer Hunter (Gunter, 2008), or that the shooter in The University of Virginia Tech massacre was copying events from an action movie (Nizza, 2013). Plenty of instances of copycat crime have been documented since the dawn of TV, with movies like The Burning Bed (1984) and The Fight Club (1999), and with TV programs like MTV’s Jackass (2001) (Sparks 2015).

Reality is that the consequences of the interaction between consumers and violent mass media are still a fertile area of research for communication studies. An area that that remains only partially understood, and that has been constantly distorted by ideological rhetoric (Ferguson 2015, Gentile 2016, Anderson et al. 2015). Two well defined theories collide when trying to assess media effects. On one hand, adherents of the General Aggression Model (Bushman and Anderson 2002, DeWall et al. 2011) fervently argue that media violence exposure needs to be considered as one of the factors that trigger human aggression (Gentile 2016, Anderson et al. 2015). On the other, advocates of theories such as Uses and Gratifications (Sherry et al. 2006) and Self-Determination (Przybylski et al. 2010) argue that the relationship between media violence and societal violence is not empirically robust. For these scholars, media is only a factor
that fulfills pre-existing motivational structures (Ferguson and Colwell 2017, Ferguson 2015, Surette 2013).

Indeed, the ways in which media activates public expression and human behavior are fast becoming one of the most central areas of research to social sciences and communication studies (King et al. 2017, Günther & Domahidi 2017).

This paper contributes the debate between the General Aggression Model and the Self-Determination Theory by empirically examining whether media coverage of violent crimes carried out by drug cartels operating at the US-Mexico border has influenced criminal behavior.

US-Mexico border drug cartels are a remarkable case to study media effects. Mirroring recent debates in the USA (see Brown v. Entertainment Merchants Association in 2011), media outlets have been strongly questioned for exhibiting the violent activities of drug cartels. While some argue that media's priority is to show the public the truth, others argue that violent media coverage inspire new forms of violence and serves as a channel for criminal organizations to gain visibility and disseminate their messages (Reyes 2011). Despite this unsolved controversy, as of now, the Mexican Government has decided to reserve the right to publish the records of drug cartel-related crimes for up to 12 years, arguing that media coverage would “allow criminal groups to generate instability and insecurity among the Mexican population” (Martin 2012).

We collected a unique database that records 31,676 homicides carried out by Mexican drug cartels, the stylistic characteristics of their crimes, whether each of these homicides was covered by the media, and how it was covered. Our panel of more than 2,500 counties/municipalities allow us to identify, for example, the share of drug-cartel homicides that were covered by the press, and whether the details of such crimes, including stylistic characteristics, were published. Using a vector auto-regression model and Granger causality tests to address possible bidirectionalities between media coverage and crime (and to show co-movements of multiple time series), our results show that, when the media covers crimes in larger detail, drug cartels do
not increase their propensity to be violent. Yet, criminals do tend to replicate more the crime styles that get more media coverage. We also provide evidence that crime style reacts to media coverage, but not the other way around.

Overall, this paper provides empirical evidence that media violence does not cause societal violence (i.e. rates of crimes) but that it does influence how societal violence takes place (i.e. style of crime). We estimate that as much as 53% of the error in the forecast of crime styles could be explained by changes in the quality of media coverage. Crime styles such as the use of credit-taking banners in crime scenes, tend to react particularly strongly to media coverage.

The rest of the paper proceeds as follows. The first section discusses the existing literature about media coverage and crime. The second section presents original data and describes empirical tests. The third and fourth sections present results and robustness tests. Both sections show that media coverage of crime functions as a crime “rudder”, but not as crime “trigger”, particularly when media is detailed in covering the style of crimes. We conclude by discussing how the paper contributes to the literature, and by suggesting possible avenues for future research.

**Media coverage and crime**

Determining whether exposure to violent media content could trigger delinquency and aggression is increasingly one of the most explored topics of media and communication studies (Günther and Domahidi 2017).

Yet, for as much as it has been written on the topic, evidence remains weak and mixed, leaving the discipline without conclusive results (Anderson et al. 2015, Gentile 2016, Ferguson 2015). This difficulty has made some to claim for the need to shift the paradigm under which media effects are studied, to include additional tools such as complex, cognitive emotional models (Lang 2013).

At least two theories collide while trying to explain the effects that violent media may have in criminal behavior: The General Aggression Model (Bushman and Anderson 2002, DeWall et al.
and theories of gratifications (Sherry et al. 2006) and self-determination (Przybylski et al. 2010).

On one hand, following the General Aggression Model, studies have shown that media violence exposure is one of the factors that could trigger human aggression (Gentile 2016). Some have argued that that media violence could be a significant factor contributing to violence by numbing the pain and suffering of others (Bushman and Huesman 2012), that profanity in video games may affect aggressive outcomes (Ivory and Kaestle 2013), that firesetters may be influenced by media coverage of similar crimes (Doley et al. 2013), and that even terrorists groups tend to perform more attacks when the press covers them (Rohner and Frey 2007, Jetter 2017). Among children, the consumption of media violence could also be related to less prosocial behavior later in the school year (Gentile et al. 2011, Gentile et al. 2007, Ostrov et al. 2006), and in their adult life (Huesmann et al. 2003). Some scholars have also found evidence of increased hostility and engagement in physical fights among individuals exposed to violent video games (Anderson et al. 2010, Anderson et al. 2007), and violent song lyrics (Anderson et al. 2003).

On the other hand, following theories of gratifications and self-determination, studies have shown a lack of correlation, or lack of causality, between media contents and aggression (Ferguson and Colwell 2017, Ferguson 2015, Ferguson et al. 2008). These studies point that we are living in the most peaceful epoch in human history despite the explosion of violent mass media (Pinker 2011), and that, even if a significant and causal effect could be found, it could not be large enough to change aggregated criminal rates in notable ways (DeCamp & Ferguson 2017, Surette 2013). It has been shown that playing violent videogames does not have a criminogenic impact (Surette and Maze 2015, Elson et al. 2015, Ferguson et al. 2012), that violent media exposure does not reduce empathy for the victims of real violence (Ramos et al. 2013), or creates more aggressive behavior (Savage and Yancey 2008). Interestingly, some studies have even claimed that violent movies and videogames reduce societal violence (Markey et al. 2015, Valadez and Ferguson 2012).
In general, this literature refuses to assume viewers are “passive receptacles of learning”, and instead conceives individuals as “active shapers and processors of media culture” (Ferguson 2015, Elson and Ferguson 2014). Rather than “finger pointing” the media as a cause of violent behavior, these studies argue that the interaction between media and behavior is shaped by media users (Phippen 2017). The media only fulfills pre-existing structures that motivate individuals (Adachi and Willoughby 2011). These theories are consistent with empirical evidence that media effects are stronger on individuals that already have violent traits. For example, violent media tends to be watched the most by those with a relatively higher taste for violence (Coyne 2007, Savage 2008, Savage and Yancey, Bushman and Huesman 2012, Helfgott 2015).

Even if the evidence about the impacts of violent media on societal violence is inconclusive, several studies have shown a stronger and more solid association between media coverage and the stylistic decisions of criminals. The work of Surette (2014), for example, analyzed anonymous surveys of 574 male and female correctional inmates. Surette concluded that the media influenced the style of crimes by providing instructional models to predisposed individuals, yet it did not prompt crime per se. He coined the term “ruddering” to illustrate how media portrayals of criminality shape the stylistic form the crime takes on, instead of acting as a direct catalyst for the crime itself (Surette 2013).

Criminals could be expected to copy “crime styles” featured by the press, not only because the media could function as an “instructional model” (Surette 2013), but also because criminals may want media attention. The most developed research about this phenomenon concerns terrorism (e.g. Iqbal 2015). Media coverage is proactively sought by some criminals who wish to advance their criminal objectives by receiving attention and inducing fear. Criminals want press to promote an appearance of strength (Hoffman 2010, Kearns et al. 2014, Conrad & Greene 2015), or to gain support from alike audiences (Abrahams & Conrad 2017). Other conditions, such as reduced probability of enforcement may also increase the probability that criminals search for public attention (Hoffman 1997).
The debate of media effects on crime stands unresolved, partially because of the difficulties involved in finding appropriate ways to measure and correlate the role of the media. Most studies rely on evidence gathered from post-crime interviews with offenders (Surette 2013). This means that all these studies are subject to perception biases and self-justification. Offenders may rationalize their criminal behavior by attributing it to the impact of the media, or to other third parties, because they find it comforting to avoid the cost of decision-making. To mitigate this problem, studies have tried to identify copycat criminals based on the facts of the case (Surette 2013). Despite this, the lack of a centralized and comparable source of information that describes crimes occurring at different times and in different police jurisdictions is a serious challenge. Furthermore, even if two crimes appear to be similar, scholars cannot be certain that they were inspired by the same source (Stack 2000, Coleman 2004, Surette 2015).

A second difficulty is that media coverage and criminal behavior may enforce one another. Front-pages prioritize content with higher audience ratings and editor’s approval (Reiner and Newburn 2007, Fink and Schudson 2014, Coddington 2014). Criminal events may induce media coverage if crimes are strategically planned to be scandalous and provocative (Wu 2000; Nacos, 2002).

In sum, testing for the media effects is problematic because of the dynamic process between the media, which may be driven by sensationalism, and criminals, who may be benefited by the direct/indirect reputational gains of media coverage. Identifying which of these two reactions happens first is a methodological challenge, particularly when --as has been the case-- academics lack data on the strategic choices of criminals that has been observed over long-enough time periods to provide material for statistical inference.

In the following we present an empirical model that studies how media may influence criminal behavior, contributing to a long literature of the impacts of media on social behavior (Slater 2007, Zhang et al 2010, Valenzuela 2012) and political communication (McCarthy-Latimer and Kendrick Jr 2016, King et al. 2017).
Data

To directly contribute to the above-mentioned literature, our study uses drug cartels operating at the US-Mexico border as our objects of study. We select this case because of their notably different stylistic patterns (Martin 2012), and their large time and geographical variance of crime rates (Coscia and Rios 2012, Molhzan et al. 2012). Homicides perpetrated by drug cartels vary in style, stylistic differences can be found in the use of specific types of weapons, victims' characteristics, types of torture, the display of dismembered or decapitated bodies at the crime scene, and in the use of other intentionally public displays, such as banners, that explain their motivations or intents (Shirk and Wallman 2015, Durán-Martínez 2015). Drug cartel-related crimes can be observed across 1,068 municipalities, from border cities like Río Bravo and Tamaulipas that had only 18 homicides from 2008 to 2010, to places like Juárez that endured 6,300 homicides during the same period. A burgeoning literature seeks to understand the levels of violence in Mexico (Dell 2015, Ríos 2015, Shirk and Wallman 2015, Osorio 2015, Calderon et al. 2015, Trejo and Ley 2017) but research analyzing the dynamics within the conflict, such as communication strategies, has not kept pace.

Our research was only made possible due to the existence of two unique datasets that we collected to describe crime rates and crime styles among drug cartels operating at the US-Mexico border.

First, to measure “Crime Rates”, we obtained official registries of homicides attributed to drug cartels by Mexican intelligence and security institutions (SNSP 2011). During a short sui generis period (2007-2011), Mexican authorities allowed public access to a database that recorded whether a homicide was drug cartel-related. This gave us the unique opportunity to identify drug cartel-related violence in a georeferenced panel. To be considered drug cartel-related, a homicide needed to meet six criteria. These are (i) use of high-caliber firearms, (ii) signs of torture or severe lesions in victims, (iii) bodies found at the crime scene or in a vehicle, (iv) victims were taped, wrapped, or gagged, (v) murders happened in a prison and involved criminal
organizations, and (vi) if one of several “special circumstance” occurred. Among these “special circumstances” are whether the victim was abducted prior to assassination (known as a “levantón” in Spanish), ambushed or chased, whether the victim was an alleged member of a criminal organization, and whether a criminal organization publicly claimed responsibility for the murder (Molzahn et al. 2012). In the period from 2008 to 2010, we identified 31,676 drug cartel-related homicides across 1,112 counties/municipalities. Overall, these homicides represent 95% of all homicides perpetrated during those years and in those areas.

Second, to measure “Criminogenic Style”, we constructed a database that identifies two discretionary stylistic features that sometimes accompany drug cartel-related homicides: credit-taking banners and bodies/dismemberment put on display.

We matched official registries of homicides with our original data set of about 1,800 credit-taking banners displayed publicly by drug cartel organizations during 2007-2010. These banners, also known as “narco-messages” (Campbell and Hansen 2014, Martin 2012, Atuesta 2017, Mendoza 2016, Durán-Martínez 2015), are used by drug cartels to take-credit for their criminal actions, or to clarify their degree of responsibility for them. Narco-messages may also be displayed to intimidate potential victims, to communicate with local citizens, or to give instructions to investigators, policemen, or journalists (Martin 2012). The content of the banners may be a threatening maxim like “you cannot be on good terms with both God and the Devil”, or an appeal to the public, like the claim that “this [battle for turf] is for the good of all”, or like the banner dedicated to “the brave, noble, and loyal people” wishing them “Merry Christmas, ho, ho, ho”. Narco-messages are a creepy stylistic innovation that stretches the boundaries of traditional graffiti with its bizarre mimicry of the formality of Mexican political campaign propaganda (Salopek 2011).

Our database allowed us to identify the share of drug cartel murders that were accompanied by a credit-taking banner, we classified this as a dummy called “Credit-taking Style”.
The use of credit-taking messages in Mexico is fascinating in its own right, but this is not the only example of such phenomena. We have evidence of similar criminal messaging occurring around the world, in places such as Colombia, Southern Italy, and in numerous U.S. cities (Cowell 1992, Carbay 2002, Martin 2012, Ortiz 2013).

Criminal messaging is also a major part of terrorism, which has been described as violent propaganda or violent communication (e.g., Schmid and De Graaf 1992). A line of research has examined why terrorist groups sometimes claim their attacks (Wright 2009) among reasons for doing so are intergroup competition (Hoffman et al. 2010) communication within the group (Brown and Hamilton-Giachritsis 2005) and operation in democratic countries (Min 2013). However, this literature also established that there are reasons militant groups do not seek credit. Such reasons could be that the attack was especially heinous, or the desire to avoid a bad reputation (Hoffman 2010, Abrahms and Conrad 2017).

Interestingly, and specific to the case of US-Mexico border drug cartels, we were also able to identify the share of credit-taking banners that were combined with another criminogenic style: the display of bodies or dismemberment (typically beheadings) (Durán-Martínez 2015). The stylistic display of human heads or bodies is worth analysis because it helps us understand why the appearance of the crime scene is important to these kinds of criminals and how they use violence as a narrative.

Narco-messages and bodies/dismemberment are typically displayed openly in high-traffic public areas where authorities, citizens, and journalists can easily find them. They are often found on roads, hanging from bridges, or dispersed around various parts of a city (Lantz 2016). Out of the total of 1,800 narco-messages, 51% were accompanied by a body, or part of one. We created a dummy for homicides with this characteristic and called it “Body Exposure Style”.

We also developed two ways to measure the extent and the quality of the media coverage of criminogenic contents. To create the variable “Media Coverage”, we identified the amount of
drug cartel-related homicides that were covered by the press. Beginning in 2007, news-media organizations closely followed organized crime-related homicides, keeping count independent of government sources. The most comprehensive coverage was done by Reforma, a major national newspaper with a large pool of correspondents, but other national newspapers like Milenio and El Universal also had their own independent counts (Molzahn 2012). The “Justice in Mexico Program” has also gathered statistics regarding media coverage of drug-related homicides from 2006 to 2017 (Reforma 2017, Milenio 2017).

Out of the 32,199 homicides officially classified as perpetrated by drug cartels, 23,737 were covered by the press. Coverage is very different across time, and geography. For example, although the press covered 76% of the homicides in 2010, in 2007 it only covered 63%. Also, in Oaxaca, 26% of drug cartel-related homicides were not covered, meanwhile, in Querétaro were all were covered by the press. It is important to note that Mexican news outlets and the Mexican government used a similar methodology to classify a homicide as drug cartel-related.

Finally, to identify the quality of media coverage, we measured the degree of detail with which each of the 1,800 narco-messages was reported. Out of our total sample, 74% of the messages were detailed. We classified coverage as “detailed” when the specific content of the narco-message was reported. This means that messages like “Esto les va a pasar a los que no respeten a los grandes jefes de La Familia” (this will happen to those that don't respect La Familia’s great chiefs) could be read in their entirety in the newspaper (El Sol de Toluca 2009). Coverage classified as “non-detailed” was when the reporter only hinted at the existence of a narco-message without explicitly quoting its content. The share of detailed messages over total messages is represented by the variable “Media Coverage Quality”.

Our final dataset is thus a weekly-frequency panel with 5,408 observations over a period of 508 weeks between 2007 and 2010.\(^1\) We exploit state-level variations in measures of the extent and

\(^1\) We use weeks as our frequency measure because media coverage measures were only available per week (Reforma 2017, Milenio 2017).
quality of media coverage, and in measures of the relative frequency of the two criminogenic styles: narco-messages and body/dismemberment displays. Descriptive statistics of our measures of media coverage, quality of media coverage, and criminogenic styles are shown in Table 1.

(Table 1 about here)

On average the media fails to cover 1.28 homicides per week, per state. The lowest recorded coverage was during the 13th week of 2010 when, in the state of Chihuahua, the media failed to report on 77 drug related homicides. There are instances in which media covers more homicides than the official count like during the 43th week of 2010 for the state of Guerrero (61 more homicides). This happens when mass murder graves are found. Official records generally avoid these records as they consider them just part of previous “missing persons” statistics. Of the total events covered by the media, on average only 10.8% are reported in detail. Drug cartels take credit on average for 2.7% of their homicides. There are cases in which credit taking is up to 250% larger than homicides because many drug cartels take credit for a single action. Finally, on average 7.9% of credit-taking style homicides were accompanied with the display of bodies or dismemberment.

**Empirical test**

To address possible bidirectionalities between media coverage and crime, we rely on reaction functions and Granger causality tests as our main empirical specifications. These methods are an efficient way to show co-movements of multiple time series. A large empirical literature supports the use of Granger causality tests (Granger 1969) for testing cycles (Jaeger and Paserman 2008, Huang et al. 2008, Gambacorta et al. 2014) and as a relevant tool for crime studies with time series analysis (Saridakis 2004, Ramirez 2013, Hsu and McDowall 2017).
Our panel vector autoregression consists of \( p \) lags of each variable in the equation, in this case empirical reaction functions for Criminogenic style (Credit-taking or Body exposure style) and Media coverage (Media coverage or Media coverage quality):

\[
x_{it} = \beta_0 + \sum_{j=1}^{5} \beta_{1j} x_{it-j} + \sum_{j=1}^{5} \beta_{2j} z_{it-j} + e_{x_{it}} \quad (1)
\]

\[
z_{it} = \beta_0 + \sum_{j=1}^{5} \beta_{1j} z_{it-j} + \sum_{j=1}^{5} \beta_{2j} x_{it-j} + e_{z_{it}} \quad (2)
\]

where the \( \beta_1 \)'s and \( \beta_2 \)'s are matrices of coefficients for each state \( i \), on time \( t \). The terms \( z \) (for 1) and \( x \) (for 2) are vectors of exogenous variables that may shift the reaction function up or down, and \( e_x \) and \( e_z \) are the vector error terms. These equations can also be expressed in matrix form, letting \( Y_{it} = x_{it} z_{it} \) and \( e_{it} \):

\[
A(L)Y_t = e_{it} \quad (3)
\]

where \( e_{it} \) are structural shocks which are, by definition, uncorrelated with each other, and \( A(L) \) is a matrix lag polynomial of order \( A(L) = L^1 - A_1 L^2 - A_2 L^3 + \cdots + A_p L^p \) where \( A_1 \) is:

\[
A_1 = \begin{pmatrix}
\beta_{11}^x & \beta_{12}^x \\
\beta_{11}^z & \beta_{12}^z
\end{pmatrix} \quad (4)
\]

Note that efficiency and consistency is achieved because all variables in the equations are lagged \( (t-1 \) or earlier), while the error term corresponds to time \( t \), and because all variables on the right side of the equations are the same.

This specification is advised to test whether two variables can be characterized as a cycle, or as a unidirectional effect. It fits our purposes because we want to determine if media coverage is reacting to past crime rates or crime styles, not to solve for a dynamic equilibrium.

Every panel vector auto-regression model is accompanied by a Granger test, a joint significance test to check the significance of the coefficient of our lagged impulse and response variables. The null hypothesis that \( x \) does not Granger-cause \( y \) is accepted if and only if no lagged values of \( x \) are individually significant according to their t-statistics, provided that collectively they add
explanatory power to the regression according to an F-test. The null hypothesis of the F-test is that there is not explanatory power jointly added by the x’s. If our coefficients for the impulse variable are significant we can reject the hypothesis that the impulse variable is not causing the response variable to change. It is considered that the impulse variable will react to the response variable if the lagged values of the impulse variable have an effect on the current value of the response variable, controlling for the lagged values of the response variable.

When estimating a panel vector auto-regression, we are generally not interested in our coefficients. Instead, we are interested in the dynamic responses of the variables to shocks. Therefore, we provide additional post-estimation analysis like nonparametric impulse reaction functions and forecast error in variance decomposition. An impulse-reaction function is a signal processing technique that allowed us to take our defined dynamic system with an input signal, called an impulse, and to describe the reaction of the system to it as a function of time.

We followed Love and Zicchino (2006) to transform the system of equations into a recursive auto-regressor vector with Choleski decomposition of variance-covariance matrix residuals. Note that residuals need to be orthogonal to control for other shocks. The forecast error in variance decomposition is useful to measure how relevant each shock is to the explanation of each variable in the equation system. This is the same as obtaining the size of the forecast error in variance for each variable, due to each shock at each period.

**Results**

Table 2, shows the results for the models that use combinations of variables for quality of media coverage and crime rates for both reaction functions, estimated from a panel vector auto-regressor with five lags. Columns (1) and (2) show the relationship between quality of media coverage and crime rates.
The results show that exposure to crime media does not trigger an increase in violent crime or aggression. Specifically, we can see that crime rates show no reaction in any of the five weeks following media coverage.

Additionally, results show that quality of media coverage also does not react to crime rates. Our Granger test supports this result, showing that we fail to reject the hypothesis that quality of media coverage does not “Granger cause” crime rates and vice versa.

Columns (3) and (4) show the relationship between the quality of media coverage and crime rates.

The results show that crime rates do not react to criminogenic media content. Moreover, quality of media coverage has no reaction to crime rates. As expected, the Granger test shows that quality of media coverage and crime rates both fail to predict each other.

(Table 2 about here)

In Tables 3 and 4, we present the same models as above, but for the two stylistic patterns: credit-taking (columns 1 and 2) and body exposure (columns 3 and 4).

Columns (1) and (2) of table 3 show the relationship between quality of media coverage and observations of crimes that have a credit-taking style.

The results indicate that credit-taking styles of crime increase in a statistically significant way when similar crimes have been covered in the prior one, two and four weeks. The Granger test supports this result, showing that quality of media coverage helps to predict credit-taking behavior (5% significance level), but credit-taking behavior fails to predict quality of media coverage (35% level).

Drug cartels tend to take credit more for their crimes when the media has previously covered their crimes with detail. The forecast error in variance decomposition supports our findings. We can see that as much as 53% of the error in the prediction of credit-taking crimes is due to media
coverage. In other words, about half of the variance of credit-taking style is explained, not by previous cases of credit-taking, but by increased detailed media coverage of cases of credit-taking.

Columns (3) and (4) show the relationship between quality of media coverage and observations of crimes that have a body-exposure style.

The results are consistent with previous models, showing that body-exposure styles increase with quality of media coverage of similar crimes during the prior first and fifth weeks. The Granger test supports these findings that the quality of media coverage helps to predict body-exposure crime styles but with lower significance than previous models.

Drug cartels tend to expose bodies more when the media has previously covered their crimes with detail, yet this effect is less string than with credit-taking styles. The model shows that as much as 26% of the error in the forecast of the body-exposure crime style is due to quality of media coverage. A quarter of the variance of body-exposure style is explained, not by previous trends in cases of body-exposure, but by increased detailed media coverage of body-exposure crimes.

(Table 3 about here)

Overall, our empirical specifications show that media coverage influences the style of the crimes perpetrated by drug cartel organizations operating at the US-Mexico border, but does not motivate more crime. Detailed media coverage influences crime style, but not crime rates.

The impulse reaction functions for credit-style taking and media coverage are presented in figure 1. They use 95 percent confidence intervals and 1000 repetitions of Monte-Carlo simulations to create a 5 percent band error interval. The graph in the bottom-left corner describes how the number of credit-taking style crimes reacts to quality of media coverage, while holding all other shocks at zero. The graph in the top-right shows how quality media coverage reacts to credit-
taking style crimes, while holding all other shocks at zero. The shocks and the impacts are presented as standard deviations.

(Figure 1 about here)

Just as the tables show, the bottom-left corner of Figure 1 shows that increased quality media coverage of credit-taking crime styles increases similar crimes in the second and fourth week. This effect is statistically significant.

In Table 4, we present the same models as in Table 3, but instead examine media coverage, independently of its quality. We have estimates for crime styles in the form of credit-taking (columns 1 and 3) and body-exposure (columns 3 and 4).

(Table 4 about here)

The results show that we do find a statistically significant reaction to media coverage. As in Table 4 above, both crime styles increase in a statistically significant way with media coverage. The impact of both crime styles seems to be present during the first, third, and fourth weeks. Additionally, the Granger test supports a rejection of the hypothesis that media coverage does not cause the credit-taking criminal style (5% significance level), and a rejection of the body-exposure hypothesis (5% significance level). As much as 1.9% of the error in the forecast for credit-taking style, and 0.6% of the error in forecast for body exposure style is explained by changes in media coverage.

Our results show that criminogenic media content provides criminals with inspiration regarding the features of the crime, but does not cause crime. Such influence is dramatically stronger when media covers crime with full detail. In the case of the most detailed media coverage, we observe impacts that are 28 times larger.

Figure 2 presents the impulse-reaction functions with 95 percent confidence bands for credit-taking and for media coverage (columns 1 and 2 in Table 4. The graph in the bottom-left corner
describes how credit-taking reacts to the media coverage, while holding all other shocks at zero. The graph in the top-right shows how media coverage reacts to crimes exhibiting the credit-taking style. The shocks and the impacts are presented as standard deviations.

The bottom-left corner of Figure 2 shows that when there is an increase in media coverage, credit-taking crimes increase in the following week. This effect is statistically significant. During the second week, the positive effect decreases but keeps its statistical significance. In the third week after coverage, the positive effect decreases again and loses significance. During the fourth week, however, the positive effect increases and becomes statistically significant again. After the fourth week period, the graph indicates the beginning of a slightly decreasing tendency without statistical significance.

(Figure 2 about here)

Robustness tests

To interrogate our data further, we tested for heterogeneous effects driven by (a) the strength of drug cartel territorial entrenchment, and (b) the degree in which drug cartels follow media coverage. The logic of behind these tests is straightforward. First, if criminogenic media coverage serves as inspiration for crime style, as we proved in our previous models, then we should expect that media coverage will have a larger effect in are where drug cartels are more entrenched and thus, more physically present to be influenced. Second, if the media provides instructional cues to people intending to perform criminal acts, we may see different effects depending on how much drug cartels follow the dissemination of information by the media. We expect that media coverage will have a larger effect in areas where traffickers more closely follow media coverage.

We began by testing heterogeneous effects by the strength of drug cartel territorial entrenchment. We determine whether a state is drug cartel territory by identifying the presence of drug cartels in different territories over time. To measure drug cartel presence, we relied on a published big-
data framework that uses a text-analysis algorithm to extract web content about recorded criminal activities by subnational economy. The algorithm “reads” digitalized records, news content, blogs and Google-News indexed content searching for instances in which drug cartel operations are mentioned. The Python crawler was created to extract JSON objects using unambiguous query terms to perform text analysis. The final data, cleaned using a hyper-geometric cumulative distribution function, includes 2,449 sub-national economies, and 178 “actor terms” associated with traffickers and drug cartel organizations. Each actor was classified according as part of 13 drug cartels and a residual category. We have information of 13 drug cartels operating in Mexico for 19 years (1991 - 2010). Drug cartel organizations operate in 713 municipalities in Mexico, and in most of the US-Mexico border. A more detailed description of the methodology that we followed can be found at the published paper (Coscia and Ríos 2012).

This framework allowed us to obtain information of a phenomenon that would otherwise require large scale, expensive intelligence exercises. Most importantly, this procedure helped us to disentangle drug cartels performing violent crimes from drug traffickers that are present in peace. Many of the recorded drug cartel operations are non-violent, consistent in peacefully trading, transporting, producing or cultivating illegal drugs. This data set has been a source to study criminal activity in many published papers (Osorio 2015, Castillo et al. 2014, Dube et al. 2016, Holland and Ríos 2017).

Table 5 shows our estimates for the quality of media coverage and credit-taking style for two subsets: areas that are geographical bastions for drug cartels, and areas that are not. The results indicate that crimes with credit-taking style react in a statistically significant way on the first, second and fourth, as detailed coverage increases. Meanwhile, locations where drug cartels are not entrenched only exhibit association between criminogenic media content and the stylistic decisions made by criminals during the second week. The Granger test bolsters these findings, showing that media coverage helps to predict credit-taking crimes (10% significance level) in places where drug cartels are entrenched, but fails to do so otherwise (30% significance level).
Furthermore, the forecast error in variance decomposition supports our findings. We can see that as much as 52% of the error in the forecast for credit-taking crimes is due to quality of media coverage.

(Table 5 about here)

A second robustness tests was conducted to evaluate heterogeneous effects the degree in which drug cartels follow media coverage. Following the research of (Holland and Ríos 2017), we used statistics of violence against the press as a proxy to measure how much drug cartels care about the dissemination of information. The degree in which individuals care about the dissemination of information is crucial in determining the violence that they are willing to employ against potential informants (Reuter 1983, Kalyvas 2006). Only drug cartels that are powerful and that care and pay attention to the media will incur in the potentially quite large cost of inflicting violence against journalists to silence the press. Violence against the press is costly because it may lead to increased federal attention and enforcement on local illicit activity. Thus, incurring on the high cost of inflicting violence to journalists is a proxy for how much drug cartels care and pay attention to media contents.

To identify the existence of violence against the press, we used journalist homicide data collected by the Committee to Protect Journalists (CPJ). This same data has been used before in published academic articles like (Holland and Ríos 2017). The US-Mexico border is one of the most dangerous areas in the Western Hemisphere to practice journalism, with various sources reporting between 85 and 100 journalists having been killed or disappeared since 2000 (Edmonds-Poli 2013). In many recent years, journalists in Mexico have faced levels of danger comparable to countries in war like Iraq and Pakistan (CPJ 2014). In fact, in 2010 and 2011, more journalists were assassinated in Mexico than in any other country in the world, except Pakistan (CPJ 2014).
Table 6 shows that credit-taking reacts to criminogenic media content in states where cartels care the most about the dissemination of information.

There is a positive and statistically significant association during first, second, and fourth week after the detailed coverage occurred. Meanwhile, states in which criminals do not follow media coverage do not show any significant statistical reaction between credit-taking and the quality of media coverage. The Granger test supports these findings, showing that media coverage helps to predict credit-taking crimes (1% significance level) in states where criminals more closely follow press contents, but fails to do so in states where they do not (65% significance level). Moreover, the forecast error in variance decomposition also reinforces our findings. We can see that as much as 52% of the error in the forecast for credit-taking crimes is due to media coverage.

(Table 6 about here)

In sum, our results show evidence that crime styles covered by the press tend to be more replicated. In other words, we find that detailed media coverage of crime creates templates for crime. However, there is no evidence that coverage impacts crime rates. We interpret these results as evidence of a world in which the media influences the style of crimes for those already so inclined, but provides no other kind of encouragement. Publicity-seeking criminals use more stylized crimes when they know that their messages will be better spread by the press, but this does not mean that they commit more crimes.

It is also notable that we find no evidence to suggest that the relationship between media coverage and crime style is bidirectional. There exists a Granger causality that runs from media coverage to criminal style, but not from criminal style to media coverage. The results above are further cemented by our finding of heterogeneous effects in states where drug cartels operate. Specifically, we found a clear association between the media and crime style in states with cartel operations, but not in states without them. Additionally, we found that states in which the press was endangered by cartel operations exhibit a strong association between media coverage and
crime style, but this did not hold for states without cartel operations. For both cases, we found evidence that the relationship between media coverage and crime style is not bidirectional.

**Conclusion**

Our research was inspired by one of the most enduring controversies in media studies: whether exposure to criminogenic media content causes crime by “triggering” delinquency and aggression or not. This debate has been difficult to resolve because measuring copycat crime presents major empirical challenges, but also because criminogenic media content and crime rates may be modeled as a self-reinforcing cycle. This would mean that media coverage may induce criminal events, and criminal events may also induce increases in criminogenic media content, if such events are interesting for audiences.

To provide insight into the controversy, and to overcome these empirical challenges, we examined drug cartel operations at the US-Mexico border by leveraging two exceptionally fruitful and unique datasets. To do so, we developed an empirical specification that address the possibility that the relationship between media coverage and criminal behavior may be bidirectional. Specifically, we defined reaction functions and Granger causality tests to identify the relationships between media coverage, or media quality, and crime rates, or crime styles.

Our major finding is that media coverage of crime provides criminals with stylistic inspiration, but does not cause crime rates to increase. Specifically, we found evidence that two “Criminogenic Styles” tend to react to media coverage: credit-taking banners and displays of bodies/dismemberment. These results indicate that publicity-seeking criminals will intensify the most gruesome aspects of their crimes if they believe that doing so means that their messages will get more attention. Additionally, contrary to suppositions, a strong Granger causality from media coverage to crime style shows that this relationship is unidirectional.

When media covers crimes in larger detail, criminals increase the use of credit-taking and body exposure styles. As much as 53% of the variance in credit-taking styles of crime is explained by
changes in the quality of media coverage. The use of body-exposure styles is also influenced by the quality of press coverage, but much less, only 26%, and with higher variance. This may be related to the higher costs related to copycat different styles. While credit-taking requires displaying a public banner next to a homicide, body-exposure requires dismembering and displaying the body of the victim. Interestingly, we also present evidence that detailed criminogenic contents (media coverage in which all the details of the crime are covered) have up to 28 larger effects on crime style. Our robustness tests also show that, as expected we find stronger in territories where drug cartels are more entrenched, and where they follow media coverage with more attention.

Although this paper has contributed to a better understanding of the relationship between the press and criminal behavior, future research would need to test for causal relationships beyond Granger causality. Furthering this area of research is critical to the social sciences and to democratic governance because it exposes the tension between two important values: freedom of the press and the elimination of publicity-seeking crime. In addition to guiding us as we consider this issue, this research will assist with the development of better strategies to stifle terrorism, criminal organizations, copycat criminals, and deviant individuals who aspire to notoriety.
References


### Tables

#### Table 1: Descriptive statistics

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<th>Variable</th>
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<th>Max</th>
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<td>Body-exposure style crimes</td>
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#### Table 2: Crime and media coverage

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<th>Coverage Quality</th>
<th>Homicides</th>
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<td></td>
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Note: * p <0.1; ** p <0.05; *** p <0.01.
### Table 3: Quality of media coverage and crime styles

<table>
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<th>Coverage Quality</th>
<th>Body exposure</th>
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<td>0.0738***</td>
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<td>Credit-taking (t-3)</td>
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<td>0.048**</td>
<td>0.786</td>
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Note: * p <0.1; ** p <0.05; *** p <0.01.

### Table 4: Media coverage and crime styles

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<th>Coverage</th>
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Note: * p <0.1; ** p <0.05; *** p <0.01.
Table 5: Strength of drug cartel territorial entrenchment

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Note: * p <0.1; ** p <0.05; *** p <0.01.

Table 6: Degree in which drug cartels follow media coverage

<table>
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<tr>
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Note: * p <0.1; ** p <0.05; *** p <0.01.
Figures

Figure 1: Impulse reaction functions, Quality of media coverage and Credit-taking style

![](image)

impulse : response
Figure 2: Impulse reaction functions, Media coverage and Credit-taking style

- Credit-taking style crimes: Credit-taking style crimes
- Credit-taking style crimes: Media coverage
- Media coverage: Credit-taking style crimes
- Media coverage: Media coverage

**Step**: 0 5 10

**Impulse**: response

**95% CI**: Orthogonalized IRF