RODRIGO TABORDA

Bias in Economic News: The Reporting of Nominal Exchange Rate Behavior in Colombia

The behavior of the nominal exchange rate (NER) is regularly reported and commented on in Colombian newspapers, editorials, and op-eds. However, the number and flavor of the news and commentary seem to increase disproportionately during revaluation in contrast to periods of devaluation.[1] During the course of a revaluation, it is common to read claims (not facts) in the press of firms and entire industries in distress owing to revaluation and arguments about the benefits of outdated policies such as fixed and multiple exchange rates—implemented after 1967 with the enactment of Law 444 (Congreso de Colombia 1967)—if not a dollarization of the economy.[2]

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1. The nominal exchange rate (NER) is defined as the number of Colombian pesos per American dollar. Devaluation is defined as an increase in the amount of the local currency—pesos—valued at US$1. Revaluation is a reduction in this relationship. In Colombia, *devaluation* and *revaluation* are used interchangeably with *appreciation* and *depreciation,* which are the appropriate words for this phenomenon. In this paper, the first two words are used for the sake of consistency with the use in the media.

2. For example, see J. Córdoba for dollarization claims (Córdoba, "Urgente Dolarizar," 26 April 2001, *El Tiempo* archive [www.eltiempo.com/archivo/documento/MAM-545045]), and C. Caballero on the usual claims for returning to the 1967 exchange rate regime (Caballero, "De la Miopía a la Ceguera Absoluta," 1 March 2008, *El Tiempo* archive [www.eltiempo.com/archivo/documento/MAM-2846761]).

On one hand, many news articles and op-ed pieces often maintain that revaluation is devastating for the macroeconomic performance of the country owing to the reduced income for exporters and holders of foreign debt and the subsequent effects on the employment and wages of workers in related industries. On the other hand, when devaluation occurs, little attention is paid in news, editorials, or op-eds. There are no complaints addressing the plausible effects of a devaluation, such as inflation from higher prices of foreign capital (machinery and equipment) or imported raw materials.

This asymmetry in media reporting is hard to understand. Why would revaluation be more important to report and discuss than devaluation? Why are there claims of the benefits of a fixed exchange rate when the country has already gone through the crippling effects of an exchange rate black-market premium? Easterly (2002, p. 222), describes a high black-market premium as "a punitive tax on exporters—not a good incentive for growth." Finally, why, after almost twenty years of experience with a market-determined nominal exchange rate, is revaluation still reported as harmful for the economy, even though there have been more devaluation episodes than revaluation ones?[3] One answer to these questions lies in media bias in reporting the behavior of the NER.

The existence of an interest group supplying media outlets with news to increase the awareness of readers and government officials of the catastrophic consequences of revaluation is considered. When this is the case, the media benefit from a larger audience and subsequent higher income, from advertising revenues. The interest group's goal is further satisfied when the fiscal authority offers subsidies or the monetary authority intervenes in the exchange rate market. When a government-related institution steps in to tame the expressions of discomfort, it fulfills the goal of increasing political affection and public acceptance.

There is a growing literature on the economics of media bias and media slant. Gentzkow and Shapiro (2008) and Larcinese, Puglisi, and Snyder (2011) offer a review of the theoretical and empirical approaches to this topic. The literature describes both supply- and demand-side models. On the supply side, the distortions of the news, its relationship with the private sector, and the government capture of media are the core subjects. On the demand side, the distortion comes from the public and its preference for news with a certain bias or slant and the media competition for their attention. The empirical evi-

3. Colombia's exchange rate began a transition from a fixed exchange rate toward flexibility early in 1991, with exchange rate bands from 1994 to 1999 and dirty floating since then.

dence of media bias shown in this paper fits into the supply-side models and the idea of media "capture" not by the government but by an interest group. Specifically, the work of Corneo (2006) is an appropriate analytic framework for the alleged sources of media bias and slant in this paper.

Corneo (2006) builds a voting model of media capture at the hands of special interests. To begin with, the interest group, looking for a policy that will favor its current status, seeks to form a coalition with the media. The media can accept or refuse the formation of a coalition. When they do refuse, media demonstrate their independence and commitment to honest reporting. When they accept, media show their commitment to forwarding the interest group's view. Citizens to a large degree get their information from media. If media has formed a coalition with an interest group, citizens are likely to vote in favor of a policy (or policymaker) that reflects the interest group's view. Corneo (2006) discusses the conditions for coalition formation and its influence on voters.

This theoretical sequence of events seems to describe well Colombian news reporting on the behavior of the NER. The media, attentive to the message from an interest group, present to the public disastrous effects of a revaluation. The interest group is in search of sympathy and help from the fiscal and monetary authorities. Once the message of disaster has been spread, a mix of timid but realistic and decisive but chimerical expressions of support from public servants appear. The bearer of the message becomes an ally of the interest group, increases his or her visibility, and capitalizes political power for the next elections.

The empirical evidence offered in this paper follows Corneo's (2006) sequence. First, the relationship between the number of news articles, editorials, and op-eds that discuss the behavior of the NER and the occurrence of revaluation or devaluation is explored. The findings support the hypothesis of an asymmetrical number of news articles with a high correlation of news and revaluation (and a corresponding low correlation of news and devaluation). Second, the content and flavor of the news is examined, using statistical analysis of text. The results confirm the association of language and emphasis between the word *revaluation* and the words *central bank, government,* and *exporters,* whereas *devaluation* is associated with words that simply describe exchange rate behavior. Finally, the paper explores the association between the Colombian central bank's decision to intervene in the exchange rate market and the asymmetrical number of news stories.

The main contribution of the paper is to provide empirical evidence of media bias for a particular economic event. This is done by framing media

bias as the uneven reporting of an economic outcome and using a test of means and conditional expectation of the relative and absolute number of news items. The paper also contributes in exploring slant via statistical analysis of text. Secondarily, the paper shows a correlation between the amount of news and intervention in the exchange rate, bringing forward a seemingly neglected variable to previous studies of central bank intervention in such markets (Taylor 1995; Humpage 2003).

The Political Economy of the Exchange Rate and the Media in Colombia

For the last three decades of the twentieth century, exchange rate policies were at the core of policymaking in Latin America, regardless of the existing economic environment. Whatever the issue, be it import substitution, oil shocks, debt crisis, openness, or structural reforms, the choice of exchange rate regime and its behavior has been a prominent factor (Frieden and Stein 2001a). Given the link between the political environment and exchange rate policies, it is important to review the emergence of interest groups with regard to the exchange rate choice and level and how they interact with the media.

Three questions can be asked to establish a connection between politics and the exchange rate. One is the choice of regime: Should countries choose fixed exchange rates, flexible exchange rates, or something between these two options? (Fischer 2001). The second is the level of the exchange rate: Should the exchange rate be set at a certain level? If so, how should that level be determined and maintained? The third is the trend: Does exchange rate behavior favor the country's trade performance? In each of these scenarios, there is the possibility that a pressure group will try to coordinate its interests with those of politicians to create political pressure for a choice that will benefit them both.

A defining characteristic of the political economy of the exchange rate in Colombia is the alignment of the financial, manufacturing, and agriculture sectors with the government during the 1970s and 1980s: what was good for the private sector was good for the government. This conjunction ended in the early 1990s with the adoption of structural reforms—trade liberalization, the reduction of state ownership and intervention in the economy, and reliance on the market. This new policy setup allowed an interest group and a politician to capture policymaking for their mutual benefit, in contrast to the previous arrangement, under which the private sector and the government behaved in tandem.

In Colombia, for the last quarter of the twentieth century, the choice of exchange rate regime might be considered a matter of lesser debate than the level. Starting with the crawling peg adjustment established in 1967, followed by the adoption of crawling bands of the early 1990s and the subsequent dirty floating, the regime choice was not a prominent issue. Although not without dissenters, these regime changes did not bring political upheaval, since there were other compensation mechanisms in place that favored the private sector. However, this was about to change. If during a period of import substitution industrialization, the prohibitively high tariffs protected manufacturing, implying that the level of the exchange rate was irrelevant (Frieden and Stein 2001b, p. 11), with the beginning of trade openness and the move to crawling bands the level of the exchange rate became important and the formation of interest groups was unstoppable.

If regime changes were not the source of rising interest groups, the behavior of the exchange rate after trade liberalization under the crawling band and dirty floating was. The reduction of tariffs and the end of subsidies to local manufacturers, mining, or agriculture left several industries unprotected and ready to raise their voice against a "low" or decreasing NER. This has been the case for coffee growers, flower growers, the manufacturing industry, and trade guilds (Jaramillo, Steiner, and Salazar 2001). Less favorably for the rising interest groups, the central bank redefined its policy objective and policymaking structure. First, inflation control became the primary objective (interest rates became the tool in an inflation-targeting policy framework), and second, the composition of the central bank board evolved from a government-centered arrangement to a government-independent body.[4] This also meant that exchange rate management became a tool and not a policy objective, and the central bank could no longer be perceived as an unconditional ally of the private sector.

Such institutional evolution became a challenge to private interests. If under import substitution industrialization and during the 1980s debt crisis the interest groups and the economy-related government institutions were indistinguishable, after the structural reforms they were clearly distinct. In this paper, an interest group is defined as a separate entity subject to market-determined outcomes, foreign competition, and no subsidies. Rather than a

4. By law, the earlier board comprised the finance minister, the economic development minister, the agriculture minister, the head of the national planning department, the head of the foreign trade department, and the central bank director. Currently, the central bank board members are the finance minister, the central bank director, and five cochairs with advanced academic and technical backgrounds, appointed by Colombia's president.

single institution within the government, an interest group is a separate body in search of a coalition with politicians and the public for the purpose of obtaining favorable treatment under unfavorable circumstances with respect to the exchange rate.

Driven by the institutional changes of the early 1990s, interest groups also faced the advent of financial openness and an inflation-targeting central bank. Those circumstances have been studied for a broader set of countries by Levy-Yeyati, Sturzenegger, and Gluzmann (2013) and Pontines and Siregar (2010). Levy-Yeyati, Sturzenegger, and Gluzmann (2013) put "fear of appreciation" in place of "fear of floating" (Calvo and Reinhart 2002). Whereas fear of floating is related to financial turmoil and defense of the domestic currency after countries have deepened their financial dollarization, fear of appreciation surges during economic bonanzas and so does the search for a devaluation of the currency (Levy-Yeyati, Sturzenegger, and Gluzmann 2013, pp. 4–5). This macroeconomic setup fits well the shaping of Colombian interest groups that act not toward a stable exchange rate but toward an increasing one, to exploit economic growth.

The new economic environment left the vulnerable industries no choice but to reconstruct their relationship with the government. Therefore a higher interaction with the media was in order to gain attention from politicians and policymakers. The empirical analysis undertaken in this paper uses information from *El Tiempo,* Colombia's most influential newspaper and one of the closest to the nation's private interests. After its censorship and closure in mid-1950s at the hands of the military dictatorship, *El Tiempo* declared itself a defender of democracy and constitutional law. It became a supporter of every party that eventually won the presidency and the policies of the government in power. This tendency coincided with the political arrangement National Front (Frente Nacional), which changed the political landscape of the country, concentrating political power in two right-wing parties and leaving left-wing initiatives aside.[5] When the term of the National Front ended, *El Tiempo* continued its progovernment stance in defending democratic elections and the democratically elected president, particularly against leftist or socialist policies and revolutionary initiatives.

El Tiempo has a close relationship with interest groups such as industry, banking and financial, and agriculture. It has become a part of an economic

5. The Frente Nacional was an agreement between two right-wing parties (the liberals and the conservatives), reached following the dictatorship of Gustavo Rojas Pinilla, stating that the parties would take turns in the presidency every four years. This agreement was carried out between 1958 and 1974.

conglomerate, a partner in business rather than commercially dependent on other industries. The period of its growth from a small newspaper early in the twentieth century into a media conglomerate by the early years of this century coincided with a long period of industrialization in Colombia. *El Tiempo's* ownership structure and business growth is a picture of that process. In the early 1980s, *El Tiempo* began to publish several magazines with nationwide circulation. The paper also began to cover regional issues, spreading its popularity from Colombia's capital to small and medium-sized cities and towns across the country. Furthermore, an unfortunate turn of events consolidated the newspaper business. The only newspaper that could match *El Tiempo* in distribution and opinion, *El Espectador,* suffered a frontal attack from drug lords in the mid-1980s, in which its head editor was killed. With the demise of *El Espectador, El Tiempo* became Colombia's only newspaper with nationwide distribution and the center of a media conglomerate.

Although *El Tiempo* is commonly thought of as a powerful political player in Colombia's politics, that is not necessarily the case. Eduardo Santos founded the newspaper in 1911 and was Colombia's president from 1938 to 1942. Seventy years later, Juan M. Santos (the grandson of Eduardo's brother Enrique Santos) became Colombia's president in 2012, having served as minister of trade, finance, and defense during the 1990s and the early years of this century. Francisco Santos (the grandson of Eduardo's brother Hernando Santos), a former journalist for *El Tiempo,* served as Colombia's vice president (2002–10). No other member of the newspaper's high-level staff or ownership has participated in politics. Furthermore, a rule of the conglomerate states that after a member of the owning family has played a role in politics, he or she is not allowed into the governing structure of the newspaper or even as a staff member of the newspaper. As both Juan M. Santos and Francisco Santos had held political office, neither of them has returned to the newspaper. And there is evidence that *El Tiempo* took a hard editorial line regarding their performance in government. Thus over a century and three generations of Santos family ownership, only three members of *El Tiempo*'s owning family have held high-ranking positions in government.

For the 100 years of its existence, *El Tiempo* experienced no inner ownership threat. Ownership has been in the hands of a single family, with some minor shareholders who are close allies of the founding family. This structure lasted for almost a century, until August 2007, when the Spanish media conglomerate Grupo Planeta bought 55 percent ownership in the *El Tiempo* group. This change represented an important shift for the media corporation. The family could no longer use the influence of the newspaper for its own

political interests, since it was now part of an international media conglomerate. But the ownership change did not represent a shift in the influence of the newspaper, showing that its editorial line and its alignment with democratic institutions and private entrepreneurship was deeply rooted. Meanwhile, as the Grupo Planeta strategy did not evolve as expected, the ownership of the newspaper changed again when the Colombian financial conglomerate Organización Luis Carlos Sarmiento Angulo, in four buyouts, acquired full ownership of the newspaper between March 2010 and May 2012. For the purpose of this paper, the evolution in ownership helps identify whether there have been changes in the editorial line, reporting of the exchange rate, and coverage of interest groups.

On one hand, both the historical growth into a media conglomerate and the ownership structure positioned *El Tiempo* as a close ally of interest groups. On the other hand, the political stance of support for ruling democratic government and entrepreneurial spirit made the paper an obvious choice to carry the message of industries and economic organizations affected by the new policy regarding a market-driven economy. The advent of structural reforms gave rise to interest groups that in the past had been in line with the government and its policies. And the most important media outlet in the country became a natural ally thanks to its influence with the government and private sector foundations (reinforced after the ownership change).

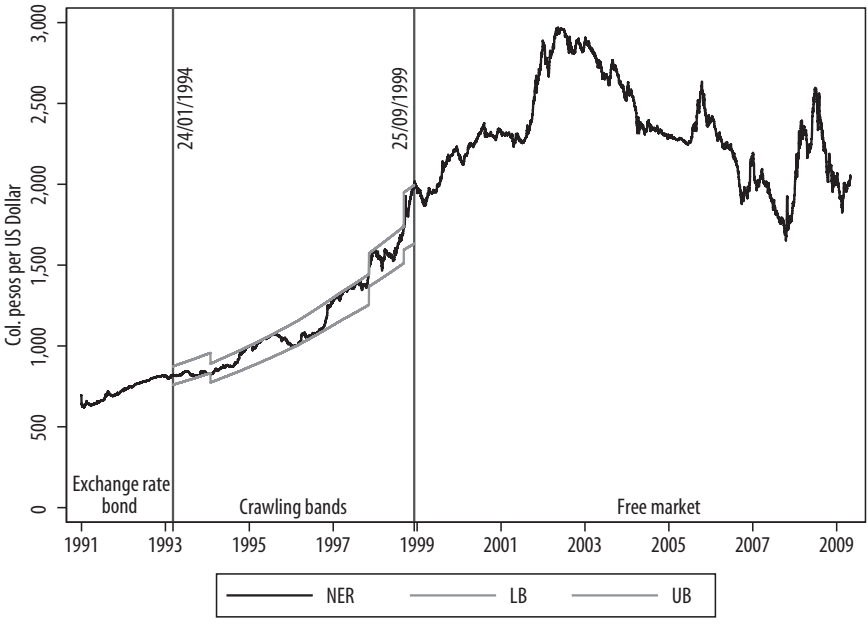
Nominal Exchange Rate

Since December 1991, Colombia has had a market-determined exchange rate. The daily nominal exchange rate is set as the average exchange rate from each operation in the market. Since that time, multiple financial entities have provided financial services that involve foreign currency on behalf of businesses and individuals. These financial entities are the participants in the exchange rate market.[6]

From 1 December 1991 to 23 January 1994, the Colombian central bank used the existing exchange rate bond (*certificado de cambio*) to track the

6. The real exchange rate is a more meaningful measure in economic terms than the nominal exchange rate. In this analysis, however, the NER was used for two reasons. First, in current news, government, and central bank language, the focus of attention is on the nominal, not the real, exchange rate. Second, there is no difference in the behavior of the two series, as presented in figures A.15 and A.16 in the appendix (available at http://goo.gl/glXjf). Although there seem to be some instances of deviation between the series within the crawling peg period, the two series are indistinguishable in their behavior afterward.

FIGURE 1. Colombia's Nominal Exchange Rate, 1991–2009[a]



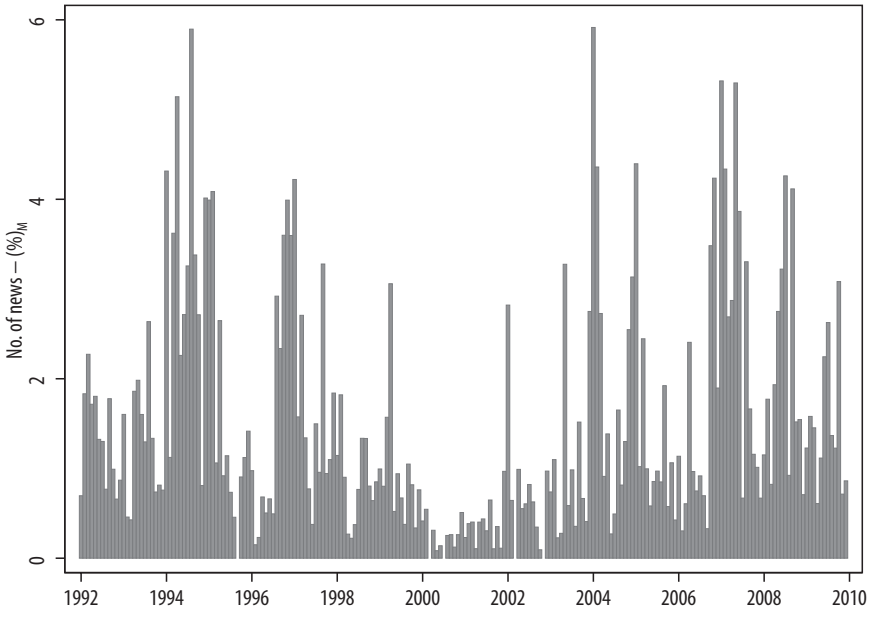
Source: Banco de la República (2010).
a. Daily data. UB is the upper bound and LB the lower bound for the exchange rate band.

behavior of the NER. This bond was available to exporters and local financial institutions that held U.S. dollars. The bond matured at twelve months, and the price was set by the central bank with a maximum discount of 12.5 percent. The main purpose of the exchange rate bond was to phase out the fixed exchange rate and to introduce market-based mechanisms.

From 24 January 1994 to 25 September 1999, crawling bands were in place. The exchange rate bands were realigned several times, by a reduction or revaluation (of 7 percent on 13 December 1994) and two increments or devaluations (9 percent on 3 September 1998 and 5 percent on 29 June 1999). Since 26 September 1999, the NER has been determined solely by market forces in a dirty float scheme. Figure 1 shows the daily NER for the period of analysis, the data used in this paper.[7]

7. The NER data are available from Colombia's central bank website (www.banrep.gov.co) or from the author.

FIGURE 2. News Items, Editorials, and Op-Eds on Devaluation and Revaluation, 1992–2010[a]



Source: Casa Editorial El Tiempo (2010).
a. Number of news items, editorials, and op-eds published in *El Tiempo, Portafolio,* and *Cambio.*

For the purpose of this paper, both management periods, the crawling band and the dirty floating, are relevant. The dirty floating strategy is an intrinsically interventionist policy option, which might suggest that no pressure from an interested party would be relevant. However, from 1997 to 1999 the central bank, unable to contain the dynamics of the exchange rate, increased the slope and the width and realigned the bands twice, because of the strategic behavior of economic agents speculating against the upper and lower bounds in search of profit. This is a known outcome in the literature on the exchange rate band (see Krugman and Miller 1992) and represents a valid counterfactual scenario to contrast the reporting in the media as if the regime could trigger a change in news items. In other words, studying both periods allows us to distinguish differences in media attention to the behavior of the nominal exchange rate, that is, whether the change in regime shifts the attention in one way or the other. The number of news items does not appear to be particularly different during this period than during the dirty floating period (figure 2), which is also confirmed in the econometric results.

Data Source

The source for the data on news items, editorials, and op-eds comes from the electronic archive of Colombia's main newspaper conglomerate, Casa Editorial El Tiempo.[8] Nowadays, the conglomerate is made up of several media outlets involved not only in current news but also in lifestyle, fashion, and cars, among others, and not only in the printed and web media but also on its own local television network. The main publications are the newspaper *El Tiempo,* the current economic events newspaper *Portafolio,* and the weekly magazine *Cambio; El Tiempo* is the keystone of the media empire. The conglomerate is considered Colombia's biggest media company, reaching countrywide distribution. Founded in 1911, it stopped circulation only once, from August 1955 to June 1957, during the dictatorship of Gustavo Rojas.[9]

The words *devaluación* and *revaluación* were used jointly to search for any journalistic piece containing both words. The output is a total of 2,109 news items, editorials, and op-eds (1,707 from *El Tiempo,* 394 from *Portafolio,* and 8 from *Cambio*). This information was extracted from January 1992 to December 2009. Information on date, author (if identified), section of the newspaper, and title was recorded. News items from the science and technology, culture and leisure, international, car sales, and home sales sections, Bogotá local news sections, and paid commercial information were excluded from the sample. The news items were collected with a daily frequency and aggregated to the monthly number of news items.

A secondary source of data is the website n-gramas (http://ngrams.cavorite.com). This website holds archives of the Colombian newspaper *El Tiempo* and magazines *Semana* and *Dinero.* The primary objective of the website is to generate a count of the number of press articles that contain the words of interest in these news outlets. By default, the website renders a time series graph of the monthly frequency of the articles. Access to the number of articles was granted by the website administrator, and the number of *El Tiempo* articles that contained the word *economía* was collected. With these data, a ratio of the number of news items originally collected using the *El Tiempo* web-based archive to the number of news items from *n-grams* was calculated.

8. The news market in Colombia is rather small. Using different outlets in the analysis could easily have led to a double counting of reports on the behavior of the NER. For editorials and op-eds, a fairly well organized news syndicate of commentators distributes the same op-ed to different outlets, leading again to a double counting if they were taken into consideration.

9. Gustavo Rojas is the only military dictator Colombia has ever had. During the closing of the newspaper, a secondary newspaper continued, produced by the *El Tiempo* staff.

This ratio allows for a relative (rather than an absolute) measure of the news to control for the total flow of news in *El Tiempo.*

Given the data frequency, daily from the *El Tiempo* archive and monthly from the n-gramas website, the count of news items with the words *devaluación* and *revaluación* was aggregated to monthly frequency and a relative measure of the number of news items as follows:[10]

$$(1) \qquad No.\,news_{M(devaluación - revaluación \text{ from } El\ Tiempo \text{ archive})} = \sum_i^I News,$$

and

$$(2) \qquad Relative\ No.\,News_M = \frac{No.\,news_{M(devaluación - revaluación \text{ from } El\ Tiempo \text{ archive})}}{No.\,news_{M(\text{Economia } from\ n-gramas)}}$$

Both measures are used in the subsequent analysis. Although the absolute number of news items is the fundamental variable (and the one that motivates the econometric approach), the relative number of news items helps clarify the size and importance of the absolute number.[11]

Figure 2 shows the monthly relative number of news items as a percent of total news items that contain the word *economía.*[12] The peak periods are 1994, 1995, 1997, 2004, 2005, 2007, and 2008, with more than 4 percent of the news items per month. There were also periods when the number of monthly news items was low and even zero. The number of news items per newspaper section and those with named authors is summarized in table 1. After removing news published in nonrelevant sections (as listed above), the total number of news items used in this study is 1,925. Of these, 151 are editorials, 288 are op-eds, and 1,486 are news items that discuss revaluation and devaluation in

10. Figure A.10 in the appendix (available at http://goo.gl/glXjf) shows a time series plot with the number of news items that contain both the words *devaluación* and *revaluación* and news items that contain the word *economía,* from which the relative number of news items is obtained. Figure A.11 in the appendix shows the scatter and linear (ordinary least squares) fit between both measures estimated below, equations 1 and 2. Figure A.10 suggests there are no long-term trends in the number of economics news items that could affect the use of the absolute number of news items discussing revaluation and devaluation. Figure A.11 shows that the two measures are not very different and can be used interchangeably as a measure of coverage of the nominal exchange rate.

11. As shown in figure A.10 in the appendix (available at http://goo.gl/glXjf).

12. From now on news items, editorials, and op-eds are used interchangeably.

TABLE 1. Number of News Items, Editorials, and Op-Eds, by Section and Authorship[a]

Newspaper section	*News items*	*Authored news items*
Economy	1,015	243
Op-ed	439	288
General news	336	88
Weekend magazine	10	10
Nation	17	3
Other	36	4
Politics	5	2
Special issue on the economy	67	15
Total	1,925	653

Source: Casa Editorial El Tiempo (2010).

a. Authored news items are those in which the name of the author is published. News items without an author's name are assumed to be written by the newspaper staff. The op-ed section includes editorials and op-eds; op-eds are those items that include the name of the author.

different sections. The news items were mainly published in the economy, op-ed, and general news sections.

News and NER Behavior

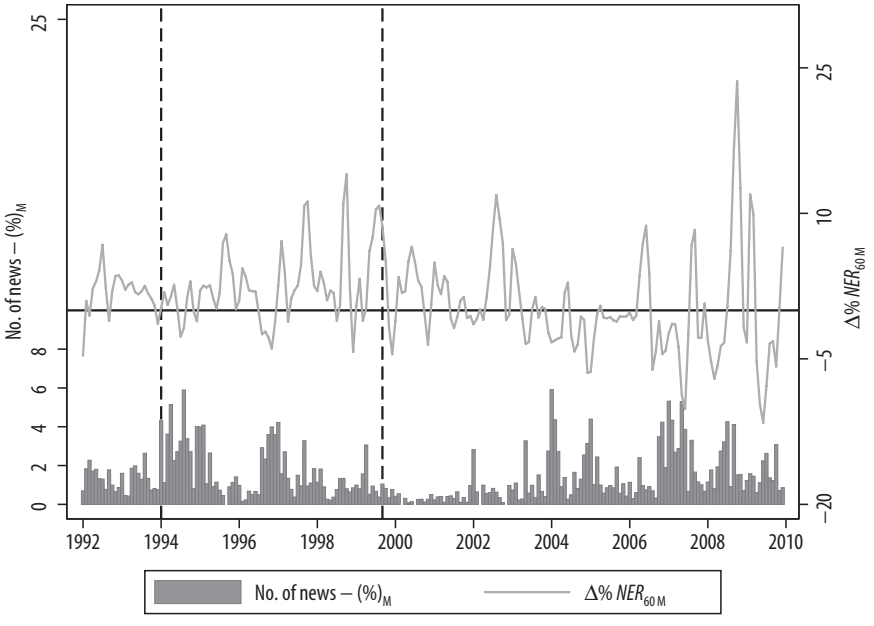
The behavior of the exchange rate (available with a daily frequency) was aggregated to monthly frequency in the following way:

$$\Delta\%NER_{mM} = I^{-1}\sum_{i}^{I}\left(\frac{NER_t - NER_{t-m}}{NER_{t-m}}\right), \tag{3}$$

where M stands for monthly frequency of the data, m stands for the lag used in estimating the percentage change in the NER (thirty- and sixty-day lags were estimated), and I stands for the aggregation period in days. $I = 30$ days was used to end up with a monthly aggregate.

The time series of the monthly percentage change of the exchange rate and the number of news items (as a percentage of the total) is shown in figure 3 and a combined histogram and scatter plot in figure 4. The sixty-day lag is used for illustrative purposes. Both figures identify the suggested bias in favor of more news items during a revaluation than a devaluation period. Figure 3 shows that there are more news items not only in a revaluation period but also when devaluation is decreasing, as in the 1994 and 1997 revaluation episodes. The scatter plot of both variables suggests a negative, nonlinear relationship between the number of news items and the NER. Histograms show that the number of monthly news items is skewed to less than ten news items, and

FIGURE 3. News Items, Editorials, and Op-Eds on Nominal Exchange Rate Behavior[a]



Source: NER behavior from Banco de la República (2010); number of news items, editorials, and op-eds from Casa Editorial El Tiempo (2010).

a. Left axis represents the number of news, editorials, and op-eds (monthly) as a percentage of all such items published in *El Tiempo, Portafolio,* and *Cambio*. Right axis represents the monthly 60-day percentage change in the NER.

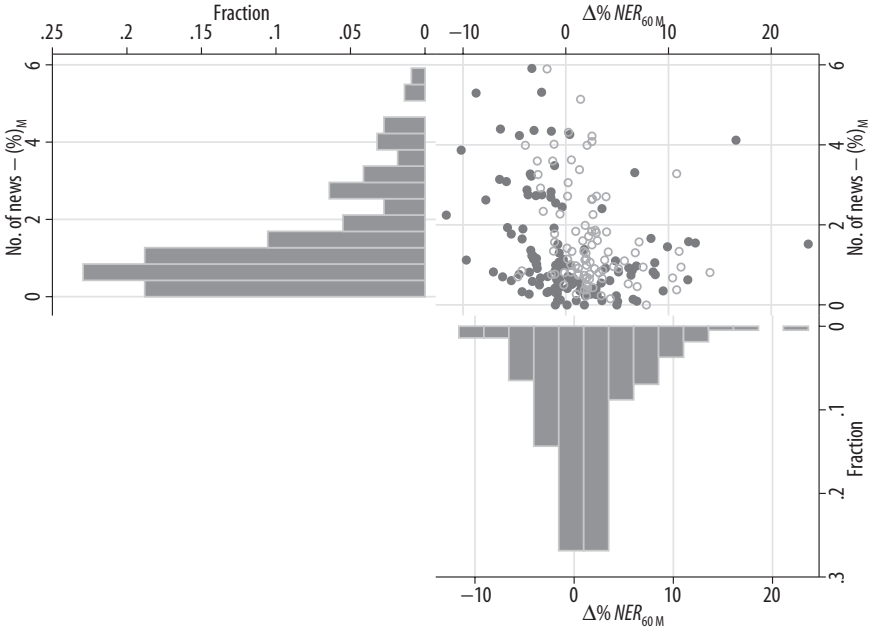
there are more devaluation than revaluation episodes. Summary statistics of the number of news items for both events and a test of difference of means is provided in table 2 for all news items, editorials, and op-eds.

Testing Media Bias

A growing literature involves empirical studies that measure media bias and slant in different fields of study (politics, sociology, economics). Most of them analyze U.S. politics and partisan bias. This section reviews the most prominent empirical studies that propose and use a measure of media bias, in order to frame the measure used in this study.

A considerable number of studies measuring media bias and slant have explored the closeness of newspapers and other media outlets to political

FIGURE 4. Distribution and Scatter Plot of NER and News Items, Editorials, and Op-Eds[a]



Source: NER from Banco de la República (2010); number of news items, editorials, and op-eds from Casa Editorial El Tiempo (2010).
a. As percent of all such items. Hollow circles correspond to premarket observations, solid circles to market period observations.

interests. The approach has been to align political views to newspapers and study foreseeable implications. A prominent paper within this line of research is Groseclose and Milyo (2005), which takes advantage of an existing political orientation score, that of the Americans for Democratic Action, and the known political stands of think tanks and policy groups to benchmark the political view of newspapers in the United States. This approach provides a pragmatic measure to unveil the political leanings of U.S. newspapers.[13]

Gentzkow and Shapiro (2010) also develop a slant index measure for a much larger number of U.S. newspapers. The authors measure "the frequency with which newspapers use language that would tend to sway readers to the right or to the left on political issues" by comparing the use of phrases by

13. Groseclose and Milyo's (2005) approach is not without critics, however; see B, Nyhan, "The Problems with the Groseclose / MilyoSP2 Study of Media Bias," 2005 (www.brendan-nyhan.com/blog/2005/12/the_problems_wi.html).

TABLE 2. Equality of Means Test and the Wilcoxon Rank-Sum Test of Equal Distribution for the Number of News Items, Editorials, and Op-Eds[a]

		Revaluation N = *96*		*Devaluation* N = *121*		*Test*	
		Mean	*SD*	*Mean*	*SD*	*Stat*	p *value*
No. News	*m = 30*						
All news	Student's *t* test of means	10.312	8.613	7.727	6.471	−2.443	0.015
	Wilcoxon rank-sum test					−2.067	0.019
Editorials and op-eds	Student's *t* test of means	7.802	6.714	6.09	5.311	−2.0411	0.042
	Wilcoxon rank-sum test					−1.509	0.065
Relative No. News	*m = 30*						
All news	Student's *t* test of means	1.71	1.444	1.255	1.107	−2.546	0.011
	Wilcoxon rank-sum test					−2.067	0.019
Editorials and op-eds	Student's *t* test of means	0.409	0.445	0.274	0.315	−2.499	0.013
	Wilcoxon rank-sum test					−2.345	0.009
		N = 91		*N = 125*			
No. News	*m = 60*						
All news	Student's *t* test of means	10.758	8.843	7.568	6.207	−2.952	0.003
	Wilcoxon rank-sum test					−2.418	0.007
Editorials and op-eds	Student's *t* test of means	2.637	2.714	1.592	1.68	−3.248	0.001
	Wilcoxon rank-sum test					−2.837	0.002
Relative No. News	*m = 60*						
All news	Student's *t* test of means	1.8	1.452	1.218	1.087	−3.226	0.001
	Wilcoxon rank-sum test					−2.067	0.019
Editorials and op-eds	Student's *t* test of means	0.437	0.451	0.261	0.306	−3.222	0.001
	Wilcoxon rank-sum test					−2.345	0.009

a. *N* is the number of devaluation or revaluation episodes. Mean is the average number of news items. SD is the standard deviation. Stat is the statistic of each test. The *p* value is the probability of equal means and distribution, respectively.

members of Congress and their resemblance to the ones used in news outlets (Gentzkow and Shapiro 2010, p. 36). Such an index allows them to identify the political stance of the newspaper and estimate a model of newspaper demand, matching the consumer's ideology with the newspaper's slant. In the same fashion, Gans and Leigh (2012) use public intellectuals, instead of think tanks, to define the media slant toward certain political positions. Additionally, Gans and Leigh (2012) use independent raters to code stories and headlines published during the 2004 election campaign. The ratings are also used to establish slant based on the flavor of the news.[14] This methodological

14. On a scale of one to five, from Very prolabor to Very procoalition.

approach is also used by Hassett and Lott (2006), Covert and Wasburn (2007), and Birz and Lott (2011).[15]

Gentzkow and Shapiro (2006) construct a media bias (not slant) metric in which bias is defined as the deviation from an even coverage of the two presidential candidates in the 2000 U.S. elections. Bias was defined as $bias_i = (Bush_i/Bush_i + Gore_i - 1/2)$. This measure is constructed on the logic of an even distribution of time on the air in *i* radio stations in the United States, encompassing the concept of media unbiasedness as the equality of broadcasting a certain event, in this case, the presidential campaigns.

Treatment in the academic literature of the relationship between economic news and the behavior of economic variables is more limited; Hassett and Lott (2006); Birz and Lott (2011), and Larcinese, Puglisi, and Snyder (2011) have explored this relationship. Hassett and Lott (2006) test the link between the way newspapers cover the economy and the partisan leanings of such coverage. Their findings vary regarding the nature of the economic news, gathered around four categories: news on durable goods, GDP, retail sales, and unemployment were examined. Their main message is that there is uneven coverage of the range of economic events and the party in charge. When examining the effect of the same set of news but on the returns of a U.S. stock index, Birz and Lott (2001) find a solid relationship between stock returns and newspaper headlines about unemployment and GDP.

Larcinese, Puglisi, and Snyder (2011) examine the intensity of coverage of economic issues explained by the current economic conditions and the party in power in the United States. The economic events studied are inflation, the federal budget, and the trade deficit. The authors' empirical strategy is to construct a relative measure of news that discussed those economic issues (a ratio of the count of stories for each issue to the number of stories in the newspaper) and regress this metric on the behavior of the economic variable and the presidency's party. Their main finding is a strong partisan bias when newspapers report unemployment and the trade deficit, less definite for the budget deficit, and no relationship for inflation.

The approach to measuring media bias adopted in this paper is apolitical and nonpartisan and is closer to the journalistic principles of fairness and independence (Harcup 2009). The main rationale for adopting an apolitical approach is the absence of properly defined political parties in Colombia.

15. This is a subjective approach because of the need of human qualification, although testable and properly controlled in the papers cited above.

This modeling framework broadens the scope of measuring media bias, in contrast with the empirical literature reviewed earlier in this paper, which is reduced to U.S. politics and limited to an artificial classification that is hard to fit into the Colombian case between conservative and liberal media.[16]

The definition of media bias used here focuses on the reporting of an economic issue itself and not the economic consequences of political actions and the role of the media. This paper investigates the bias in coverage of an economic event (the exchange rate) confronting news reporting with the behavior of the variable, not the political leaning of the news or partisan endorsement for an interest group. Using the exchange rate reduces the analytical framework in two outcomes (devaluation or revaluation), and for each case one affected and one benefited party (the substitution effect of Dornbusch 1987).

Reclaiming the fairness and independence principles, and attempting to accommodate the absence of political and partisan background, this paper presents two statistical approaches to establishing whether there is unbalanced reporting of the economic event. First, using the absolute and relative number of news items that discuss exchange rate behavior, a test of means was performed, under the two possible outcomes (devaluation or revaluation). The test is an unconditional estimation of the number of news items in both scenarios, used here as indicative of media bias when the null hypothesis of equal means is rejected.

Second, the number of absolute and relative news items is used as the dependent variable in a regression framework, using as the explanatory variable the behavior of the exchange rate and other covariates. The exchange rate behavior is included separately for devaluation and revaluation episodes. Under this setup, the conditional expected value of the number of news items is being estimated, and the coefficients are meant to capture the response of the number of news items with respect to the exchange rate. An estimation that shows an asymmetric response indicates unbalanced reporting.

Both statistical approaches are designed to show whether there is uneven reporting, and this is how bias is defined in the paper. This line of reasoning is not far from the index used by Gentzkow and Shapiro (2006) and similar to that of Larcinese, Puglisi, and Snyder (2011) with regard to the expected number of news items, given the economic behavior and presidential party. But it takes a step forward in isolating the magnitude of reporting to the market outcome and not the political interference.

16. As Covert and Wasburn (2007, p. 693) argue, the "discussion of media bias almost invariably makes use of the description 'conservative' and 'liberal' [in U.S. politics]."

Test on Means

The first approach to assessing media bias as a disproportionate reporting of revaluation is a test of equality on means (test of means) and distribution (Wilcoxon rank-sum test) of monthly news items over the number of devaluation and revaluation events (table 2). The test is performed using the count of devaluation and revaluation cases, as defined in equation 3, for $m = 30$ and for $m = 60$ and the monthly number of news items, editorials, and op-eds only from January 1991 to December 2009, as well as the relative measure. If the first test is accepted it will mean that the average number of news items that report on the behavior of the exchange rate (devaluation and revaluation) per month is statistically equal. If the second test is accepted, it will mean that the distribution of news is the same for both instances (devaluation and revaluation), invalidating the hypothesis of media bias.

Both tests reject, at high levels of statistical confidence, the null hypothesis that the means and distributions are equal. The tests confirm the hypothesis that revaluation episodes are overreported in Colombia. This becomes clear from the fact that for the monthly average with a revaluation in the last 30 (60) days there are 96 (91) months of revaluation against 121 (125) of devaluation, and the average number of total news items that discuss the behavior of the NER is 10.3 (10.7) against 7.7 (7.5), and the average number of editorials and op-eds is 7.8 (8.1) against 6 (5.9), respectively. The results of these tests do not change when performed on the relative measure of the number of news items.

Econometric Estimation

To study further the media bias in favor of revaluation episodes, the following equation is estimated, using a negative binomial regression model:

$$(4) \qquad No.\,News_{M} = f\Big(\Delta\%^{+}NER_{mM}, \Delta\%^{-}NER_{mM}, Duration, Market\ dummy, Ownership\ dummy, Year\ dummy, Month\ dummy\Big),$$

plus the interaction with the market period and ownership dummy.[17] The NBRM was chosen because of the discrete, nonzero nature of the monthly

17. The volatility of the NER was also considered as an explanatory variable in the econometric estimation. Volatility measured as the standard deviation is highly correlated with the behavior of the nominal exchange rate $\Delta\%NERmM$, as shown in figure A.16 in the appendix (available at http://goo.gl/glXjf). For this reason it was not included in the final results.

number of news items (*No. News*$_M$) as the dependent variable.[18] As explanatory variables, $\Delta\%NER_{mM}$ is modified with an interaction dummy variable for the coefficient to capture the asymmetry:

$$\Delta\%^{-}NER_{mM} = \Delta\%NER_{mM} \times Dummy^{R} \quad where \begin{cases} Dummy^{R} = 1 & \text{if } \Delta\%NER_{mM} < 0 \\ Dummy^{R} = 0 & \text{otherwise} \end{cases}$$

$$\Delta\%^{+}NER_{mM} = \Delta\%NER_{mM} \times Dummy^{R} \quad where \begin{cases} Dummy^{R} = 1 & \text{if } \Delta\%NER_{mM} > 0 \\ Dummy^{R} = 0 & \text{otherwise} \end{cases}$$

In addition, as an explanatory variable, the duration of $\Delta\%NERmM$ is used (*Duration* in the results). This variable counts (in months) the duration of a devaluation or revaluation episode. It takes a value of 1 when the devaluation or revaluation lasts one month, and 2 the second month and so forth. The behavior of the variable is shown in figure A.13 in the appendix for the cases of $m = 30$ and $m = 60$. A scatter plot of the three variables used in the regression is shown in figure A.12 in the appendix. A dummy variable equal to 1 for the free market (from September 1999 to present) period and 0 otherwise is also included in the estimation (*Market dummy* in the results). This variable accounts for the difference in the number of news items during the free market period with respect to the previous exchange rate schemes. An ownership dummy is also included (*Ownership dummy* in the results) equal to 1 for the period when the newspaper *El Tiempo* changed ownership, from March 2010 to May 2012. Time dummies for year and month are also included (*Year dummy* and *Month dummy* in the results). In addition to helping in the identification strategy of other time-variant omitted variables, the month dummy can help to capture intrayear effects that induce certain behavior on the number of news items. For instance, February is a particularly important

18. In preliminary estimations NBRM had a better fit to the observed data than the Poisson regression model (as the alpha parameter for overdispersion suggests in the results below). This paper is an application of count regression models and the basic formulation of NBRM; for this reason no formula regarding the econometric methodology is presented. Full presentations of this technique can be found in Wooldridge (2001); Long and Freese (2006); and Cameron and Trivedi (2005, 2009).

month for flower exporters because of the St. Valentine's Day celebration in the United States. Since flower growers are highly sensitive to exchange rate fluctuations, this month of the year is full of complaints regarding the effects of revaluation.

The estimation of equation 4 serves the purpose of testing the hypothesis of whether there is a bias in the number of news items when a revaluation event occurs and whether this changed after the free NER market began or under the new ownership of the news data source. Furthermore, it allows measurement of the response of the number of news items to the degree of devaluation or revaluation via the asymmetry coefficients.

The econometric results shown in tables 3 and 4 ($_m = 30$ and $_m = 60$, respectively) use as dependent variable the total number of news items, editorials, and op-eds. The first main result, the coefficients of interest ($\Delta\%^{+}NER_{mM}$ and $\Delta\%^{-}NER_{mM}$) show the expected sign and magnitude. All coefficients corresponding to a revaluation ($\Delta\%^{-}NER_{mM}$) have positive and significant coefficients in both tables (except for results in columns 5, 7, and 11 in table 3), suggesting that revaluation increases the number of news items, while in most cases the lag of this variable is not significant (except for results in columns 6, 8, and 12 in table 4). The coefficients corresponding to a devaluation ($\Delta\%^{+}NER_{mM}$) are not significant at all in the estimation corresponding to thirty days. For the sixty-day estimation specifications, those with 1 lag in columns 3, 4, and 10 have a positive and significant coefficient, suggesting that devaluation also increases the contemporaneous number of news items; however once the effect is combined with the first lag, negative and significant in all three cases, the decreasing number of news zeroes the initial effect. In other words either devaluation does not generate news or it decreases the number of news items after two months.

The variable *Market period dummy* is not significant and is negative in some equations. This result suggests that the number of news items is systematically lower during the dirty floating period (after October 1999) than during the crawling bands period. The interaction dummy with devaluation and revaluation episodes is not significant in almost all of the estimated equations. The exception is in the case of sixty days in columns 5, 6, and 8, where the coefficients are significant and suggest that revaluation in the market period increased the number of news items with respect to the crawling band period. The variable *Ownership dummy* is not significant at all in any of the estimated equations for the case of $m = 30$; in this case the ownership change does not have any effect on the number of news items that discussed the exchange

TABLE 3. Negative Binomial Regression Model Estimation for Equation 4, with $m = 30$[a]

	1	*2*	*3*	*4*	*5*
$\Delta\%^{+}NER_{30M}$	0.0191	0.0380	0.0147	0.0351	−0.0221
	(0.0266)	(0.0270)	(0.0268)	(0.0272)	(0.0439)
$t-1$		−0.0432*		−0.0429	
		(0.0262)		(0.0265)	
$\Delta\%^{-}NER_{30M}$	0.0965**	0.113**	0.0896*	0.115**	0.0126
	(0.0448)	(0.0471)	(0.0469)	(0.0488)	(0.101)
$t-1$		0.0185		0.0155	
		(0.0451)		(0.0463)	
Market period dummy			−0.610	−0.612	−0.791*
			(0.427)	(0.419)	(0.455)
Ownership dummy			0.776	0.616	0.787
			(0.510)	(0.510)	(0.511)
$\Delta\%^{+}NER_{30M} \times$ Market dummy					0.0550
					(0.0527)
$t-1$					
$\Delta\%^{-}NER_{30M} \times$ Market dummy					−0.104
					(0.114)
$t-1$					
$\Delta\%^{+}NER_{30M} \times$ Ownership dummy					
$t-1$					
$\Delta\%^{-}NER_{30M} \times$ Ownership dummy					
$t-1$					
Duration Dev/Rev					
Duration × Market dummy					
Constant	2.085***	2.069***	2.003***	2.065***	2.095***
	(0.213)	(0.228)	(0.246)	(0.251)	(0.258)
ln alpha	−1.204***	−1.280***	−1.220***	−1.295***	−1.228***
	(0.135)	(0.138)	(0.136)	(0.139)	(0.136)
Observations	217	216	217	216	217
Month dummy test p value	0.618	0.733	0.632	0.709	0.578
Year dummy test p value	0	0	0	7.29e-11	0
AIC	1335	1325	1337	1326	1339
BIC	1440	1436	1448	1445	1458
Pseudo R^2	0.0751	0.0814	0.0768	0.0829	0.0779
LL	−636.6	−629.3	−635.4	−628.2	−634.7

a. Negative binomial regression model. Dependent variable is the monthly number of articles and op-eds. Market dummy refers to the post–exchange rate band period or free market period for the NER determination. Standard errors in parentheses.

***$p < 0.01$.

**$p < 0.05$.

*$p < 0.1$.

6	*7*	*8*	*9*	*10*	*11*	*12*
0.0232	−0.0222	0.0242	0.0152	0.0360	−0.0220	0.0259
(0.0448)	(0.0437)	(0.0441)	(0.0268)	(0.0272)	(0.0436)	(0.0438)
−0.0656		−0.0774*		−0.0440*		−0.0817*
(0.0449)		(0.0448)		(0.0265)		(0.0447)
0.274**	0.0190	0.281**	0.0898*	0.115**	0.0189	0.300**
(0.128)	(0.100)	(0.126)	(0.0469)	(0.0488)	(0.102)	(0.129)
0.0755		0.0811		0.0157		0.0892
(0.0969)		(0.0959)		(0.0463)		(0.0963)
−0.598	−0.970**	−0.720	−0.632	−0.642	−1.076**	−0.797
(0.453)	(0.483)	(0.484)	(0.431)	(0.422)	(0.512)	(0.511)
0.659	1.109*	0.780	0.816	0.671	1.236**	0.943
(0.512)	(0.566)	(0.578)	(0.520)	(0.518)	(0.593)	(0.606)
0.0220	0.100	0.114			0.102	0.116
(0.0533)	(0.0787)	(0.0797)			(0.0787)	(0.0794)
0.0298		−0.0744				−0.0738
(0.0526)		(0.0743)				(0.0741)
0.173	−0.218	0.0370			−0.226	0.0480
(0.139)	(0.139)	(0.157)			(0.141)	(0.159)
0.0670		0.150				0.151
(0.111)		(0.124)				(0.125)
	−0.0600	−0.117			−0.0599	−0.119
	(0.0759)	(0.0770)			(0.0758)	(0.0768)
		0.150**				0.151**
		(0.0734)				(0.0731)
	0.173	0.211*			0.189	0.226*
	(0.120)	(0.117)			(0.122)	(0.118)
		−0.122				−0.110
		(0.106)				(0.107)
			0.00816	0.0112	0.00255	0.0222
			(0.0206)	(0.0202)	(0.0279)	(0.0271)
					0.0192	0.00406
					(0.0422)	(0.0412)
2.032***	2.073***	2.027***	1.987***	2.043***	2.061***	1.968***
(0.274)	(0.257)	(0.273)	(0.249)	(0.254)	(0.262)	(0.279)
−1.327***	−1.242***	−1.375***	−1.222***	−1.299***	−1.248***	−1.388***
(0.141)	(0.137)	(0.143)	(0.136)	(0.139)	(0.138)	(0.144)
216	217	216	217	216	217	216
0.772	0.628	0.726	0.619	0.689	0.644	0.739
6.45e-11	1.95e-09	1.33e-08	0	6.00e-11	9.70e-09	4.07e-08
1330	1341	1331	1339	1328	1345	1333
1462	1466	1476	1454	1450	1477	1485
0.0858	0.0794	0.0914	0.0769	0.0831	0.0798	0.0925
−626.2	−633.6	−622.4	−635.3	−628.1	−633.4	−621.7

TABLE 4. Negative Binomial Regression Model Estimation for Equation 4, with $m = 60$[a]

	1	*2*	*3*	*4*	*5*
$\Delta\%^{+}NER_{60M}$	0.000980	0.0321*	0.00136	0.0323*	−0.0174
	(0.0153)	(0.0185)	(0.0155)	(0.0187)	(0.0269)
$t-1$		−0.0485***		−0.0446**	
		(0.0185)		(0.0186)	
$\Delta\%^{-}NER_{60M}$	0.0738***	0.0655**	0.0789***	0.0744**	0.227**
	(0.0265)	(0.0304)	(0.0288)	(0.0314)	(0.0882)
$t-1$		0.0223		0.0277	
		(0.0322)		(0.0330)	
Market period dummy			−0.682	−0.515	−0.737*
			(0.419)	(0.415)	(0.445)
Ownership dummy			0.614	0.270	0.709
			(0.504)	(0.508)	(0.500)
$\Delta\%^{+}NER_{60M} \times$ Market dummy $t-1$					0.0283
					(0.0314)
$\Delta\%^{-}NER_{60M} \times$ Market dummy $t-1$					0.161*
					(0.0944)
$\Delta\%^{+}NER_{60M} \times$ Ownership dummy $t-1$					
$\Delta\%^{-}NER_{60M} \times$ Ownership dummy $t-1$					
Duration Dev/Rev					
Duration × Market dummy					
Constant	2.055***	2.050***	2.067***	2.136***	2.061***
	(0.214)	(0.224)	(0.245)	(0.252)	(0.250)
ln alpha	−1.261***	−1.335***	−1.279***	−1.351***	−1.318***
	(0.137)	(0.141)	(0.138)	(0.142)	(0.140)
Observations	216	215	216	215	216
Month dummy test p value	0.605	0.699	0.574	0.628	0.608
Year dummy test p value	0	0	6.20e-11	1.46e-10	0
AIC	1323	1312	1325	1314	1323
BIC	1428	1423	1436	1432	1441
Pseudo R^2	0.0795	0.0869	0.0814	0.0885	0.0854
LL	−630.6	−623.1	−629.3	−622.0	−626.5

a. Negative binomial regression model. Dependent variable is the monthly number of articles and op-eds. Market dummy refers to the post–exchange rate band period or free market period for the NER determination. Standard errors in parentheses.

***$p < 0.01$.

**$p < 0.05$.

*$p < 0.1$.

6	*7*	*8*	*9*	*10*	*11*	*12*
0.0113	−0.0174	0.0113	0.00556	0.0326*	−0.00934	0.00724
(0.0286)	(0.0268)	(0.0284)	(0.0153)	(0.0186)	(0.0263)	(0.0284)
−0.0212		−0.0249		−0.0389**		−0.0176
(0.0273)		(0.0280)		(0.0187)		(0.0285)
0.288***	0.232***	0.290***	0.0876***	0.0732**	0.252**	0.227**
(0.0931)	(0.0882)	(0.0923)	(0.0285)	(0.0310)	(0.105)	(0.101)
0.166**		0.170**		0.0343		0.149*
(0.0785)		(0.0782)		(0.0327)		(0.0785)
−0.437	−0.652	−0.338	−0.577	−0.434	−0.760	−0.553
(0.439)	(0.477)	(0.470)	(0.416)	(0.414)	(0.480)	(0.485)
0.428	0.656	0.340	0.319	0.104	0.658	0.559
(0.499)	(0.566)	(0.561)	(0.507)	(0.510)	(0.577)	(0.584)
0.0368	0.00911	0.0517			−0.00189	0.0519
(0.0341)	(0.0432)	(0.0483)			(0.0424)	(0.0481)
−0.0334		−0.0861**				−0.0944**
(0.0316)		(0.0436)				(0.0437)
0.223**	0.148	0.193*			0.171	0.132
(0.1000)	(0.103)	(0.106)			(0.117)	(0.113)
0.160*		0.172*				0.154*
(0.0869)		(0.0923)				(0.0929)
	0.0253	−0.0234			0.0282	−0.0209
	(0.0405)	(0.0481)			(0.0395)	(0.0478)
		0.0785*				0.0779*
		(0.0468)				(0.0466)
	0.0283	0.0534			0.0391	0.0622
	(0.0675)	(0.0699)			(0.0664)	(0.0701)
		−0.0201				−0.0160
		(0.0677)				(0.0674)
			−0.0364**	−0.0327**	−0.0412*	−0.0298
			(0.0159)	(0.0158)	(0.0213)	(0.0216)
					0.0642*	0.0575*
					(0.0351)	(0.0349)
2.021***	2.047***	1.990***	2.234***	2.171***	2.259***	2.046***
(0.259)	(0.250)	(0.261)	(0.252)	(0.250)	(0.251)	(0.263)
−1.462***	−1.325***	−1.488***	−1.329***	−1.381***	−1.414***	−1.512***
(0.148)	(0.141)	(0.150)	(0.141)	(0.144)	(0.146)	(0.151)
215	215	215	215	215		
0.801	0.677	0.913	0.659	0.762	0.664	0.957
0	2.09e-08	2.69e-08	0	0	3.91e-07	4.43e-07
1307	1326	1311	1315	1312	1314	1312
1438	1451	1456	1429	1433	1445	1463
0.0997	0.0860	0.103	0.0867	0.0916	0.0946	0.105
−614.3	−626.1	−612.3	−623.3	−619.9	−617.9	−610.8

rate. However, in the $m = 30$ case the variable is significant and suggests an increasing number of news items in columns 7 and 11, after including the interaction terms.

The duration of the devaluation or revaluation period (*Duration Dev/Rev*) is only significant in some equations of the specification with $m = 60$ (columns 9 to 12 in table 4). Such a negative coefficient suggests a reduction in the number of news items with respect to the length of the devaluation or revaluation. This result can be interpreted as a decreasing effect of the behavior of the exchange rate on the news or awareness of the media. In all, the econometric estimation complements the results of table 2 in favor of the hypothesis of a media bias for revaluation episodes. The time dummies (both month and year) show interesting results: there are no month effects, meaning that the number of news items does not change systematically within a year; however, the test for the year dummy is highly significant, helping to capture aggregate differences along yearly data.[19]

As a robustness check, the same estimation (as in tables 3 and 4) was obtained using the relative number of news items as the dependent variable (equation 2). Because of the continuous nature of the dependent variable, an ordinary least squares regression was estimated. The results are shown in tables A.10 and A.11 in the appendix. The same qualitative results hold as for the NBRM estimation. The coefficient for revaluation in both measures (thirty and sixty days) is positive and highly significant; the opposite result holds for devaluation. Using a different but equally valid measure of news items, the outcome suggests the same interpretation offered earlier: a higher number of news items for revaluation episodes, and no significant effect from devaluation on news items.

With regard to the other variables, they are not statistically significant as they are in the NBRM, with the exception of the market period dummy. This variable shows the same negative sign; however, it does not show as good an explanatory variable in the ordinary least squares estimation as it does in the NBRM.

MODEL SELECTION AND INTERPRETATION. The econometric estimation's results for equation 4 presented in the previous section support the hypothesis of a media bias for more news when a revaluation episode occurs than when a devaluation happens, confirming the suggested relationship between the number of news items and NER behavior. The interpretation of the NBRM

19. Coefficients are not shown in the tables, only the p value of joint significance.

TABLE 5. Marginal Effect for Selected Estimation Results[a]

	m = *30*		m = *60*	
Estimation	*2*	*4*	*2*	*8*
$\Delta\%^{+}NER_{mM}$	0.295	0.272	0.248*	0.251*
	(0.210)	(0.210)	(0.143)	(0.143)
$t-1$	−0.335*	−0.332	−0.375***	−0.299**
	(0.204)	(0.205)	(0.143)	(0.144)
$\Delta\%^{-}NER_{mM}$	0.875**	0.894**	0.506**	0.563**
	(0.366)	(0.380)	(0.235)	(0.239)
$t-1$	0.144	0.120	0.172	0.264
	(0.350)	(0.359)	(0.249)	(0.251)
Market period dummy		−5.038		−3.474
		(3.715)		(3.479)
Ownership dummy		5.956		0.829
		(6.092)		(4.201)
Duration Dev/Rev				−0.252**
				(0.121)

a. Negative binomial regression model. Marginal effects on the regression results from tables 3 (equations 2 and 4) and 4 (equations 2 and 8). Standard errors in parentheses.

***$p < 0.01$.

**$p < 0.05$.

*$p < 0.1$.

coefficients in tables 3 and 4 goes further: the response and probabilities can be predicted, offering a more meaningful message. Based on the preferred regression, this section provides a further interpretation of the coefficients.

The NBRM results in tables 3 and 4 include the AIC and BIC. Both criteria, and the coefficient significances, suggest that regressions 2 and 4 in table 3 and regressions 2 and 8 in table 4 should be preferred, as they have the lowest AIC and BIC.[20] In these regressions, the variables of interest are significant and can offer a plausible interpretation once the marginal effects are computed.

Table 5 shows the marginal effect calculated based on the regression results with $m = 30$ and $m = 60$ and the preferred specifications. The marginal change in $E(y|x)$ is $\frac{\partial E(y|x)}{\partial x_k} = E(y|x)\beta_k$, which is computed at the means of

20. An informal method for assessing the fit between count models is to compare their mean predicted probability with the observed probability (Long and Freese 2006). Figure A.14 in the appendix (available at http://goo.gl/glXjf) shows this deviation: the difference between the regressions is nil.

the continuous variables and the discrete change for dummy variables from 0 to 1. The results of the marginal effect are conclusive with regard to media bias and the asymmetric response for more news when revaluation happens than when a devaluation happens. Starting with Reg 2 when $m = 30$, a 1 percent change in devaluation has a contemporaneous effect of increasing the number of news items by 0.29 percent, offset by the first lag effect of 0.33 percent. But the same 1 percent change in revaluation increases the contemporaneous number of news items by 0.87 percent plus 0.14 percent from the first lag. This effect is also observed in regression 4 when the *Market dummy* and *Ownership dummy* are included. The marginal effect for *Market dummy* in regression 4 suggests a reduction in the number of news items in the free market period of 5.03 percent. The marginal effect for *Ownership dummy* suggests higher levels of news reporting after the ownership change; however, this coefficient is not significant at all.

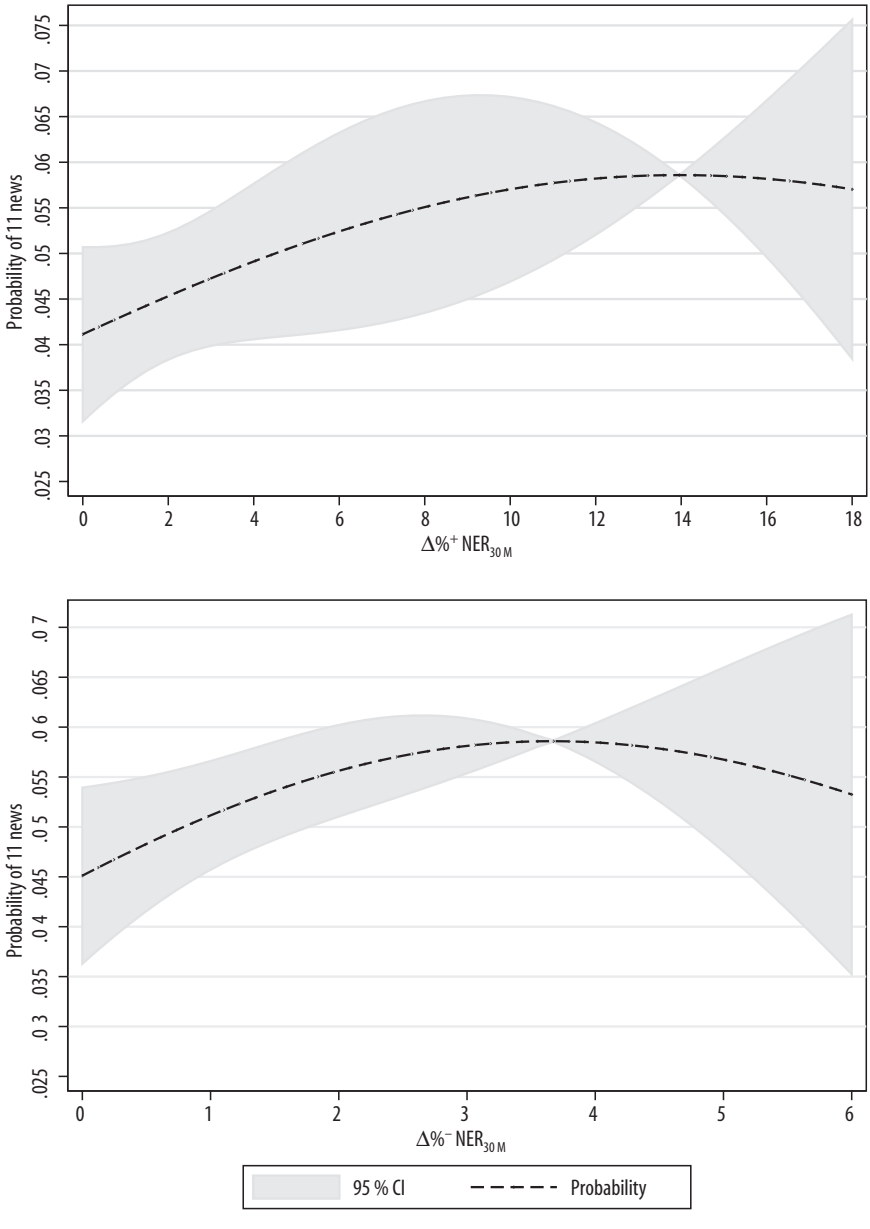
The marginal effects for the specification with $m = 60$ are very similar to those with $m = 30$. For this case, the marginal effect of the duration of the devaluation or revaluation episodes is worth highlighting. This time, longer devaluations and revaluations have a negative effect on the number of news items. This result follows the logic presented above, where the emphasis of the news decreases as the behavior of the exchange rate continues.

The predicted probabilities for a specific number of news items using different values of the explanatory (and continuous) variable used in the regression are also obtained. This was done for regression 4 from table 3 (the set of results when $m = 30$ is used). The predicted probabilities were estimated for eleven news items per month (the average number of news items observed during revaluation periods; see table 2), a revaluation from 0 to 6 percent, and a devaluation from 0 to 18 percent. The results are shown in figure 5.[21]

The figure corroborates the results discussed previously: the number of news items is influenced by the occurrence and degree of a revaluation but not of a devaluation. This result keeps suggesting a media bias for news in revaluation periods. The predicted probabilities show how a 14 percent devaluation would be necessary to obtain the highest probability for eleven news items, but how only a 3.8 percent revaluation is needed to have the highest probability for the same number of news items.

21. This equation was chosen for simplicity in the generation of predicted probabilities and because the coefficients are similar to the preferred regression results discussed above.

FIGURE 5. Predicted Probability for Eleven News Items, Editorials, and Op-eds per Month[a]



a. Calculated for different values of variation in the NER, from regression 4 in table 3.

The Flavor of News, Editorials, and Op-eds That Discuss Devaluation and Revaluation

As argued early in this paper, economics commentators and journalists in Colombia react more easily to revaluation than to devaluation, most likely influenced by an interest group that seeks sympathy and assistance, suggesting the existence of media bias. Furthermore, such dislike for revaluation is accompanied with circumstantial evidence of the harmful effect on the export industries and at the same time with a call for help from fiscal or monetary authorities. In the previous section, such a bias has been shown using statistical tests and regression results. However, the mere count of news items that contain the words *devaluación* and *revaluación* and its correlation cannot show whether the news actually has the tone or flavor of dislike and a connection with an interest group. This section reports on the flavor of the news, editorials, and op-eds that discuss devaluation and revaluation in Colombia, using statistical analysis of text.

Statistical analysis of text seeks to transform a text, or a collection of texts also called a corpus, into numerical information. Such data are intended to present the text in a systematic way for further statistical analysis (Francis and Flynn 2010; Fagan and Gencay 2011). Standard text analysis implies preprocessing an unstructured text and then a statistical analysis of the processed text. Preprocessing involves determining the format of the text, the length of the text or collection of texts (corpus), parsing the text by eliminating spaces, punctuation, and uninformative words, collecting in a single word plurals and variants of words that convey the same meaning, and transforming words into a data structure where for each document in the corpus the words are counted, thereby becoming variables. Once the preprocessing is done, different statistical procedures can be applied to this data structure, conveying information about the text.

Preprocessing

The text of 1,854 news items was collected and preprocessed using tm: Text Mining Package in the R statistics software package.[22] The preprocessing included converting text to lower case; removing white spaces and punctua-

22. I. Feinerer, *tm: Text Mining Package,* R package version 0.5–6, 2011; R Development Core Team, *R: A Language and Environment for Statistical Computing* (Vienna, Aust.: R Foundation for Statistical Computing, 2011). Also see I. Feinerer, K. Hornik, and D. Meyer, "Text Mining Infrastructure in R," *Journal of Statistical Software* 25 (March 2008).

TABLE 6. Words That Appear in the Corpus More Than 1,500 Times[a]

bancodelarepública	Colombia	crecimiento
devaluación	dólar	economía
exportaciones	**gobierno**	**inflación**
interés	mayor	mercado
millones	país	parte
pasado	peso	pesos
política	precio	precios
presidente	**revaluación**	sector
tasadecambio	tasas	

a. Words of interest appear in bold.

tion; collecting words with similar meanings into a single expression or word; and removing stop words in Spanish, such as *el, lo, los,* and *las.* The following lists the terms we used and the collected words with similar meanings:

—asistencia (assistance): asistencia, ayuda, financiación, subsidio, subsidies (assistance, help, financing, subsidy, subsidies)

—bancodelarepública (central bank): banco de la república, banco, emisor, junta directiva (central bank, bank, issuer, board)

—bandacambiaria (crawling band): banda cambiaria (crawling band)

—crecimientoeconómico (economic growth): crecimiento económico (economic growth)

—dólar (dollar): dólares (dollars)

—estadosunidos (United States): estados unidos (United States)

—flores (flowers): floricultor, floricultores (flower growers)

—gobierno (government): ministro, ministerio (minister, ministry)

—medidas (measures): medida (measures)

—salario (wages): salarios (wages)

—tasadecambio (exchange rate): tasa de cambio, tasa de cambio nominal (exchange rate, nominal exchange rate)

—tasadecambioreal (real exchange rate): tasa de cambio real (real exchange rate)

—tasadeinterés (interest rate): tasa de interés (interest rate)

Statistical Analysis

Once the text preprocessing stage is done, the software transforms the remaining words into a document term matrix in which numerical data are collected based on given criteria. The first criterion used in this analysis is to obtain words that appear at least 1,500 times in the corpus (table 6 shows the output).

Twenty-seven words meet this criterion, several of which are clearly part of standard speech in discussing the behavior of the nominal exchange rate.

As expected, the words *devaluación* and *revaluación* are on this list. Not surprisingly as well, *bancodelarepública* (Colombia's central bank) is the most repeated word; news that discusses the behavior of the exchange rate should be expected to mention this institution. Less obvious, however, is the absence of the word *importaciones* (imports), since the word *exportaciones* (exports) is in the top ten; if the treatment of the behavior of the exchange rate were not biased, then the word *importaciones* should be mentioned in the corpus as often as the word *exportaciones.* Finally, the word *presidente* (president) is also part of this group, raising the question of why the president of the government would be brought into the discussion of the behavior of the exchange rate if there were no intention to request assistance from the executive.

The second criterion for analyzing the corpus is to obtain the top correlated words with the target words of this study, that is, *devaluación, revaluación,* and *bancodelarepública.* Table 7 shows the words that have a correlation higher than 25 percent for the entire period of analysis, from 1992 to 2009. The results are a clear indication of the argument raised in this paper about the overemphasis on a revaluation episode. The word *devaluación* is correlated with naturally corresponding words such as *dólar* (dollar) and *tasadecambio* (exchange rate) and only two other words, for a total of four words. However, the word *revaluación* is highly correlated with twenty-one words, including *bancodelarepública, exportadores* (exporters), and *gobierno* (government). This shows again the use of the words and the context in which they are employed: while *devaluación* is employed along with other words simply to describe the behavior of the exchange rate, *revaluación* is highly associated with the central bank, exporters, government, and stopping (*frenar*) the exchange rate's decreasing trend. If the treatment of the behavior of the exchange rate by the media were impartial, the association of words would not show such a disparity.

The third term of interest is *bancodelarepública* (central bank). Clearly, the central bank is at the core of the news reporting that covers not only the behavior of the exchange rate but also inflation targeting, hence the associated words appear (inflation, monetary policy, target, rates, and so on). However, it must be stressed that the word *devaluación* is not on this list, showing how in the media, *revaluación* is a principal component of the language and is directly associated with the central bank, but not *devaluación,* in spite of the latter's being the other side of the same coin.

TABLE 7. Words with a Correlation of 25 Percent or Higher for Devaluation, Revaluation[a]

devaluación	1	*revaluación*	1	*bancodelarepública*	1
dólar	0.31	peso	0.38	gobierno	0.43
tasadecambio	0.28	**bancodelarepública**	0.37	**revaluación**	0.37
efecto	0.26	**dólar**	0.37	**hacienda**	0.36
Venezuela	0.25	**exportadores**	0.34	manejo	0.34
		gobierno	0.33	**tasadecambio**	0.34
		tasadecambio	0.32	dólar	0.33
		frenar	0.29	**inflación**	0.33
		mayor	0.28	monetaria	0.33
		tema	0.28	bandacambiaria	0.32
		controlar	0.27	**frenar**	0.32
		importante	0.27	interés	0.32
		inflación	0.27	política	0.31
		parte	0.27	cambiario	0.30
		últimos	0.27	meta	0.30
		exterior	0.26	público	0.30
		fenómeno	0.26	tasas	0.30
		problema	0.26	divisas	0.29
		sido	0.26	medida	0.29
		capitales	0.25	medidas	0.29
		país	0.25	**mercado**	0.28
		sino	0.25	**controlar**	0.27
				decisión	0.27
				parte	0.27
				presidente	0.27
				tema	0.27
				evitar	0.26
				tasa	0.26
				liquidez	0.25

a. Correlations for the words *revaluación, devaluación,* and *bancodelarepública*. Words of interest appear in bold.

The previous two criteria for analyzing the corpus were unstructured, in the sense that no limits were imposed on the number or correlation between the words being studied. The third, and final, criterion imposes a set of words to be studied; from this set of words an association metric is obtained and summarized in an association matrix; hierarchical clustering methods then "collapse" the number of words into groups based on the association between the words, reducing the dimensions of the matrix. This process is displayed in a dendrogram, or tree diagram, that shows the grouping or clustering of words within the corpus. The hierarchical method used is the single linkage method on an association matrix containing the cross correlations for the chosen set of words.[23] Table 8 shows the set of words chosen for this analysis, and

23. A good introduction to the topic can be found in Johnson and Wichern (2002).

TABLE 8. Words Used in the Hierarchical Clustering Analysis: Colombia's Central Bank

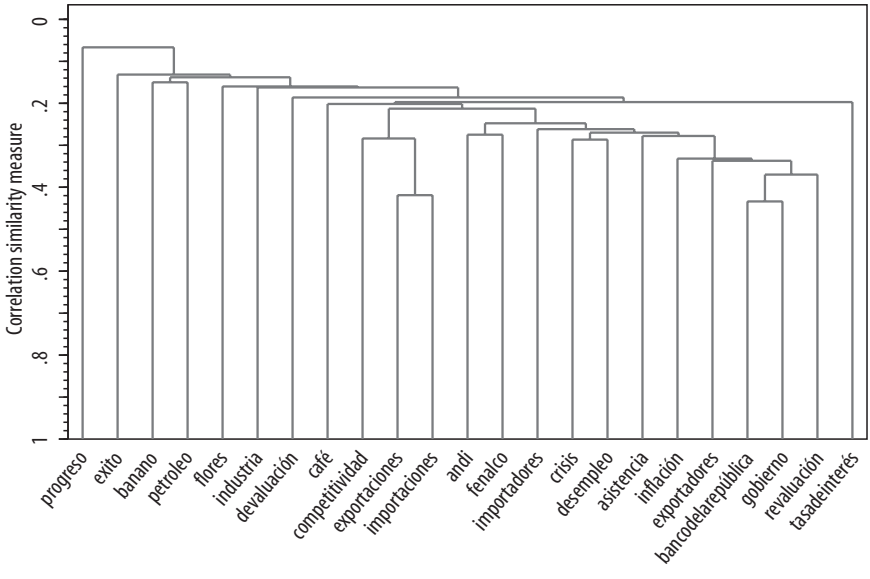
Category	*Spanish*	*English*
Economic variables	competitividad	competitiveness
	desempleo	unemployment
	industria	industry
	inflación	inflation
	exportaciones	exports
	importaciones	imports
	tasadeinterés	interest rate
Goods	banano	banana
	café	coffee
	flores	flowers
	petroleo	oil
Interest group	andi	Colombia's national industry association
	fenalco	Colombia's national retailers association
	exportadores	exporters
	importadores	importers
Keywords	revaluación	revaluation
+	devaluación	devaluation
Positive and negative wording	crisis	crisis
	exito	success
	progreso	progress
Public institutions	bancodelarepública	Colombia's central bank
	gobierno	government
Public assistance	asistencia	assistance

figures 6 and 7 present the dendrograms for the entire period under analysis and for the exchange rate band and free market periods.

The core words analyzed are *devaluación* and *revaluación* (keywords category in table 8). Examining the proximity of the two words and the branch structure around them can help demonstrate the hypothesis of overemphasis on revaluation sustained through the present paper. The second group of words are those associated with public institutions such as the *bancodelarepública* and *gobierno.* The proximity of these words to any of the core words is an indication of the implied link of public institutions with the behavior of the exchange rate.

Next are the interest group words. These words identify private interest groups that might have a particular interest in the behavior of the exchange rate and might play a role in shaping the emphasis on reporting unfavorable circumstances and unfolding a message of disaster and the need for assistance. Fourth in importance is *asistencia* (assistance). Whether this word is close to *revaluación* and public institutions, and at the same time is far from

FIGURE 6. Dendrogram for Hierarchical Clustering from Correlation Matrix, Entire Period[a]



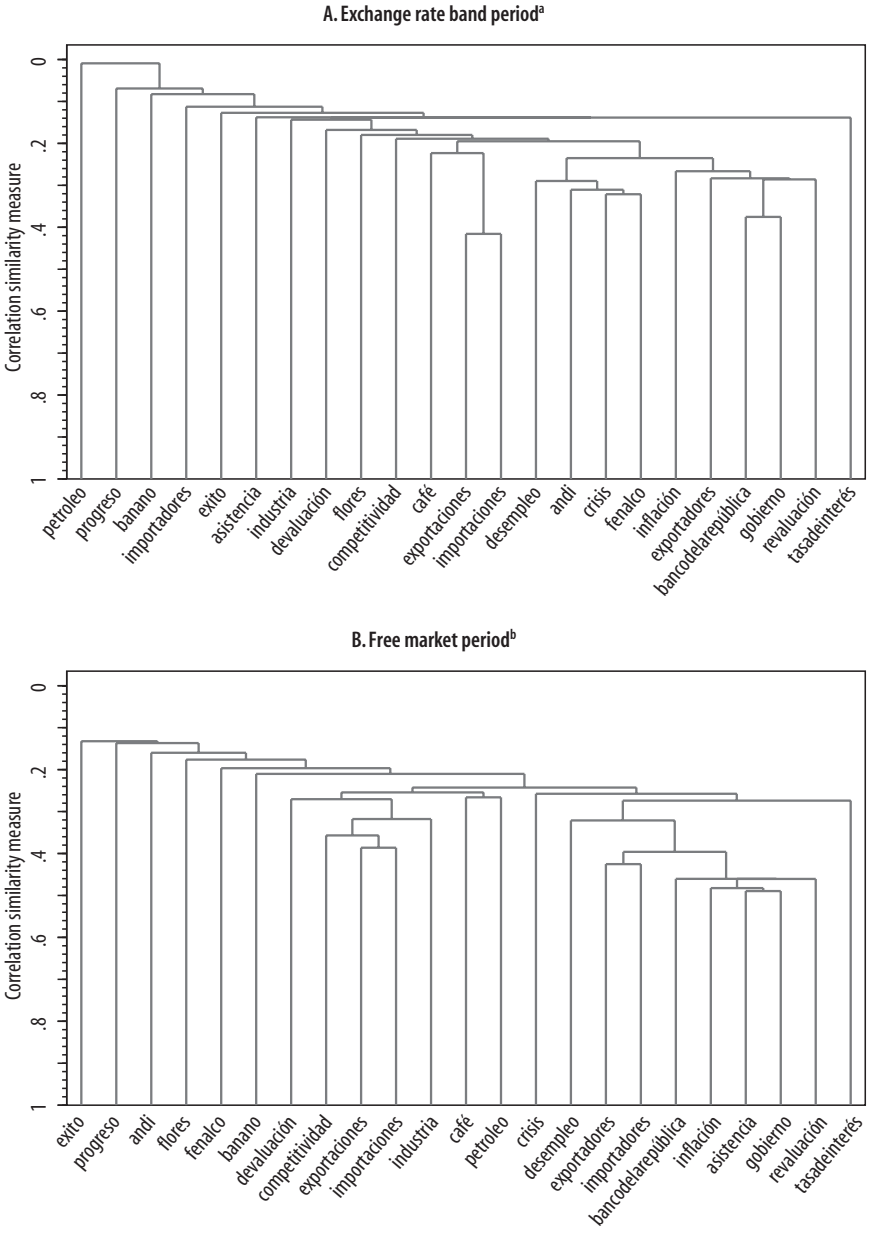
a. Corpus from 1992 to 2009.

devaluación, is evidence of the linkage between revaluation and an interest group, the media's overemphasis on exchange rate behavior and public perceptions, and, finally, the search for assistance.

The remaining words are included to fill the information matrix with the relevant terms or words concerning the behavior of the exchange rate and public institutions. If these words were not included in the analysis, the information matrix and the clustering method would generate a naive correlation and dendrogram, obviously linking a limited number of terms. By including a variety of related terms the correlation and the clustering will make the right connections between words, unfolding the presence or absence of the proposed closeness in the above diagram.

From the dendrogram corresponding to the whole period of analysis (figure 6), the similarity between the *bancodelarepública, gobierno,* and *revaluación* is clear: these words give shape to the first cluster. The word *assistance* is the nearest expression to this cluster; such an outcome shows the closeness between these expressions. In contrast, the word *devaluación* is far from this cluster. If the media covered the behavior of the exchange rate evenly and

FIGURE 7. Dendrogram for Hierarchical Clustering from Correlation Matrix, by Period



a. Corpus split from 1992 to 1999.
b. Corpus split from 1999 to 2009.

impartially, the words *devaluación, revaluación, exportadores* (exporters), and *importadores* (importers) should appear more often together in a journalistic piece and form a cluster. This would show that when discussing the behavior of the exchange rate the news items present pros and cons, evidence, positive and negative statements, and opinions or judgments from all points of views. This is precisely not the case.

This pattern of association is also observable in panel A of figure 7 for the exchange rate band period. In this case, the word *asistencia* is not part of the cluster *bancodelarepública, gobierno, exportadores,* and *revaluación.* A notable cluster is formed by *fenalco* (the national retailers' association), *crisis, andi* (the national industry association), and *desempleo* (unemployment). This grouping still shows the emphasis from business and exporters on qualifying revaluation as a negative event, without resorting to public institutions for assistance. Finally, panel B of figure 7 shows the dendrogram for the free market period. Here again, *bancodelarepública, gobierno, asistencia,* and *revaluación* are the first cluster with a high correlation.

In all, using textual analysis supports the results of the regression analysis from a different perspective. In the previous section, bias was defined as the uneven reporting of the behavior of the exchange rate, and using the count of news items, the proposed asymmetric relationship was established. In this section, by examining the content of the news, it has been shown that the reporting of the behavior of the exchange rate is strongly linked with words such as *asistencia, bancodelarepública, gobierno,* and *exportadores,* unveiling the link between revaluation, exporters, and public assistance. Beyond showing a media bias, it remains to be seen whether such overreporting has any effect on the behavior of the economic authorities.

Policy Response

Having established the asymmetry in reporting the behavior of the NER, and how news content relates an interest group to public institutions, this section addresses whether there is a relationship between news reporting and the exchange rate policy. There are two options for policy response to the exchange rate behavior. First, government officials (the fiscal authorities) can offer subsidies and support programs for specific exporting industries that seem to be affected by a revaluation episode. This is often the case in Colombia: there has been financial assistance (or at least the announcement of such) throughout different government departments and ministries. However, these

programs are not suitable for an empirical test of a systematic relationship between news and policy. In most of the cases they are politicized and broadly defined in their scale and scope. Furthermore, they can be easily confounded with favoritism of another kind, such as assistance to exogenous shocks of a financial or environmental nature.

The second option is the response from the central bank (monetary authority). Although controlling inflation is the sole purpose of the central bank, it has become an active agent in the exchange rate market. On several occasions the central bank has announced different approaches to containing revaluation of the NER. What part of the intervention initiative can be attributed to media coverage, and the underlying bias, is what this section tries to answer.

This policy option is somehow more suitable to exploring whether policy (exchange market intervention) is associated with media coverage. Therefore this section approaches empirically, using a probit regression, the relationship (not causation) between the number of news items that discuss the behavior of the exchange rate and central bank intervention in the market. This choice of policy and modeling strategy is not without problems, so results should be taken as indicative and far from conclusive of a causal relationship. First, even though the number of news items was collected daily, and the central bank can intervene on a daily basis as well, data on market intervention are publicly available only on a monthly basis. This is an obstacle in the timing of the relationship between news reporting and policy intervention for a proper econometric identification. Second, based on the criteria to collect the number of news items outlined earlier, within the monthly number of news items there can be some that include the words *devaluación* or *revaluación* as a consequence of the central bank intervention and not exclusively reporting complaints associated with the exchange rate revaluation. This is clearly an endogeneity or double causality issue. Finally, associated with the previous argument is the legitimate option of the central bank to intervene in the market. The central bank also intervenes on its own, the economy's, or the country's interest, following the monetary, exchange rate, and inflationary policy commitments, and not because of external pressure from the media. Although the endogeneity issue is tackled with an instrumental variable estimation, the remaining issues limit the scope of the results.

Following Kamil (2008) and Echavarria, Vasquez, and Villamizar (2010), volatility, international reserves, and inflation (deviation from the target) shape the central bank's decision to intervene in the exchange rate market. To investigate the relationship with media bias, a probit model (with the binary variable defined by the central bank intervention) is estimated using two rela-

tive measures of the number of news items as the variable of interest plus a set of covariates. The first measure uses the number of news items containing the words *devaluación* or *revaluación* from the *El Tiempo* archive and the number of news items with the word *economía* from the n-gramas website (equation 1). The second measure uses the number of news items containing only the word *devaluación* and only the word *revaluación* to obtain the ratio in equation 6.[24] The resulting variable is shown in figure 8.

$$(6)\quad Relative\ No.\ of\ news\ items - Rev/Dev_M = \frac{No.\ News_{M(\text{“}revaluación\text{”}\ from\ n\text{-}gramas)}}{No.\ News_{M(\text{“}devaluación\text{”}\ from\ n\text{-}gramas)}}$$

This estimation does not intend to model the central bank's exchange rate policy, only to find whether news items do or do not have a relationship with central bank intervention in the exchange rate market. The dependent variable ($CB\ buy_M$ – central bank buy) is a dummy variable that takes the value of 1 if the central bank bought (net purchase) U.S. dollars in the market in month *M,* and zero otherwise.[25] However, since inflation and international reserves are available only on a monthly basis, this data frequency binds the subsequent analysis. As with the estimation of equation 4, year and monthly dummies were included to capture any unobservable variable in the regression.

The explanatory variables are as follows:

—The absolute and relative monthly number of news items (used in the media bias estimation) ($No.\ News_M$)

—The volatility of the NER, defined as the monthly average of the standard deviation of the last *m* days (SD_{mM})

—Inflation, measured as the deviation from the inflation target ($\pi - Target = \pi_{m-12} - \pi_{Target}$)

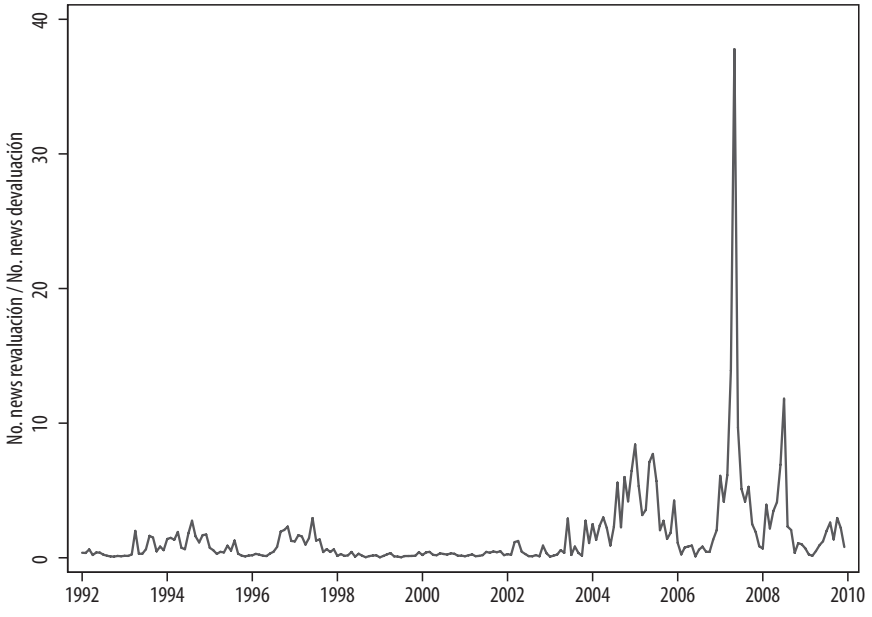
—International reserves (*Int. Reserves*), measured as the *m* day percentage change

—Real interest rate differential between the prime rate (U.S.) and the Colombian savings interest rate (DTF) (*Real interest rate differential Col – US*)

24. A referee suggested the use of this relative measure.

25. Data on market intervention are publicly available only on a monthly basis. Several requests for daily or weekly data were made to Colombia's central bank officials, but access to disaggregated data was denied on the grounds of confidentiality.

FIGURE 8. Ratio of *Revaluación* to *Devaluación*[a]



Source: Extracted by the author from Caicedo (2012).

a. The figure shows the ratio of the number of news items, editorials, and op-eds with the word *revaluación* to the number of similar items using the word *devaluación*.

—Industry employment, measured as the *m* day percentage change of industrial employment as reported by the monthly manufacturing survey (*Ind. employment* Δm)

—Industry output, measured as the *m* day percentage change of industrial output as reported by the monthly manufacturing survey (*Ind. output* Δm)

Equation 7 is estimated using a probit regression model, and the results are shown in table 9.

$$(7) \qquad CB\ buy_M = f\big(No.\ News_M, SD_{SM}, \pi - Target, Int.\ Reserves_{SM}, Real\ Interest\ rate\ diff_M, Ind.\ employment\ \Delta_m, Ind.\ output\ \Delta_m\ Year\ dummy, Month\ dummy\big).$$

The estimation output in table 9 shows a positive relationship between the number of news items and the probability of intervention in the exchange

TABLE 9. Probit Estimation for Central Bank Intervention in the NER Market[a]

	m = *30*		m = *60*	
	Reg 3	*Reg 7*	*Reg 3*	*Reg 7*
Relative No. $News_M$	0.0671*		0.0660**	
	(0.0345)		(0.0307)	
Relative No. News - Rev / Dev_M		0.612***		0.696***
		(0.156)		(0.169)
SD_{mM}	−0.0167	−0.0107	−0.000526	0.00525
	(0.0116)	(0.0116)	(0.00691)	(0.00811)
π − Target	0.374**	0.469**	0.367**	0.507**
	(0.179)	(0.208)	(0.164)	(0.199)
Int. Res_{mM} %	−0.0936**	−0.0856**	−0.0868***	−0.0911***
	(0.0386)	(0.0368)	(0.0281)	(0.0284)
Real interest rate differential Col–US	0.189	0.311**	0.220*	0.408***
	(0.125)	(0.142)	(0.126)	(0.141)
Ind. employment Δm	−0.413	−0.425	−0.0249	−0.0217
	(0.327)	(0.332)	(0.222)	(0.237)
Ind. output Δm	0.0324	0.0744**	0.0168	0.0522***
	(0.0250)	(0.0297)	(0.0128)	(0.0171)
Constant	−1.654	−1.205	−1.258	−1.069
	(1.512)	(1.498)	(0.892)	(0.824)
Observations	124	124	124	124
Year dummy test *p* value	6.75e-05	0.000193	2.58e-06	3.29e-05
Month dummy test *p* value	0.0379	0.0300	0.0320	0.0417
Pseudo R^2	0.359	0.418	0.362	0.428
LL	−54.29	−49.25	−54.02	−48.45
AIC	164.6	154.5	164.0	152.9
BIC	243.6	233.5	243.0	231.9
Linktest (*t* value)	−1.753	0.626	−1.650	0.322

a. Dependent variable is the dummy variable for central bank's purchasing U.S. dollars in the NER market. Linktest is a specification test for binary dependent variable models that estimates the regression $y = f(\hat{y}, \hat{y}2)$; the *t* value of the coefficient corresponds to the significance test for $\hat{y}2$. The instrumental variable for No. $News_M$ is No. $News_M$ $(t-1)$. Heteroscedasticity robust standard errors in parentheses.

***$p < 0.01$.

**$p < 0.05$.

*$p < 0.1$.

rate market (Regs 3 and 7 for $m = 30$). This result also holds for the relative measure—the ratio of revaluation to devaluation news items—(Regs 3 and 7 for $m = 60$). Volatility, inflation target deviation, international reserves variation, and real interest rate differential are significant and show the expected sign. For the case of $m = 60$ applicable to the two variables defined for the change in sixty days, volatility and international reserves variation, the same result holds. Finally, the year dummy variables are significant, while the monthly dummies are not, suggesting there is no difference along monthly intervention, but there has been among years.

A further view of the results emerges when the predicted probability for each significant explanatory variable, holding the remaining variables at their means, is plotted against the observed range of the variable. This is shown in figure 9 using the estimation results of regression 3. In figure 9, each graph plots the probability of intervention in the exchange rate market (vertical axis) versus plausible values of the explanatory variable (horizontal axis). In summary, the probability of the central bank's buying dollars ranges from 0.4 to 1. As long as the number of news items increases, that probability also increases, with a positive deviation from the inflation target, while it decreases from 0.7 to 0.3 as volatility and international reserves change increase.

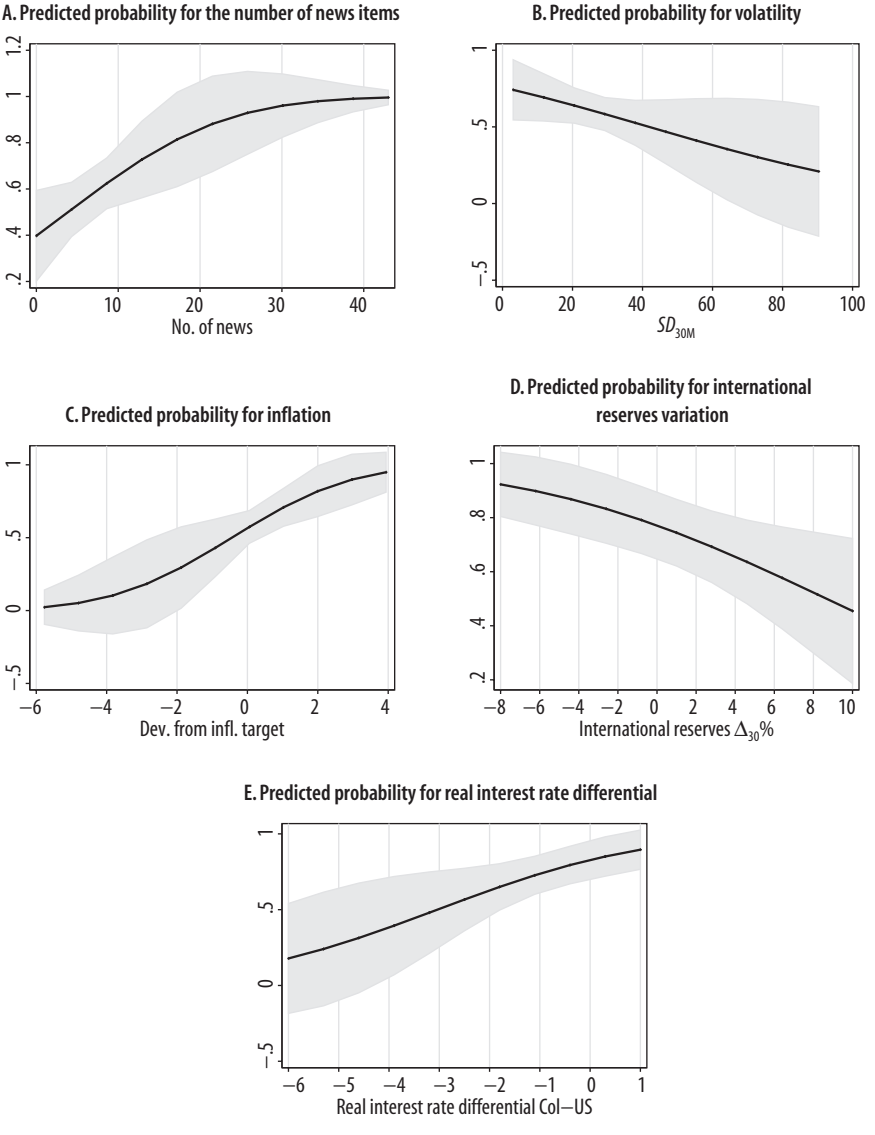
These econometric results approach the closing stage of the Corneo (2006) sequence of events proposed early in this paper, that the behavior of a public institution, the central bank in this case, is correlated with the number of news items reporting the behavior of the exchange rate. This result is relevant since it opens the door for a new understanding of the central bank's decision-making process and independence.

Closing Discussion

As a closing section, some arguments are put together here in the effort to amalgamate the empirical findings and hypothesize the forces behind them. Summarizing Corneo's (2006) paper, if an interest group is in search of a public policy to alleviate an unfavorable situation, it may form a coalition with the media, and the latter may overreport (or overstate) the accurate state of affairs, while the former waits for a friendly policy response.

This paper has reached two main conclusions regarding this sequence of events for the case of the exchange rate in Colombia. First, there is media bias in reporting on the behavior of the NER: there are more news items during an episode of revaluation than during a devaluation. This conclusion is reached after estimating a regression model of asymmetric response of the devaluation or revaluation against the number of news items that discuss the behavior of the NER. The interaction coefficient between the asymmetric coefficient and the market period dummy is significant for a revaluation but not for a devaluation, suggesting that the bias continued after the end of the exchange rate band scheme. Second, using statistical analysis of text, the content of the news is closely linked to the words *exporters, central bank, government,* and *assistance.* Therefore, besides a high proportion of news items published

FIGURE 9. Probability of Central Bank's Buying Dollars in the NER Market, from Regression 2 with $m = 30$ in table 9[a]



a. Each figure shows the probability (solid line) and confidence intervals (gray area) from regression 3 of the central bank's buying dollars in the NER market, holding the other variables at their means.

during revaluation, news items strongly report the cries for help from exporters to public institutions. Finally, with a cautionary call, is the finding that central bank intervention in the exchange rate market can be explained by the number of news items.

What forces are behind the alignment of an interest group and the media in Colombia? Besides the background presented above for the media outlet used in this study—the newspaper *El Tiempo*—interest groups, through formal guilds or associations, continuously populate media in a legitimate effort to highlight (or play down) their successes (or losses). This behavior is not limited to powerful interest groups. It might well be the case with unions, universities, animals rights advocates, and so on. The relationship between news outlets and corporate public relationship is well rooted in modern journalism. Therefore, resorting to a conspiracy theory of an evil corporate alliance between media and an interest group is not justified.

Taking a pragmatic stand, media are simply reporting based on the information provided by the interest group, which in the case studied here might be quite abundant (newsletters, press releases, public announcements, and so on). One could hypothesize that interest groups have strong and well-organized public relations offices constantly supplying media outlets with announcements, reports, and the like. Under these circumstance journalists, editors, and commentators become the public reflection of the exporting industries. In the end, there are more news items discussing revaluation because they are able to reach the media more effectively.

Resorting to the arguments put forward in Urrutia and Fernández (2000), in studying public opinion and the exchange rate level, exporters, dollar holders, and the unemployed can be taken as devaluation advocates, while importers, retail traders, non-tradable manufacturers, and debt holders (denominated in dollars) favor revaluation. Furthermore, Urrutia and Fernández (2000) suggest that Colombia has a particular attachment to devaluation, an outcome of the crawling peg years, the coffee-dependent economy of the 1970s and 1980s, and the unfounded association of devaluation with economic growth. Because of this unusual attachment, a revaluation exponent becomes a "pariah."[26] In all, what Urrutia and Fernández (2000) suggest supports the existence of some sort of eagerness toward devaluation, the presence of an interest group behind such keenness, and a certain level of policy response to media.

26. "Revaluar Tiene Amigos," 5 September 1994, *El Tiempo* archive (www.eltiempo.com/archivo/documento/MAM-215768).

A totally different issue is the copious amount of reports passed to the media by the pressure group. If the number of news items is taken as a proxy for the insistence of local exporting industries to magnify the effects of a revaluation and seek government assistance, this behavior speaks ill of the industry. The nominal exchange rate in Colombia has been set by market mechanisms for almost twenty years, and there are still complaints about the adverse results of the market. How long can it take for the exporting industry to adjust and learn from the market? Why don't exporters engage in the use of financial tools, such as futures and derivatives, to hedge against adverse events?[27] Answering these questions is beyond the scope of this paper.

Finally, what could explain a potential response from public officials to media pressure? Unfortunately the empirical analysis is not definitive on this matter. For the reasons presented in this paper, a fiscal response is not examined, and the monetary one is inconclusive. Still, arguments such as regulatory capture or political benefits, for instance, could be raised. However, both are far from testable. What might be behind a policy response is simply a candid sense of media awareness. Ministers or a central bank's board members are not completely isolated from the daily media discourse on economic matters. And if the coverage is as abundant as it appears to be with regard to nominal exchange rate behavior, their decisions can lean in favor of the media exposure and arguments. No less important are the visibility and political benefits bestowed on the bearer of (at least) the message of assistance and understanding. Subjecting these arguments to an empirical test is a lot more difficult and would require higher frequency data and a cleaner natural experiment to appropriately assess the policy response to media bias.

27. Financial tools have been available in Colombia for at least a decade, as reported in *El Tiempo* ("Un Mercado de Opciones," 28 July 1997, *El Tiempo* archive [www.eltiempo.com/archivo/documento/MAM-684297]; "Los Contrato Forward," 22 January 2004, *El Tiempo* archive [www.eltiempo.com/archivo/documento/MAM-1548723]); even the head of the exporters' association guild declared, "[Exporters] seem to continue their business as if the Act No. 444 of 1967 were still in place, [under such a scheme] with a guaranteed and continuous devaluation" ([los exportadores] todavía manejan sus negocios como si existiera el Decreto 444 de 1967 que garantizaba una devaluación gota a gota) (F. González, "Aunque las Coberturas Cambiarias Han Crecido, Su Protección Llega Cuando Ya Es Tarde," 27 July 2009, *El Tiempo* archive (www.portafolio.co/archivo/documento/CMS-5703427).

Comment

Gustavo Suarez: In recent years, both theoretical and empirical economists have provided new insights that have significantly improved our understanding of the market for news. This very interesting paper by Rodrigo Taborda is a welcome addition to this area of research because of its innovative application of text analysis tools to the study of newspaper coverage of economic news in Colombia.

The paper documents three main facts. First, appreciations and depreciations of the Colombian peso–to–U.S. dollar exchange rate are not evenly covered by the most prominent Colombian newspapers. Instead, exchange rate appreciations appear to receive disproportionally more attention. Second, the language used to describe exchange rate appreciations in newspaper articles tends to make more frequent reference to "economic authorities" and "assistance" to affected groups compared with the language used to describe exchange rate depreciations. Third, the probability that the Colombian central bank intervenes in foreign exchange markets by buying dollars is positively correlated with the frequency of news covering exchange rate appreciations.

How should we interpret these three findings? The view preferred by the author is that newspapers reflect the interests of economic groups affected by exchange rate appreciations and that the central bank intervenes in the exchange market in reaction to the news coverage of appreciations. Although the results presented in the paper are indeed consistent with the preferred interpretation by the author, they cannot exclude other views, which are not explored in the paper. This suggests that it would be very useful to conduct additional research to test the view preferred by the author against alternative explanations.

The views expressed here are my own and do not necessarily reflect those of the Federal Reserve System or its Board of Governors.

Two avenues of additional research that are worth pursuing are documenting further supporting evidence for the media bias and government response view, and listing other plausible explanations for the facts and presenting explicit evidence against those alternatives. The rest of this comment discusses some alternative explanations of the main facts documented in the paper and offers some additional tests to distinguish between different interpretations of these facts.

Uneven Coverage of Appreciations and Depreciations

The author finds evidence that currency appreciations receive more intense news coverage in Colombia than currency depreciations and favors an explanation for this "bias" originating in the supply side of the markets for news. In other words, in the view of the author, journalists offer biased reporting to an ex ante unbiased public. However, alternative explanations of the uneven coverage of appreciations and depreciations may also come from the demand side of the news market (see, for example, Mullainathan and Shleifer 2005). In particular, unbiased journalists could cater to an ex ante biased public that demands biased news coverage, with the purpose of selling more newspapers or advertisement space.

A concrete demand-side explanation for the uneven reporting of exchange rate appreciations presumes journalists' exploitation of behavioral characteristics of readers. Under this view, for example, news topics that are "newer" or less common and for which affected groups are easier to identify are in higher demand by news consumers. In the context of the behavior of the exchange rate, historical data on the nominal exchange rate in Colombia published by the Colombian central bank suggest that, for many decades, exchange rate depreciation was far more common than exchange rate appreciation (see also figure 1 in the paper for the most recent history of the exchange rate). By comparison, significant exchange rate appreciation is a relatively new phenomenon. In other words, depreciation of the exchange rate is not news material in Colombia any more.

In addition, economic groups negatively affected by currency appreciation (for example, exporters) are highly concentrated, but groups negatively affected by depreciation (for example, consumers of imported goods) are widely dispersed. Newspaper articles that portray a concentrated negative effect on a small and well-defined group of individuals are likely to find more readers than those that portray a dispersed effect on a vaguely defined group.

In other words, news subjects that negatively and significantly affect a concentrated group allow the journalist to clearly identify the appropriate persons to interview and quote, so as to "put a human face" on the story.

Some evidence presented in the paper is in fact consistent with demand-side explanations of the uneven coverage of currency appreciations and depreciations. In particular, the regressions that study the determinants of the number of news articles indicate that the longer an episode of exchange rate appreciation lasts, the lower the probability of news coverage of the behavior of the exchange rate (see Taborda's table 4). This result is more suggestive of journalists' offering the kind of news the public prefers than of journalists' reflecting the view of interest groups. In particular, according to a demand-side explanation, we should expect less news coverage for longer periods of appreciation, as the phenomenon becomes more common and the news topic becomes stale. By contrast, if interest groups were the sole explanation for uneven news coverage, we should expect more coverage for longer periods of appreciation, as interest groups would likely redouble their efforts to alter media content the longer the appreciation episode took a toll on their profits.

Additional evidence could be used to make the case that organized interest groups play a central role in generating a biased coverage of exchange rate appreciations and depreciations. In particular, in future research the author could study the industry composition of the advertisement revenue for the newspaper under analysis to ask additional interesting questions that lead to testable hypotheses. For example, do newspapers receive more advertisement revenue from industries that are affected by exchange rate appreciations? Does more current news coverage of exchange rate appreciations disproportionately increase future advertisement revenue from industries that are affected by exchange rate appreciations? If more newspapers were included in the sample, the author could consider whether newspapers that rely more on advertisement revenue present more unbalanced coverage of exchange rate appreciations and depreciations.

Some additional evidence could come from studying the ownership structure of newspapers, a question that has received some recent attention in empirical work (for example, Djankov and others 2003). The converse question could also be interesting: Do the owners of newspapers that report exchange rate appreciations more intensely hold ownership stakes in industries that are negatively affected by exchange rate appreciations? Another question that can be raised to provide indirect evidence of the role of organized groups is whether journalists or editors leave newspapers for positions at organizations that represent industries affected by exchange rate appreciations.

Central Bank Intervention and News Coverage

One of the most intriguing results of the paper is the positive correlation between the probability that the Colombian central bank purchases dollars and the frequency of news about exchange rate appreciation. One possible explanation of this correlation is that the central bank reacts to news coverage of exchange rate appreciations. That the author heavily favors this view is evident from the original title of the paper.[1] However, an important alternative explanation for this correlation is omitted-variable bias in the regression of the probability of central bank intervention. In other words, variables excluded from the regression could alter the behavior of the exchange rate, both increasing the probability of news and making intervention more likely. Unfortunately for the empirical exercise at hand, there are many relevant variables that could have been omitted from the regression (for example, perceptions of differential country risk that are not embedded in interest rates).

A useful way to compare the hypothesis that the central bank responds to news coverage of appreciations with the omitted-variables explanation is to distinguish discretionary from nondiscretionary interventions by the central bank. More specifically, some interventions by the Colombian central bank during the sample period were based on predetermined rules, which are unlikely to be affected by media coverage immediately preceding the intervention. If the probability of central bank intervention is highly correlated with news coverage of appreciations only with respect to nondiscretionary policy, the case for the central bank's actually responding to news coverage would be severely weakened. On the other hand, if the probability of central bank intervention is correlated with news coverage of appreciations only with respect to the discretionary policy, the omitted-variables explanation would lose a lot of its appeal.

In conclusion, the paper documents intriguing facts by using tools that are innovative in the economics profession to study the market for news. However, the evidence provided by the paper is not conclusively supportive of the view favored by the author (that is, media capture by interest groups and policymakers' response to media coverage) to the exclusion of other explanations. The study of the very interesting facts documented by the author deserves evaluating all possible explanations for these facts in a balanced way.

1. "Bias in Economic News in Colombia: The Reporting of the Nominal Exchange Rate and the Central Bank Response."

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