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Wharton Research Scholars 2005-2006

The Impact of Unpaid Movie Downloading on Box Office Sales

Jeremy Chan

Faculty Advisor : Professor Joel Waldfogel

1. Objective

The goal of this paper is to conduct an empirical study on file-sharing and movie sales. It hopes to measure the impact of illegal file-sharing on the movie industry from analyzing data on BitTorrent downloads, box office sales, and DVD rentals.

2. Introduction

MPEG-1 Audio Layer 3, or more commonly known as MP3 is a compression technology that can reduce 700 megabytes worth of music found on a compact disc by a factor of ten without much perceivable loss in the quality of the music. The MP3 format became popular in 1995 and sparked a trend of listening to music on the computer. When Napster was introduced in 1999, it became the first widely-used peer-to-peer file sharing service. Even though most people only had slow dial-up connections to the internet at that time, the small file sizes of MP3 files enabled them to share and trade music files over the internet.

At this time, movies were being distributed on Video CDs. A full length movie would require two discs meaning that the movie file was roughly 1.4 gigabytes in size. DVDs were also starting to become popular at the turn of the century because they offered better quality movies compared to Video CDs. However, a DVD movie file weighs in at 4.7 gigabytes in size.

Video compression formats such a DivX, XviD and recently H.264 can compress an entire DVD into a 700 megabyte movie file. Below that threshold, the picture quality is no-

ticeably degraded. At that size however, even computer users with fast cable or DSL internet connections struggled to upload and download these movie files over file sharing networks. The third section on BitTorrent illustrates how the new file-sharing protocol dramatically reduced movie downloading wait times and sparked a new revolution in movie file-sharing.

While MP3s have enabled people to store, share and download their music collection onto portable players, computer users are only just becoming accustomed to watching movies on their computers. Most people would rather watch a movie on their home theatre system instead of their small computer screen. This is because these systems have advanced to a point where they can deliver cinema-like movie experiences to the living room. Moreover, the prices of video projectors, large screen displays, high-definition sound systems have over the recent years become within reach of the mainstream consumer.

However, there has been a divide between the home theatre and the personal computer industry. Even though these products share similar technology, there have matured alongside each other and while personal computers have acquired more media-centric features, they have continued to remain on the workdesk instead of the living room. However, 2005 saw a new trend in ‘home theater PCs’ or HTPCs which bridge the gap between these two industries. These HTPCs are designed to blend in with the other home theater equipment and can connect to LCD or plasma displays, cable-TV boxes and sound systems. These computers have been popular because they can serve as digital video recorders that allow users to record their television shows for a later date.

More importantly however, HTPCs make it convenient for people to play movie files that reside on their computers on their home theater systems.

This could spell trouble for the movie industry because the unpaid consumption of downloaded movies could displace paid consumption of these movies. More worryingly, we observe that the DVD market has overtaken and continues to eclipse the box office. This means that people rather watch movies in the comfort of their living rooms than on the silver screen. The most important shortcoming of DVDs is that moviegoers have to wait three long months between the box office opening and the DVD release. It is an evenly split decision for a family of four when deciding between splurging $40 on movie tickets (popcorn not included) versus purchasing or renting the DVD three months later. Now, BitTorrent shortens the wait to a matter of a few days before a high quality version of the movie becomes available on the internet. Sometimes, the movie is leaked onto the internet a few days *before* the box office release.

BitTorrent therefore becomes a very attractive alternative to the cinema. Aside from being free, BitTorrent is the only way a person can watch a new movie that is still showing in the movie theaters on his home theater system. Even though the person is willing to pay, no legal alternatives to the box office exist because the movie studios only release their movies on DVDs, pay-per-view television or legal online movie download services after a three month window. This fact also makes it even more alluring to obtain the movie, and it can be way for people to show-off their home theater systems to friends with the hottest movie in town. The only downside these potential moviegoers face is that it is illegal to download these movies. Today however, the legal authorities are go-

ing after the torrent portal sites and not prosecuting the movie downloaders themselves. Lastly, downloading a movie still takes about 12-24 hours and might hinder the spontaneity of watching a movie. Nevertheless, it can be strongly argued that downloaded movie files have become very good substitutes for the silver screen.

In studying this window between the box office opening and the DVD launch, we also have to consider the availability of bootleg DVDs in other countries. Although not a major problem in the United States, the thriving bootleg market represents another attractive alternative to the moviegoer in these countries. These 'fortunate' people can either buy a movie ticket, download the movie, or buy a bootleg copy off the street. These DVDs are a convenient way of obtaining a current movie without the hassle of downloading it or the risk of getting caught. These bootleg DVDs are also very affordable. For example, a high quality bootleg can be purchased for $3 in the author's home country, Malaysia. Thus, these bootleg DVDs which have enjoyed strong sales even before the emergence of BitTorrent are still eclipsing the newcomer technology.

It should also be noted that bootleg copies of movies have been around since the VHS days and have successfully moved from platform to platform such as the Video CD and the DVD as these newer technologies became mainstream. Nevertheless, the process of acquiring these bootleg copies have remained the same throughout the years for the consumer. As such, consumers from these countries may also be slower to hop on onto the BitTorrent bandwagon than consumers from other countries which do not have bootleg copies. Because of this observation, I feel that it is safe to assume that the availability of bootleg copies around the world will not have a large impact on the study. Be-

cause global data for bootleg copies is not easily available, this study ignores the bootleg factor when analyzing the impact of illegal movie downloading on box office sales.

3. Previous Academic Research

This research was motivated by the scarcity of academic research on the file-sharing of movies. While the landscape is heavily dotted by studies on music downloading, as of April 2006 there has only been one study on movies by Rob and Waldfogel in January 2005. In this study, the authors surveyed 500 students from the University of Pennsylvania and found large and statistically significant evidence that unpaid consumption of movies sharply displaces paid consumption. Specifically, they found that the first unpaid consumption reduces paid consumption by about 1 unit, although the second unpaid consumption only had a 0.2 unit impact. However unpaid consumption only represented 5.2% of movie viewing, even though the sample consisted of technically adept college students that were equipped with fast internet connections.

This study also shows that the displacement effect for movies is much larger than the effect on music. In a previous study by the same authors, they found that unpaid consumption of music only displaces paid consumption by between 0.1 to 0.2 units. Rob and Waldfogel suggest that this sharper displacement is attributable to the difficulty of obtaining unpaid copies of movies. Because it takes a long time to download a movie from file-sharing networks, only highly motivated people who place high values on the

movies that they download would do so. These are the people who would have otherwise paid to see the movie because they value these movies so highly.

On the other hand, if movies were as quick to download as music, many more 'casual' downloaders would engage in this activity because it was easy to do so. These could be people who place low valuations on movies and would not have paid to watch the movie in the first place. Therefore, no displacement would occur among these people. This explains the disparity in displacement rates among movie and music downloaders.

Rob and Waldfogel also suggest that music and movies are inherently different because the consumption of movies requires a few hours of undivided attention while music consumption can occur in the background while the consumer does something else.

Because of this argument, conclusions that were drawn by previous studies on music file-sharing cannot be carried over to movie file-sharing. An in-depth study on the BitTorrent file sharing protocol has been conducted by Pouwelse, Garbacki, Epema and Sips (The BitTorrent protocol is explained in section 3). However, this study is done in the computer science field and focuses on the network capabilities of the BitTorrent system. Nevertheless, the authors have created a rich dataset called the Delft BitTorrent Dataset. This dataset was created by a supercomputer that tracked all BitTorrent activity on major BitTorrent servers from June 2003 to December 2004. The data gathering techniques that I used in this paper was inspired by this study.

A follow-up study on the geographical aspects of the BitTorrent file-sharing system was done by Iosup, Garbacki, Pouwelse and Epema. The Delft dataset contained network

addresses of every computer that was uploading or downloading information on the BitTorrent network. Different ranges of network addresses are allocated to different countries and internet service providers. Therefore, the authors were able tell which part of the world the BitTorrent activity was coming from.

They found that file-sharing activity on BitTorrent was highly localized and community specific. Certain categories of content and particular language versions of a file would be distributed only among users from the same region, even though any computer in the world had access to the same files. However, this study was done from a high-level perspective and does not examine file-sharing activity for different categories of files. A wide variety of content can be found on the BitTorrent network such as games, software, TV shows and electronic books, aside from music and movies.

Oberholzer and Strumpf, who previously studied the impact of music file-sharing on record sales, are currently analyzing the Delft dataset to study the effects of BitTorrent file-sharing on the movie industry.

4. BitTorrent

Computers communicate with other computers using a variety of standardized network protocols. For example, computers use the HyperText Transport Protocol (HTTP) to browse through websites on the World Wide Web and use the Post Office Protocol v. 3 (POP3) for email. BitTorrent is just another type of network protocol.

Network protocols are designed for specific uses, and the BitTorrent protocol is designed to quickly transfer large amounts of data between many computers at the same time. As a result, BitTorrent finally makes it feasible for people to share large movie files over the internet. Before BitTorrent, there was rampant music file sharing on networks such as Napster, KaZaa, Limewire and eDonkey. Movie piracy was not a major concern then because movie files are around 600 megabytes in size (150 times larger than music files) and would take many days to download. With the arrival of BitTorrent, movie file sharing has become a serious issue. In 2004, BitTorrent was responsible for 35% of internet traffic and 53% of peer-to-peer file sharing traffic.

Other network protocols are much slower than BitTorrent because they 'choke' when many users (called client computers) want to download from a particular computer (called the host computer). This is because the host computer has to divide its network connection capacity (called bandwidth) among all these clients that want to connect to it. Depending on the type of network, the host computer would either end up slicing its bandwidth so thinly across all these clients that everyone's download speed slows to a snail's pace, or limit the number of clients that can connect to it and block everyone else.

BitTorrent solves this problem by forcing each client to share whatever portion of the incomplete file that it has with the other clients on the network. In the case where there are two clients and one host, client A would be simultaneously downloading from the host as well as from client B. Hence, the download speeds will be nearly twice as fast. Moreover, BitTorrent becomes even faster as the number of clients increase. In BitTor-

rent terminology, the host is called a “seeder” and the clients are called “leechers”. Leechers can voluntarily become seeders if they chose to continue sharing the file after they have finished downloading the file. A group of seeders and leechers is known as a “swarm”.

In addition to increasing download speeds, BitTorrent also greatly improves on the problem of file availability that plagued other file-sharing networks. For instance, many users on the KaZaa and Napster network chose not to share their files after downloading them. As a result, the rare hosts that would share became inundated by downloaders. Because BitTorrent forces the leechers to upload while they are downloading, a particular file would be widely available as long as the file is being exchanged somewhere on the network.

This research obtains BitTorrent downloading data from Mininova.org, which is a website known as a torrent portal. Torrent portals organize .torrent files into categories such as movies, music, and software and also provide a search tool so that users can easily download these .torrent files. .torrent files are actually tiny files that contain information on the filename of a particular movie file, its size, and the address of a “tracker” server. It is important to note that these .torrent files only contain directions to the movie files, but are not the movie files themselves. Because of this, torrent portal websites such as Mininova.org do not have to host any illegal copies of the movies. As a result, law enforcement agencies have found it difficult to shut down these websites.

To download a movie, a user needs to install a software known as a “BitTorrent client”. BitTorrent clients use the information contained in the .torrent files to contact the tracker

server. These servers contain the network addresses of all the leechers and seeders that are currently downloading or uploading that particular movie file. Now, the user's computer can connect to these other leechers and seeders to obtain the movie. Every two minutes or so, the user's BitTorrent client will check in with the tracker server about the progress of the download. As a result, the tracker server always knows everything that is going on in the swarm. Lastly, these statistics such as the number of leechers and the number of seeders are given to the torrent portal websites, and are displayed next to the .torrent files. This is the data that we obtain for the study.

5. Description of Data

(A) Illegal movie downloading data is obtained from Mininova.org. The methodology and assumptions are detailed below :

1. Torrent statistics are continuously updated on Mininova.org. To simplify data collection, a snapshot of these statistics is taken at three hour intervals. Each snapshot contains approximately 6250 torrent files. The dataset ranges from December 18, 2005 to April 1, 2006. Any variability that happens in between these snapshots are not captured in the dataset.

2. Because Mininova.org does not give us the network addresses of the leechers, it is not possible to uniquely identify and track the downloading activity of particular leechers. As such, the actual number of complete movie downloads for a particular day can-

not be accurately measured. The next best alternative was to use # *leechers* as a proxy, but some potential measurement errors should be pointed out here.

As an example, if a leecher has a very fast internet connection and completes a movie download under three hours, this particular leecher would drop out of the next # *leechers* count in the dataset. If a new leecher joins the swarm, the # *leechers* count would remain the same. This movement is not captured in the dataset, and the dataset would understate the actual number of completed movie downloads. The opposite is true if a leecher takes multiple days to download a particular movie file. In this case, the dataset would be biased upwards.

To address this issue, I assumed that the average leecher takes 24 hours to download an entire movie file. This is a reasonable assumption because at a connection speed of 15 kilobtyes/sec, it takes 24 hours to download a 1.24 gigabyte movie. The average movie file size is 1.12 gigabytes. With this assumption, the upward and downward biases in the dataset would offset each other if the leechers with fast and slow download speeds were equally distributed on both sides of the 24 hour mark.

To improve on the estimate of the actual number of completed downloads per day, the average of # *leechers* was calculated across the 8 datapoints for each day. This is better than using only 1 datapoint per day because # *leechers* varies according to the time of day and no particular datapoint represents the actual number of downloads better than the other datapoints.

While it may seem that a leecher that begins downloading at 8.59PM will double count by appearing on the datapoints of day 1 and day 2, averaging takes care of the problem because he would only appear once on the 9PM datapoint of day 1 and on 7 datapoints of day 2 (assuming a 24 hour download time). Therefore, this leecher will only count as $1/8^{th}$ of a leecher on day 1 but count as $7/8^{th}$'s of a leecher on day 2.

The final step is to aggregate these daily averages into weeks because global box office data is only available at a weekly resolution.

3. The dataset ignores .torrent files that point to foreign language versions of Hollywood movies. For example, a Spanish version of "Brokeback Mountain" will appear as "Secreto en la Montana" on Mininova.org. This Spanish version will not count towards # *leechers* or # *seeders* in the dataset.

Along the same lines, the dataset also assumes that the .torrent files were not misspelled. Although not rampant, some .torrent files are misspelled on purpose to avoid detection by the MPAA. For example, "Brokeback Mountain" could be misspelled as "Brokebck Mounten" so that text string searches for the movie would not detect the file. However, a person looking at the screen would be able to discern the actual movie name.

These two assumptions are necessary because the script that downloads and reads the list of .torrents from Mininova.org does a text string search for a list of movies so that it can match these .torrents to the rest of the dataset. While it can detect a .torrent called

“[WWW FATALBITS WS].Brokeback.Mountain.DVDRip.XviD” it would not be able to find a match “Secreto en la Montana” or “Brokebck Mounten”.

4. There are also some bogus .torrent files out there and these torrents will add noise to the dataset. These .torrent files pretend to point to a particular movie, but the actual movie file that is downloaded would be a different movie, or worse, some virus or offensive material. Because the BitTorrent protocol does not download the movie file in a sequential order, it is also impossible to preview a part of the movie file to check for its authenticity before the complete file has been downloaded.

Nevertheless, this problem is not pervasive in the BitTorrent system because torrent portal websites such as Mininova.org also allow users to rate these torrents and provide feedback on them, and these ratings are displayed next to the link to the .torrent file. Movie studios have also been reported to flood these torrent portals with bogus files to foil movie downloaders.

5. The dataset only contains movies that have opened in the U.S. Box Office from December 18, 2005 onwards. These movies have a healthy presence in the international box office so meaningful comparisons can be made across countries. Foreign language translations of these movies in other countries count as the same movie in the dataset. However, the dataset does not include foreign films that are not shown in the U.S. box office because they are often country specific and comparisons cannot made be across countries.

6. The name of the .torrent files also contain information about the quality of the movie file. When a movie first opens in the box office, *CAMs* will start to appear online. These are made with a video camera that was smuggled into the cinema. If a cinema employee is involved in movie piracy, a *TELESYNC* can be made by connecting the smuggled video camera with the original audio source. A *TELECINE* has even better quality because the movie file is recorded with a computer that is directly connected to the original audio and video source inside the projection booth.

If movie pirates get their hands on preview copies of movies from the movie studios, *SCREENER*s will be posted on the torrent portals. Although these files have perfect audio and video quality, copyright warnings will be interspersed throughout the movie. Lastly there are DVD-RIPs, which are exact copies of the original DVDs and have the best quality.

In the dataset, CAMs, TELESYNCs and TELECINEs are grouped into a 'bad quality' category while SCREENERs and DVD-RIPs are grouped into a 'good quality' category.

7. Lastly, the dataset filters out any .torrent that has less than 5 seeders. .Torrent files with very few seeders have a high chance of 'death' because if these seeders who have the complete file drop out, there will not be any complete part of the movie left on the network.

(B) U.S. box office sales data is obtained from BoxOfficeMojo.com. This website provides daily box office sales data for the entire United States. I obtained data from December 18, 2005 to April 1, 2006 to match the range of the BitTorrent dataset.

On the other hand, international box office sales data for 27 countries is taken from ScreenDaily.com (please refer to Appendix ??? for the original sources that ScreenDaily.com uses). While the BitTorrent and U.S. box office data is at a daily resolution, this international data is only at a weekly resolution. This presents a severe limitation to the analysis because it reduces the number of observations by a factor of 7. Moreover, there are only 15 weeks in between December 18, 2005 to April 1, 2006. A recommendation for future research is to improve on this analysis by extending the observation period as well as comparing across legal and illegal consumption data at a daily resolution.

Measuring the displacement effect of illegal movie downloading on box office sales using the available data is not a trivial exercise. This is because there are other factors that have an impact on box office sales and movie downloading behavior and many of these factors are difficult to measure quantitatively. Furthermore, these factors also cannot be ignored in the regression because they vary across the cross-section of movies.

6. Testing the data

(A) This paper hopes to test the hypothesis that illegal movie downloading has a significant displacement effect on box office sales. This is a reasonable hypothesis because most people would not pay to watch a movie at the cinema if they have already seen

the downloaded version. To prove this hypothesis, we hope to observe a negative coefficient on the download factor.

Total Box Office Sales (for movie i) = Download factor + Other factors + Error Term

However, this equation is difficult to test because total box office sales also depends many other factors, not just the magnitude of downloading activity. For example, a major factor that affects box office performance is the popularity of the actors and actresses that star in a particular movie. Another influential factor could be the size of the movie's advertising campaign. 'Buzz' is also crucial to the success of a movie; the amount of attention a movie receives in the media can highly influence its movie ticket sales. Furthermore, a high grossing movie can turn out to be highly anticipated in the first place. A fitting example would be the next *Harry Potter* movie or the finale to the *Lord of the Rings* trilogy. Also, this summer's *Da Vinci Code* could very possibly top the charts because it is based off a bestselling novel.

Movies also compete with one another at the box office because most moviegoers only budget enough time and money to watch one or two movies during a particular weekend. Therefore, a particular movie's success is also determined by the proximity of other movie releases to its opening date. Some movies may also do better at the box office because of their genre. For example, an action movie that is full of special effects may draw moviegoers who want to experience the movie on a giant screen. Romantic movies may also draw crowds of couples to the theaters while family comedies and animated movies may garner a higher share of the DVD market.

In this equation, the magnitude of the independent variables for each movie will be different. To determine the coefficient for the download factor, we need to plug in all the numbers for the dependent and independent variables and perform a regression. However, while the dataset contains good data for box office sales and BitTorrent downloads, our progress is halted by the unavailability of data for the other factors.

(B) While examining the cross section of movies led us nowhere, we can attempt to look at the cross-section of countries instead. By analyzing each movie separately across the 28 countries in the dataset, we do not have to worry about all the 'other factors' in the section above because although we cannot measure them, they will all remain constant for the same movie. We can happily allow these factors to sit in the error term. This way, we also retain variability in the measures of box office sales and downloading activity.

For each movie,

Total Box Office Sales (for country i) = Download factor + Country factor + Error

However, we open a whole new can of worms by looking at the cross-section of countries. When testing for the impact of downloading activity of box office sales, we also have to account for country-specific factors that also impact a particular country's box office. For instance, population size and demography are determinants of box office sales. Ticket sales will also vary from country to country because of the availability of foreign language versions of a movie in the language of a particular country. Some

countries may also prefer movies of a particular genre because of its culture and traditions. Finally, there may even be no ticket sales in certain countries because the distribution rights of movie studios may vary across the 28 countries in the dataset.

Moreover, although the dataset contains box office data for 28 different countries, it only has one global measure of BitTorrent download data since I was unable to obtain the network addresses of the computers on the BitTorrent network. However, the Delft BitTorrent dataset that was mentioned in the introduction section contains country specific download data. If the country factors could be measured, we could use this country specific download data to proceed along this path.

(C) Now, we exploit the fact that movie studios typically stagger their movie releases around the world. The movie “Ice Age: The Meltdown” was first released on 3/1/2006 in Uruguay and was released in the United States on 3/31/2006. Over the subsequent three weeks, it will be released in another 36 countries. However, Japan will only be able to watch the movie on 7/29/06.

This staggered schedule allows us to identify each country according to their ‘lag’. This lag is measured in the dataset as the number of weeks that has elapsed since the United States box office release. Note that this lag is negative for countries that open before the United States. This lag can now serve as a proxy for the amount of downloading activity in each country. The section above explained that the dataset does not categorize downloading activity by country but instead gives a global aggregate.

In this section, we assume that the passage of time allows more downloading activity to take place. Furthermore, these movie files do not self-destruct after they have been watched. The leechers who have finished downloading and watching these movies can in turn become seeders and share them on the BitTorrent network. Moreover, these movie files can also be distributed in a variety of other ways and can move from one computer to a friend's computer via flash drives, external hard drives, CDs or DVDs. With the very low cost per megabyte or storage media today, it has also become nearly costless to store and duplicate these movie files. As a result, the global supply of a particular movie file will increase as time goes by.

As the global supply increases, it becomes easier to obtain an unpaid copy of the movie because there will be a large number of seeders so that it is also quicker to obtain the movie file. If BitTorrent movies can be easily and quickly downloaded, they will become more attractive to potential moviegoers and as a result be more likely to displace box office sales. Furthermore, a longer lag for a certain country also means that its population has also had more time and opportunity to have watched an unpaid version of the movie.

In part B, we showed that the 'country factors' are determinants of box office sales in a particular country. Furthermore, these country factors are also correlated with the downloading variable. Because of this, there will be omitted variable bias if the country factors are not included in the regression.

However, instrumental variable regression can be used to solve this problem. The lag variable is a suitable instrument because it fulfills the two conditions for instrument valid-

ity. (i) It is a relevant instrument because there is a non-zero correlation between the lag variable and the downloading variable. As explained above, a longer lag time allows more downloads to take place around the world as well as in a particular country. (ii) It is also an exogenous instrument because there should not be any correlation between the lag variable and the 'country factors' that sit in the error term. The lag for a particular movie is usually a strategic decision made by the movie studios and should not have anything to do with the country factors that influence box office sales. With the instrumental variable, we are able to isolate the part of the downloading variable that is uncorrelated with the country factors and therefore be able to measure its impact of box office sales.

Thus, the following section proceeds with a regression that uses box office sales in a particular country as the dependent variable, and lag as the instrument to estimate downloading activity as the independent variable.

6. Test Results

The instrumental variable regression shows that movie downloading has a negative effect (coefficient = -133) on box office sales when lag is used as an instrumental variable. This coefficient is highly statistically significant with a t-statistic of 8.00. However, the R-square is only 0.17 (from the two-stage regression).

To ensure that the regressions are meaningful, any movie that has less than 20 observations is dropped from the dataset. Furthermore, a movie is also left out of the dataset if there are less than 5 observations for that movie in a particular country. With these filters in place, we are only left with 18 movies to analyze.

7. Conclusion

Although this paper finds that illegal movie downloading does have a negative impact on box office sales, this test is only done over a small sample size of 18 movies. Therefore, these movies may not be representative of the general movie industry. Furthermore, while the dataset used contains excellent data for BitTorrent movie downloads and U.S. box office, international box office data can only be analyzed at a weekly resolution. This limitation is further hampered by the relatively short time frame of the dataset, which only contains 15 weeks of data.

Box Office Total by Movie and Country (in thousands)

Movie	ARGENTINA	AUSTRALIA	BELGIUM	CZECH	DENMARK	FINLAND	GERMANY	ICELAND	ITALY	JAPAN	MEXICO	NETHERLANDS	NORWAY	POLAND	ROMANIA	RUSSIA	SPAIN	SWEDEN	SWITZERLAND	TURKEY	UK	USA	Total
16 Blocks									443											174		35652	36270
A Good Woman							180															239	419
ATL																						12654	12654
Annapolis																						16613	16613
Aquamarine																						18052	18052
Ask the Dust																						643	643
Basic Instinct		253					886		1367													3740	6245
Big Momma's Hou	45	3125	1467		288			94			4778	1702				1096	5452			127	10263	69264	97702
BloodRayne																864						1550	2414
Casanova		1040	99	32	119	24	1969	26	2076		479	724	151	44	63	698	1975	948	390		1276	10251	22383
Cheaper by the	119	3630					344	51			4056				26	491	3725				5456	79595	97493
Curious George																						57593	57593
Date Movie		3370			128	24					473	415				160	2594	278			6438	47904	61784
Dave Chappelle'																						9400	9400
Deep Sea 3-D (I																						4610	4610
Don't Tell																						29	29
Doogal																	469					7410	7879
Duck Season	2																					115	117
Eight Below							340		503	549												79354	80746
End of the Spea																						10629	10629
Failure to Laun			95		79		2281		686		1040		83			728			345			74021	79359
Final Destinati	423		239					41	541		359			151		1032	1442		39		9928	52208	66402
Find Me Guilty									273													844	1117
Firewall	159	1819					472				1870						1348					48084	53751
Freedomland																		17				12513	12530
Fun with Dick a	428	4228	1115	62	817	188	5827	158	4537		4594	1338	661	258	98	2651	3521	1554	1167	502	8808	110593	153106
Glory Road																						41702	41702
Grandma's Boy																241						6005	6246
Hostel	120	1259	420	175				101	2195		509	460		301		846	1011	144		731	2117	47619	58009
Ice Age: The Me			1433															1440				75648	78521
Imagine Me and																						669	669
Inside Man		1347					1554				812	414		224				190	310		3145	54716	62711
Larry the Cable																						11828	11828
Last Holiday							269				185										1558	38980	40993
Manderlay																						20	20
Match Point	513	1629	93			47	4004	10	7985			591	311		5	78	1466	389	933	294	2748	20353	41449
Munich	362	2870	1239	187	739	96	5205	68	4014	3603	1783	1395	433	592	55	455	5569	363	945	912	5440	47695	84020
Nanny McPhee	191	3859	1456		398	65	4310	51				1224	435	402	17	405		232	462	466	157	46518	60650
Neil Young: Hea																						1429	1429
Night Watch (No																						1456	1456
Rumor Has It	301	4097	706	30	344		4393	58	2105		1024	953	178	62	37	546	2088	246	758	581	2809	42021	63337
Running Scared															8						662	5913	6583
She's the Man																						27131	27131
Slither																						4464	4464
Something New																						10617	10617
Stay Alive																						17799	17799
Thank You for S																						3601	3601
The Hills Have					84		848											13			3692	39325	43961
The Matador	62		44					24								297					901	11658	12985
The New World			353		87	24	316	18	2380			96	181				1718	26	172	578	210	7923	14082
The Pink Panthe	256	1900	692	158	301	296	3740	90	683		3463	664	271	627	82	2578	6785	379	870	265	5525	81757	111384
The Ringer																					976	34024	35000
The Second Chan																						432	432
The Shaggy Dog		788									2310			196								54014	57308
Tristan and Iso																						11784	11784
Tyler Perry's M																						62869	62869
Ultraviolet																						18501	18501
Underworld: Evo		2839		95	124		3329	45	1468		1178		79	291		1485	3768				3689	62933	81322
V for Vendetta		1187	218		186	110	1358	42	1280		1342		210					408	255		3147	57789	67531
When a Stranger		1112																				47753	48865
Wolf Creek		109			37								16									15935	16097
Total	2982	40461	9670	739	3731	874	41625	877	32537	4152	30255	9977	3010	3146	391	14650	42931	6627	6647	4632	78943	1776440	2115298

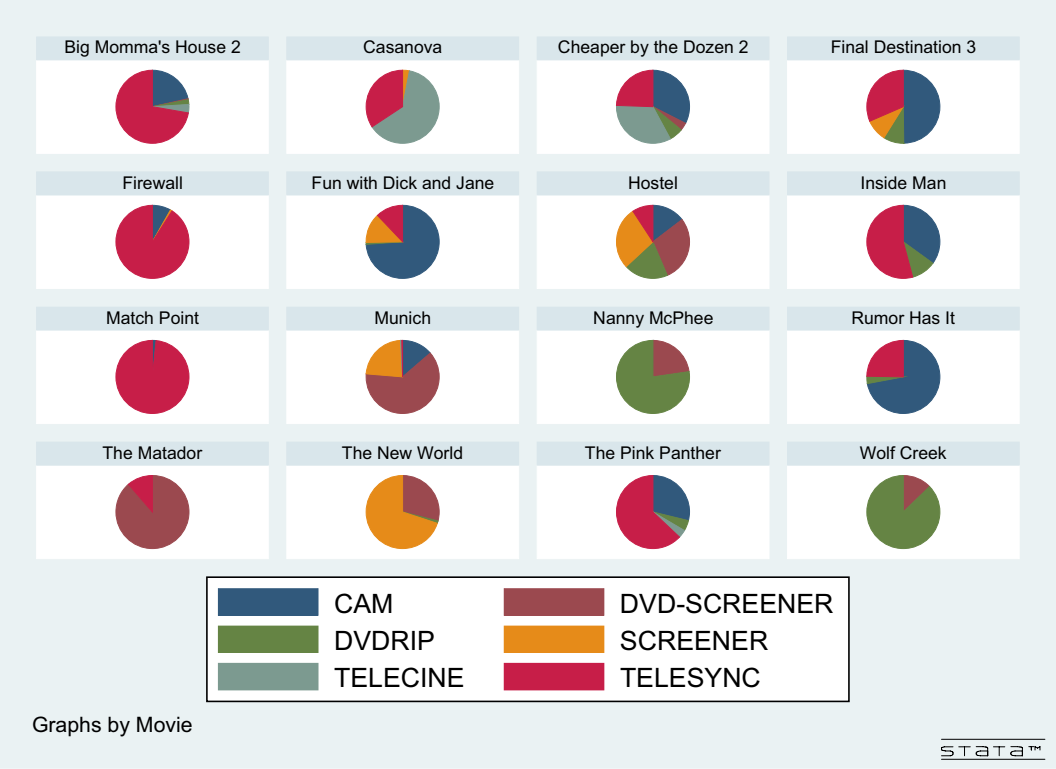
Movie Popularity (Legal and Illegal)

Movie	LegalRank	IllegalRank	BoxOffice	Downloads
Fun with Dick and Jane	1	8	153687232	247852
The Pink Panther	2	10	111623898	148572
Big Momma's House 2	3	12	98011427	140638
Cheaper by the Dozen 2	4	13	97943209	132161
Munich	5	1	87219424	616024
Underworld: Evolution	6	3	83642327	467327
Eight Below	7	27	80746405	51120
Failure to Launch	8	4	79358875	407089
Ice Age: The Meltdown	9	48	78521455	1
V for Vendetta	10	20	69203638	90830
Final Destination 3	11	6	66402294	307512
Rumor Has It	12	26	63633720	52659
Tyler Perry's Madea's Family Reunion	13	61	62868632	0
Inside Man	14	25	62710861	64247
Date Movie	15	5	62200605	396218
Nanny McPhee	16	22	61810858	77683
Hostel	17	7	58342144	274294
Curious George	18	41	57593280	11561
The Shaggy Dog	19	36	57308129	19882
Firewall	20	9	54332964	178727
When a Stranger Calls	21	33	48865434	24488
The Hills Have Eyes	22	17	43961389	104944
Glory Road	23	40	41701881	11980
Match Point	24	23	41448642	69828
Last Holiday	25	31	40992581	29462
16 Blocks	26	29	36269516	47162
The Ringer	27	24	34999968	64904
She's the Man	28	42	27130782	11025
Casanova	29	15	22559982	109856
Ultraviolet	30	18	18500966	93451
Aquamarine	31	30	18051660	35847
Stay Alive	32	46	17798532	3330
Annapolis	33	34	16613087	20976
Wolf Creek	34	19	16166448	90923
The New World	35	11	14081941	148397
The Matador	36	28	12985357	48686
ATL	37	49	12653816	0
Freedomland	38	35	12529508	20100
Larry the Cable Guy: Health Inspector	39	56	11828128	0
Tristan and Isolde	40	14	11784366	110172
End of the Spear	41	54	10629000	0
Something New	42	43	10617374	8400
Dave Chappelle's Block Party	43	39	9400000	13970
Doogal	44	44	7878836	4589
Running Scared	45	2	6583211	510178
Grandma's Boy	46	38	6246242	17323
Basic Instinct 2	47	37	6245048	19549
Deep Sea 3-D (IMAX)	48	51	4610069	0
Slither	49	58	4464490	0
Thank You for Smoking	50	59	3601133	0
BloodRayne	51	16	2413912	107677
Night Watch (Nochnoi Dozor)	52	21	1470699	83679
Neil Young: Heart of Gold	53	57	1428563	0
Find Me Guilty	54	47	1117258	85
Imagine Me and You	55	55	669130	0
Ask the Dust	56	50	643312	0
The Second Chance	57	60	432253	0
A Good Woman	58	45	418851	3474
Duck Season	59	53	116604	0
Don't Tell	60	52	29015	0
Manderlay	61	32	20296	26376

 # Observations by Movie and Quality

(Higher number denotes better quality)

Movie	Q0	Q1	Q2	Q3	Q4	Q5	Total Observations
Rent	704	706	705	706	705	706	4232
King Kong	646	703	640	643	386	703	3721
Harry Potter and the Goblet of Fire	594	703	691	357	494	640	3479
The Chronicles of Narnia	278	701	686	561	574	605	3405
Walk the Line	693	492	634	347	408	384	2958
Elizabethtown	0	691	686	689	0	461	2527
Jarhead	66	548	0	575	510	428	2127
Aeon Flux	696	700	704	22	0	0	2122
Chicken Little	0	699	700	0	296	319	2014
Wallace and Gromit	0	690	0	691	0	468	1849
Cheaper by the Dozen 2	633	501	451	0	136	89	1810
Saw II	0	686	0	0	693	427	1806
Final Destination 3	338	507	0	239	0	691	1775
Derailed	617	126	0	682	169	176	1770
Underworld: Evolution	464	460	172	400	106	117	1719
Fun with Dick and Jane	662	652	0	214	0	186	1714
Hostel	553	509	0	318	205	111	1696
Munich	615	73	170	420	411	0	1689
Kiss Kiss, Bang Bang	376	0	0	656	415	174	1621
Syriana	594	0	0	243	610	170	1617
BloodRayne	445	488	223	166	153	0	1475
The Family Stone	0	0	698	335	319	70	1422
Tim Burton's Corpse Bride	0	83	0	0	697	601	1381
Big Momma's House 2	405	402	247	0	113	196	1363
Wolf Creek	0	0	0	0	620	662	1282
Shopgirl	0	0	0	0	623	621	1244
The Pink Panther	328	315	55	0	0	542	1240
In Her Shoes	0	0	699	14	0	485	1198
Get Rich or Die Tryin'	112	177	0	561	137	175	1162
Capote	0	0	0	508	472	174	1154
Night Watch (Nochnoi Dozor)	0	150	243	0	53	701	1147
Pride and Prejudice	91	0	0	0	605	434	1130
Good Night, and Good Luck.	0	0	0	0	568	530	1098
North Country	0	0	0	0	705	366	1071
Just Friends	0	399	0	332	0	259	990
Tristan and Isolde	352	456	0	0	0	140	948
Hoodwinked	506	421	0	0	18	0	945
The Weather Man	0	0	0	555	0	379	934
Date Movie	288	266	116	124	0	134	928
The Ringer	338	0	0	0	560	0	898
Memoirs of a Geisha	5	0	0	0	640	244	889
Mrs. Henderson Presents	12	0	0	55	666	139	872
The New World	0	0	0	454	243	167	864
The Matador	0	163	0	0	641	0	804
Casanova	0	330	359	102	0	0	791
Annapolis	414	349	0	0	0	0	763
Manderlay	0	0	0	113	0	649	762
Rumor Has It	476	232	0	0	0	49	757
In the Mix	345	0	0	0	389	10	744
Yours, Mine and Ours	63	0	0	329	0	340	732
Brokeback Mountain	0	0	0	81	474	173	728
Firewall	321	318	0	68	0	0	707
Glory Road	519	188	0	0	0	0	707
Match Point	76	618	0	0	0	0	694
When a Stranger Calls	375	296	0	0	0	0	671
Grandma's Boy	444	225	0	0	0	0	669
Nanny McPhee	43	0	0	0	274	346	663
Last Holiday	502	88	0	0	0	0	590
Inside Man	80	77	0	0	0	430	587
Eight Below	302	269	0	0	0	0	571
Running Scared	360	206	0	0	0	0	566
Paradise Now	132	0	0	0	0	433	565
A Good Woman	0	0	0	0	0	515	515
The Hills Have Eyes	170	155	0	0	0	169	494
Curious George	332	151	0	0	0	0	483
The Producers	478	0	0	0	0	0	478
The Three Burials of Melquiades Estrada	294	0	0	0	0	159	453
Freedomland	289	110	0	0	0	0	399
Transamerica	0	0	0	172	226	0	398
Tsotsi	0	94	0	70	204	0	368
Something New	362	0	0	0	0	0	362
16 Blocks	173	175	0	0	0	0	348
Ultraviolet	174	173	0	0	0	0	347
Doogal	51	0	0	152	0	129	332
The Shaggy Dog	165	118	0	0	0	0	283
The World's Fastest Indian	0	0	0	0	192	88	280
Aquamarine	169	110	0	0	0	0	279
Basic Instinct 2	0	17	0	0	0	239	256
Bee Season	0	0	0	0	0	239	239
V for Vendetta	130	60	0	0	0	39	229
First Descent	0	0	0	0	0	223	223
Failure to Launch	0	151	45	0	0	0	196
Dave Chappelle's Block Party	167	0	0	0	0	0	167
Stay Alive	63	0	0	0	0	0	63
Find Me Guilty	53	0	0	0	0	0	53
She's the Man	51	0	0	0	0	0	51
Dreamer: Inspired by a True Story	0	0	0	0	0	46	46
Ice Age: The Meltdown	7	1	7	0	0	0	15
Total	18991	17978	8931	11954	15710	18150	91714



Graphs by Movie

stata™

Number of observations in regression sample by movie and country

Movie	Country	Observations	Country Observations
Big Momma's House 2	Australia	65	6
Big Momma's House 2	Belgium	65	5
Big Momma's House 2	Denmark	65	6
Big Momma's House 2	Mexico	65	7
Big Momma's House 2	Netherlands	65	6
Big Momma's House 2	Spain	65	5
Big Momma's House 2	UK	65	7
Big Momma's House 2	United States	65	11
Casanova	Netherlands	79	6
Casanova	Romania	79	5
Casanova	Sweden	79	8
Casanova	Switzerland	79	5
Casanova	United States	79	15
Cheaper by the Dozen 2	Australia	67	6
Cheaper by the Dozen 2	Iceland	67	7
Cheaper by the Dozen 2	Mexico	67	6
Cheaper by the Dozen 2	NewZealand	67	6
Cheaper by the Dozen 2	Romania	67	6
Cheaper by the Dozen 2	Spain	67	6
Cheaper by the Dozen 2	UK	67	8
Cheaper by the Dozen 2	United States	67	16
Date Movie	Australia	33	5
Date Movie	UK	33	5
Date Movie	United States	33	8
Final Destination 3	UK	38	7
Final Destination 3	United States	38	16
Firewall	United States	23	9
Fun with Dick and Jane	Argentina	127	6
Fun with Dick and Jane	Australia	127	5
Fun with Dick and Jane	Belgium	127	5
Fun with Dick and Jane	Denmark	127	7
Fun with Dick and Jane	Germany	127	5
Fun with Dick and Jane	Iceland	127	6
Fun with Dick and Jane	Italy	127	5
Fun with Dick and Jane	Mexico	127	5
Fun with Dick and Jane	Netherlands	127	7
Fun with Dick and Jane	NewZealand	127	5
Fun with Dick and Jane	Norway	127	8
Fun with Dick and Jane	Romania	127	6
Fun with Dick and Jane	Sweden	127	9
Fun with Dick and Jane	Switzerland	127	7
Fun with Dick and Jane	UK	127	6
Fun with Dick and Jane	United States	127	16
Hostel	Iceland	58	5
Hostel	United States	58	14
Inside Man	United States	20	12
Match Point	Australia	101	5
Match Point	Germany	101	7
Match Point	Italy	101	8
Match Point	Netherlands	101	9
Match Point	Norway	101	7
Match Point	Spain	101	8
Match Point	Sweden	101	9
Match Point	Switzerland	101	9
Match Point	United States	101	16
Munich	Argentina	142	7
Munich	Australia	142	5
Munich	Belgium	142	7
Munich	Czech	142	6
Munich	Denmark	142	8
Munich	Germany	142	5
Munich	Iceland	142	6
Munich	Italy	142	5
Munich	Netherlands	142	8
Munich	Norway	142	7
Munich	Romania	142	9
Munich	Spain	142	8
Munich	Sweden	142	5
Munich	Switzerland	142	5
Munich	UK	142	6
Munich	United States	142	16
Munich	japan	142	5
Nanny McPhee	Argentina	107	6
Nanny McPhee	Australia	107	7
Nanny McPhee	Belgium	107	6
Nanny McPhee	Denmark	107	9
Nanny McPhee	Germany	107	6
Nanny McPhee	Iceland	107	5
Nanny McPhee	Netherlands	107	7
Nanny McPhee	NewZealand	107	8
Nanny McPhee	Norway	107	6
Nanny McPhee	Sweden	107	5
Nanny McPhee	Switzerland	107	7
Nanny McPhee	United States	107	16
Rumor Has It	Argentina	107	6
Rumor Has It	Australia	107	6
Rumor Has It	Belgium	107	6
Rumor Has It	Denmark	107	6
Rumor Has It	Germany	107	5
Rumor Has It	Iceland	107	6
Rumor Has It	Italy	107	5
Rumor Has It	Netherlands	107	6
Rumor Has It	NewZealand	107	5
Rumor Has It	Norway	107	5
Rumor Has It	Romania	107	5
Rumor Has It	Switzerland	107	7
Rumor Has It	United States	107	15
The Matador	United States	24	15
The New World	United States	46	13
The Pink Panther	Argentina	83	5
The Pink Panther	Mexico	83	5
The Pink Panther	Spain	83	5
The Pink Panther	United States	83	14
Underworld: Evolution	Australia	57	5
Underworld: Evolution	United States	57	12
Wolf Creek	United States	24	16

Lag by Movie and Country

Movie	USA	Argentina	Australia	Belgium	Czech	Denmark	Finland	France	Germany	HongKong	Hungary	Iceland	Italy	Japan	Mexico	Netherlands	NewZealand	Norway	Poland	Romania	Russia	Serbia	SouthKorea	Spain	Sweden	Switzerland	Turkey	UK
16 Blocks	0												5														3	
A Good Woman	0								-1																			
ATL	0																											
Annapolis	0																											
Aquamarine	0																											
Ask the Dust	0																											
Basic Instinct 2	0		1						1				1															
Big Momma's House 2	0	2	1	5		3						8			1	4	4				3			1			5	3
BloodRayne	0																				7							
Casanova	0		7	14	12	10	11		7			8	8		9	4	10	7	13	9	6		11	8	5	13		8
Cheaper by the Dozen 2	0	5	1						10			4			2		3			9	6			1				2
Curious George	0																											
Date Movie	0		1			6	6								6	5	3				6			5	4			2
Dave Chappelle's Block Party	0																											
Deep Sea 3-D (IMAX)	0																											
Don't Tell	0																											
Doogal	0																							-1				
Duck Season	0	-2																										
Eight Below	0								6				7	5														
End of the Spear	0																											
Failure to Launch	0			3		2			2				4		2				2		1					2		
Final Destination 3	0	4		7								1	7		7					7	7			6		7		1
Find Me Guilty	0												1															
Firewall	0	5	4						8						4		4						2	7				
Freedomland	0																								5			
Fun with Dick and Jane	0	8	2	9	5	8	6		3			6	6		4	8	5	6	7	9	11			8	6	3	11	5
Glory Road	0																											
Grandma's Boy	0																				7							
Hostel	0	12	8	10	8							1	8		11	9	8		9		8			12	9		10	12
Ice Age: The Meltdown	0			1																					1			
Imagine Me and You	0																											
Inside Man	0		2						1						1	1			1						2	1		1
Larry the Cable Guy: Health Inspector	0																											
Last Holiday	0								9						9													8
Manderlay	0																											
Match Point	0	11	10	-6			4		1			10	3			4		7		13	1			-7	4	-8	8	2
Munich	0	6	6	6	7	6	8		6			6	6	7	6	6	6	7	6	6	9		8	6	8	6	6	6
Nanny McPhee	0	3	-1	4		1	8		2			5				3	6	4	4	7	9		2		5	3	5	-9
Neil Young: Heart of Gold	0																											
Night Watch (Nochnoi Dozor)	0																-1											
Rumor Has It	0	6	2	4	7	4			0			1	0		7	5	1	4	7	7	7			8	4	0	3	5
Running Scared	0																			4								-1
She's the Man	0																											
Slither	0																											
Something New	0																											
Stay Alive	0																											
Thank You for Smoking	0																											
The Hills Have Eyes	0					2			3																3			1
The Matador	0	12		6								12									9							10
The New World	0			11		9	9		10			11	3			13		9						9	10	8	9	5
The Pink Panther	0	3	5	4	5	4	5		5			4	7		1	4	6	5	3	4	6			3	4	5	7	6
The Ringer	0																											14
The Second Chance	0																											
The Shaggy Dog	0		1												2				2									
Tristan and Isolde	0																											
Tyler Perry's Madea's Family Reunion	0																											
Ultraviolet	0																											
Underworld: Evolution	0		1		7	8			7			5	4		7		9	8	1		4		6	3				1
V for Vendetta	0		3	3		2	2		1			2	1		1			2					1		1	1		1
When a Stranger Calls	0		7																									
Wolf Creek	0		-7			10											11	13										
Average Lag	0.0	5.8	2.8	5.4	7.3	5.4	6.6	N/A	4.3	N/A	N/A	5.6	4.4	6.0	4.7	5.5	5.4	6.2	5.5	7.6	6.3	N/A	5.0	4.6	4.7	3.4	6.7	4.0

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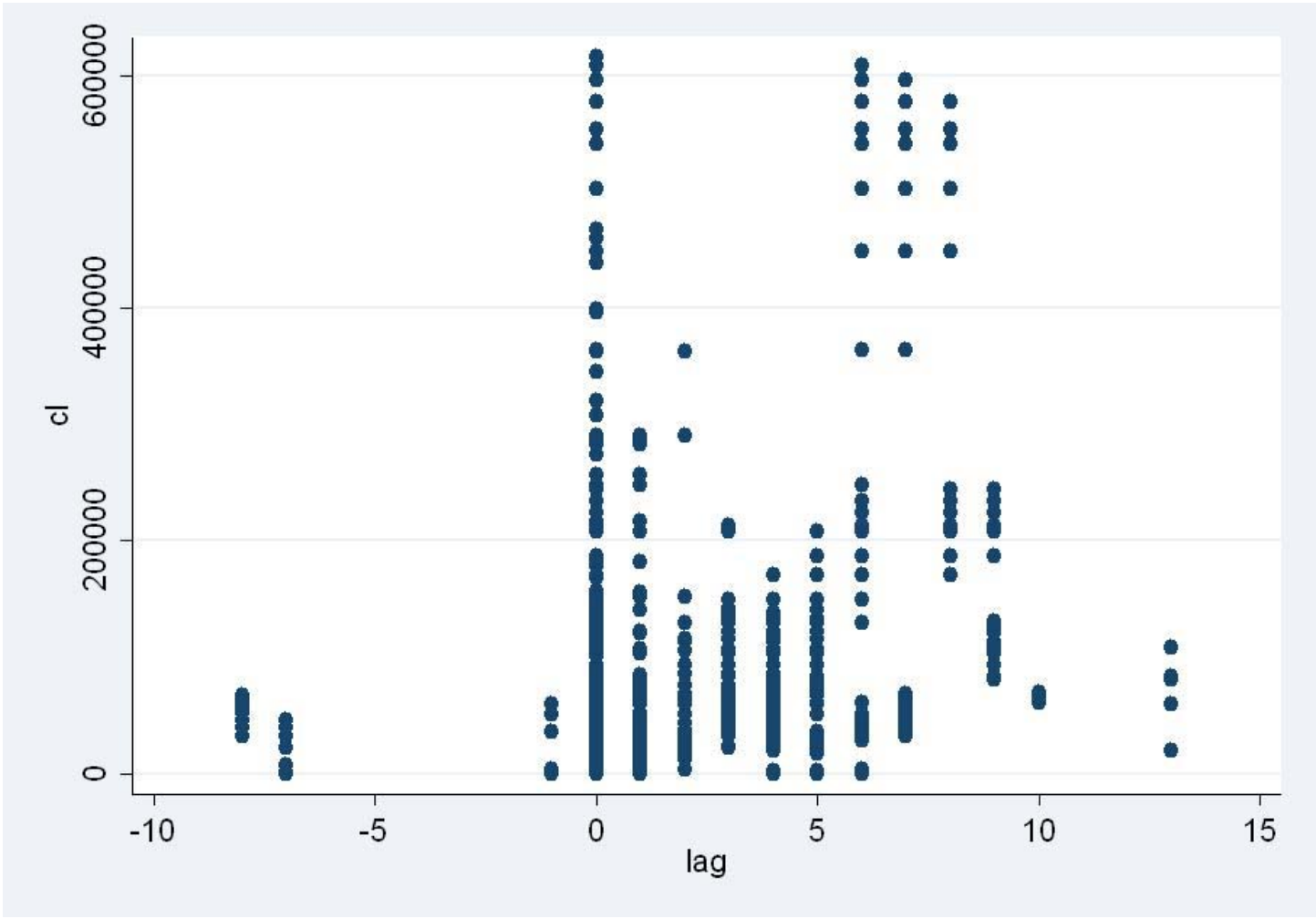
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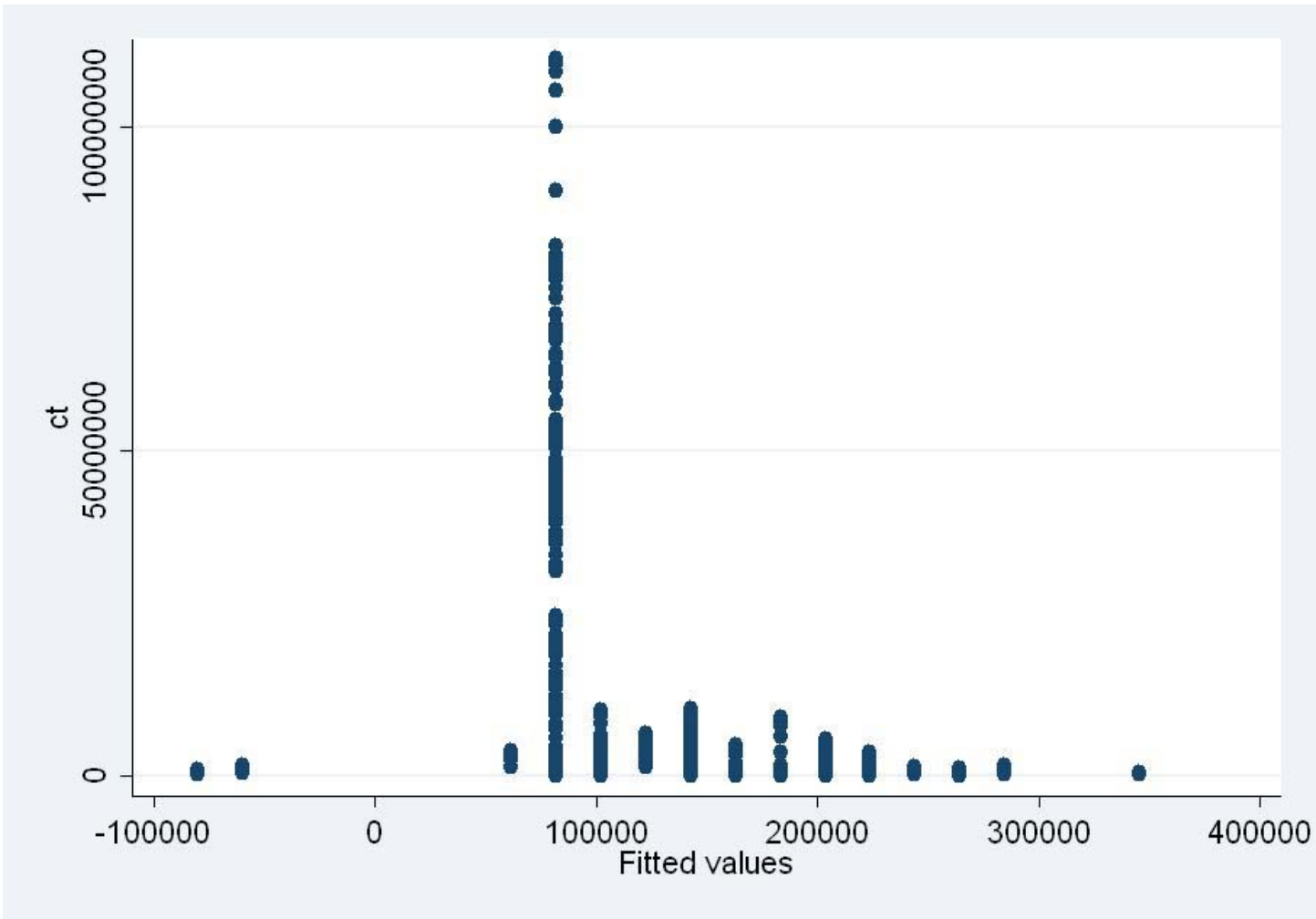
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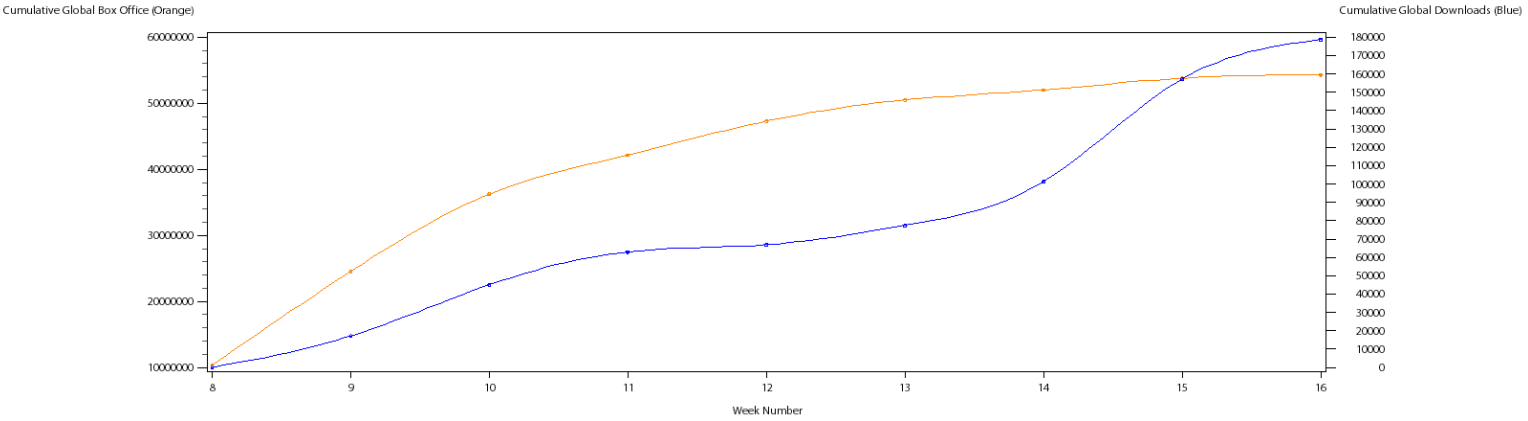

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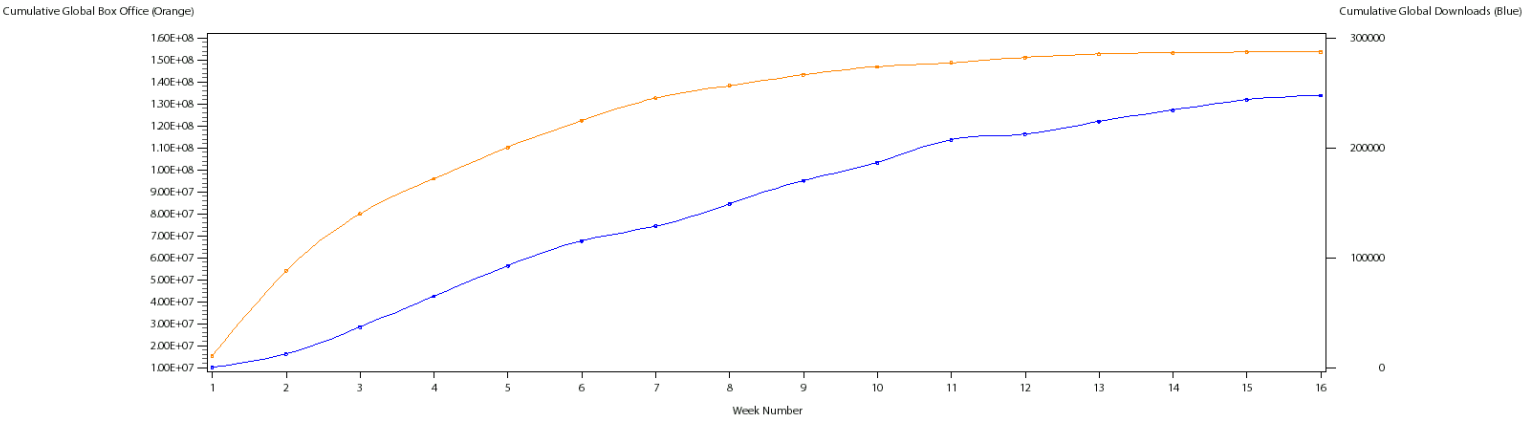

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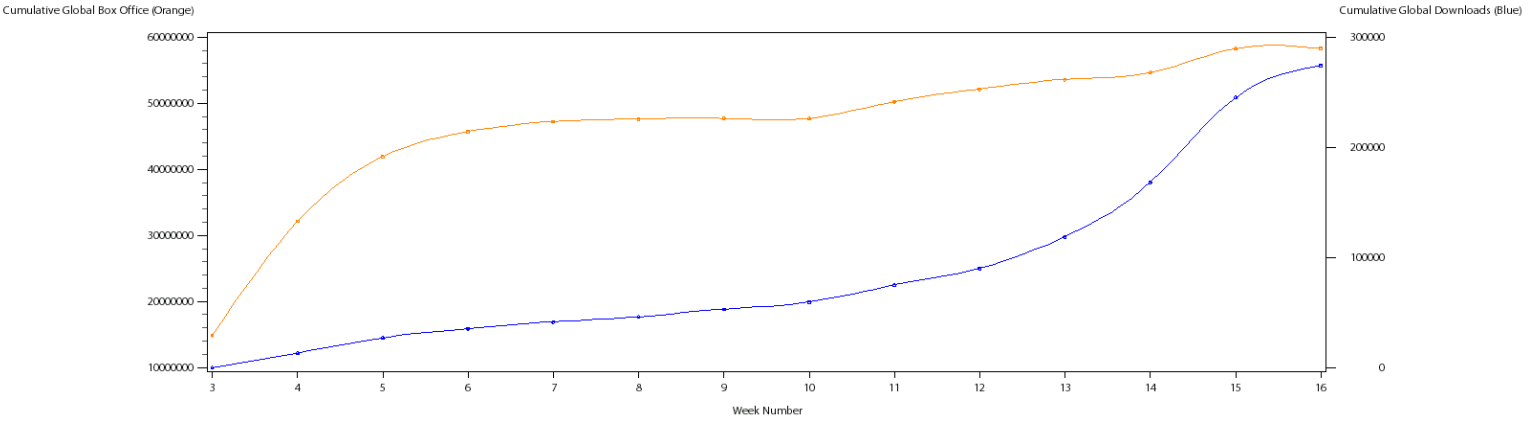

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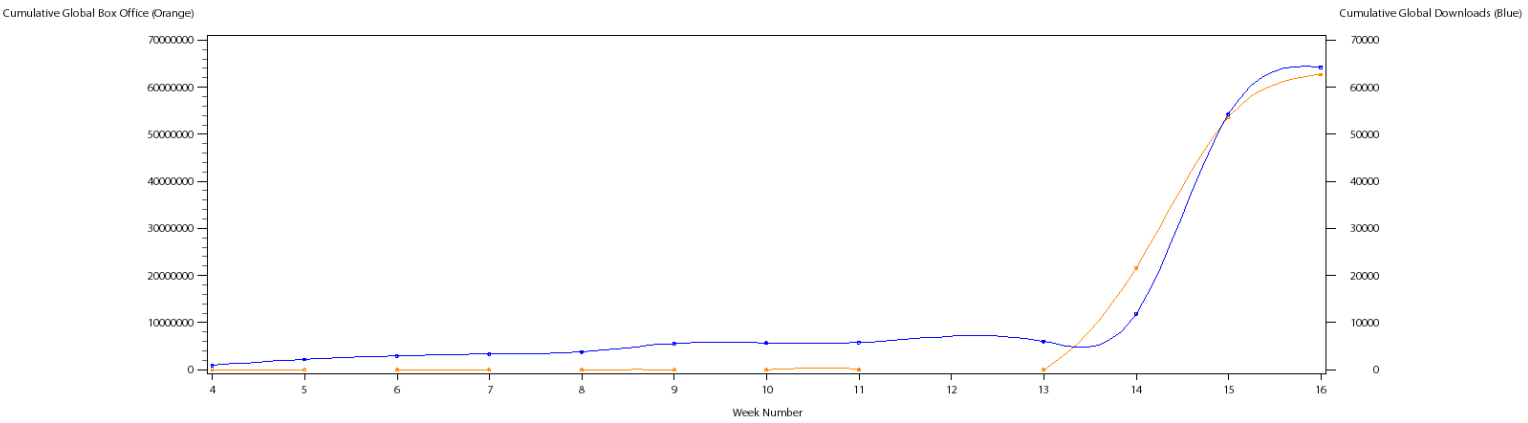

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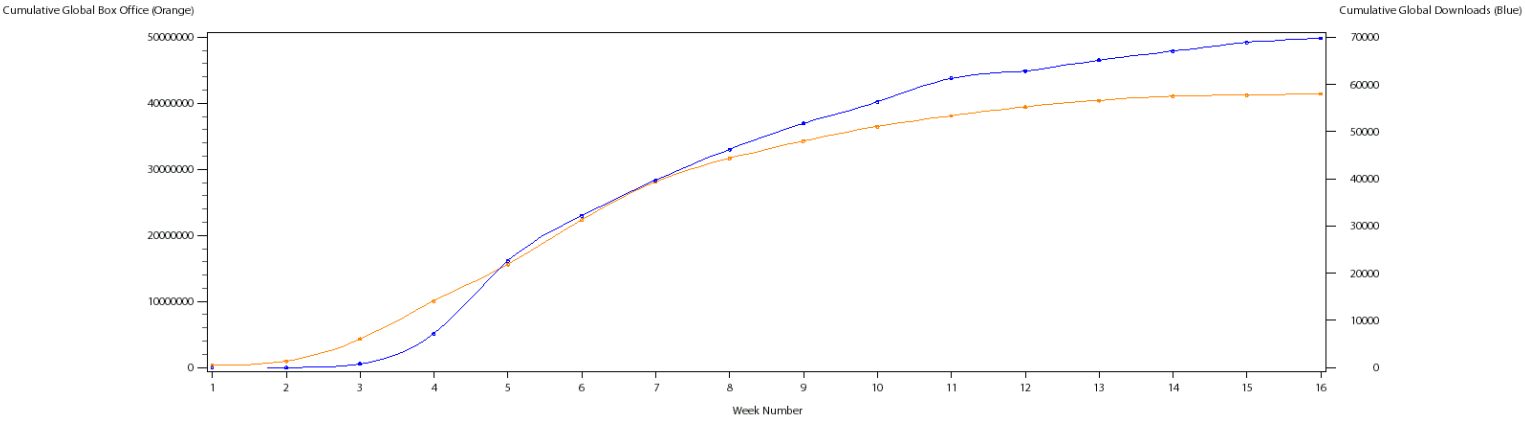

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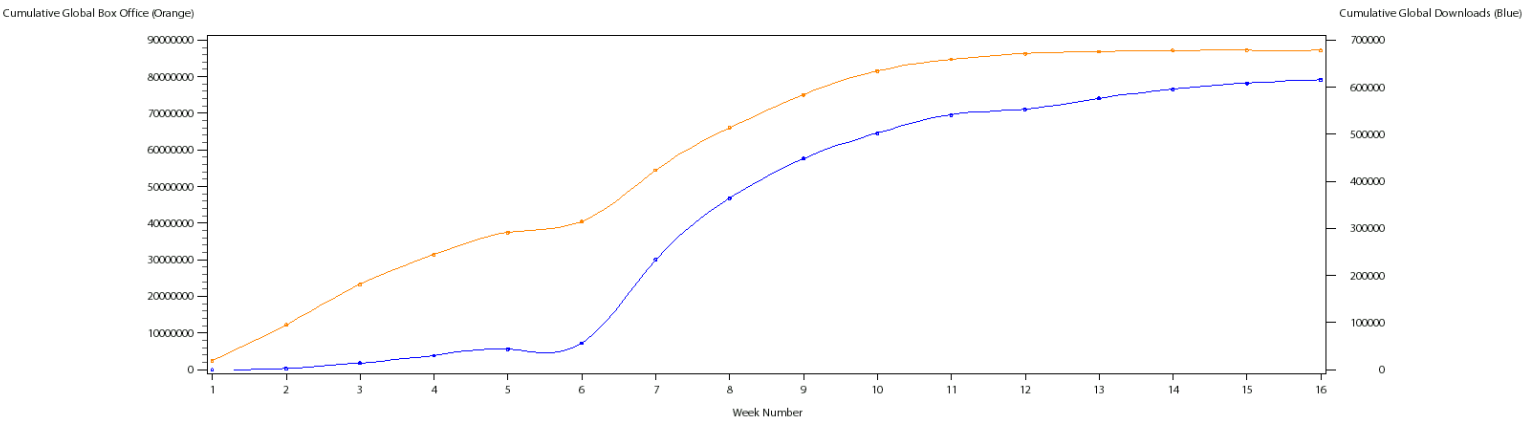

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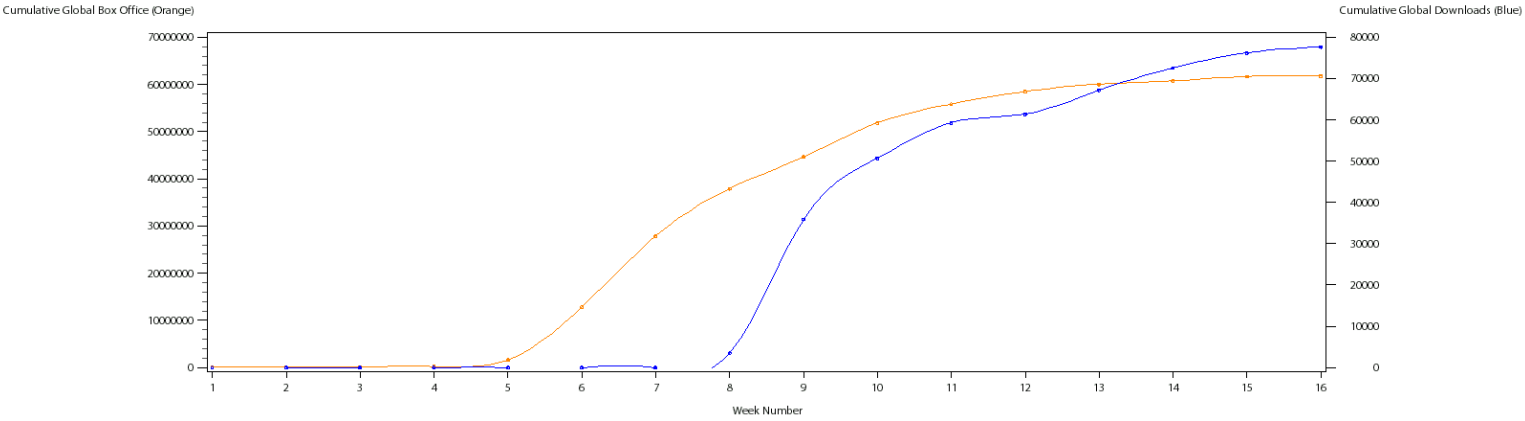

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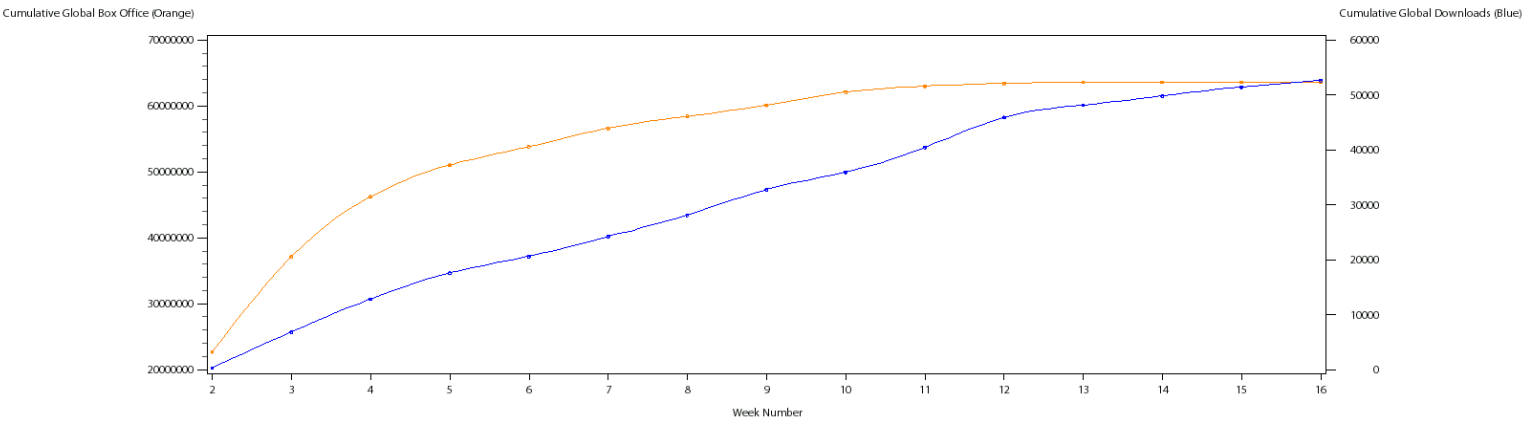

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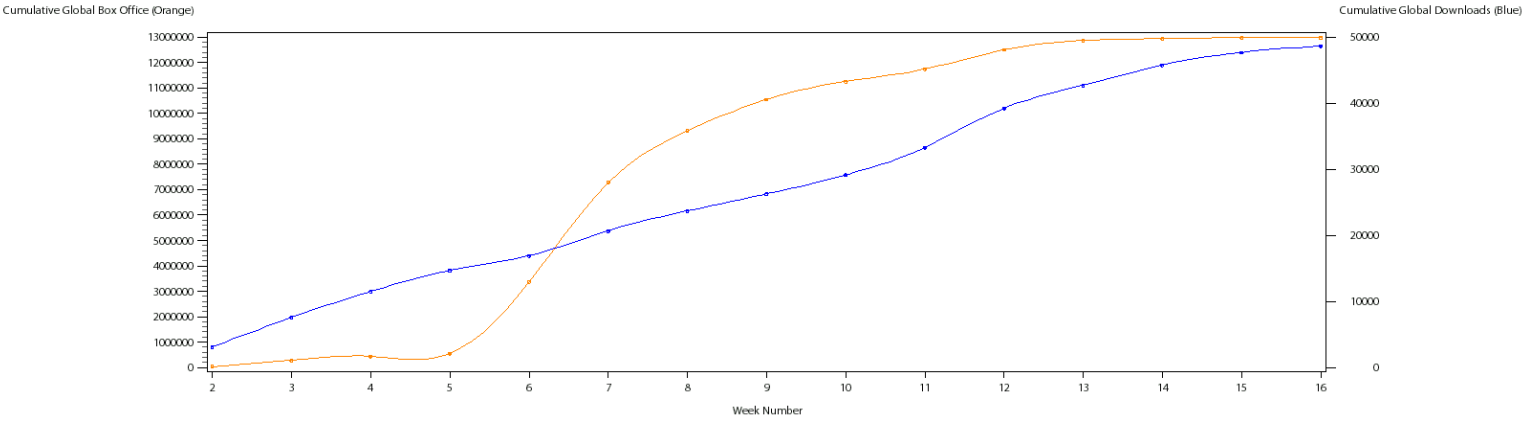

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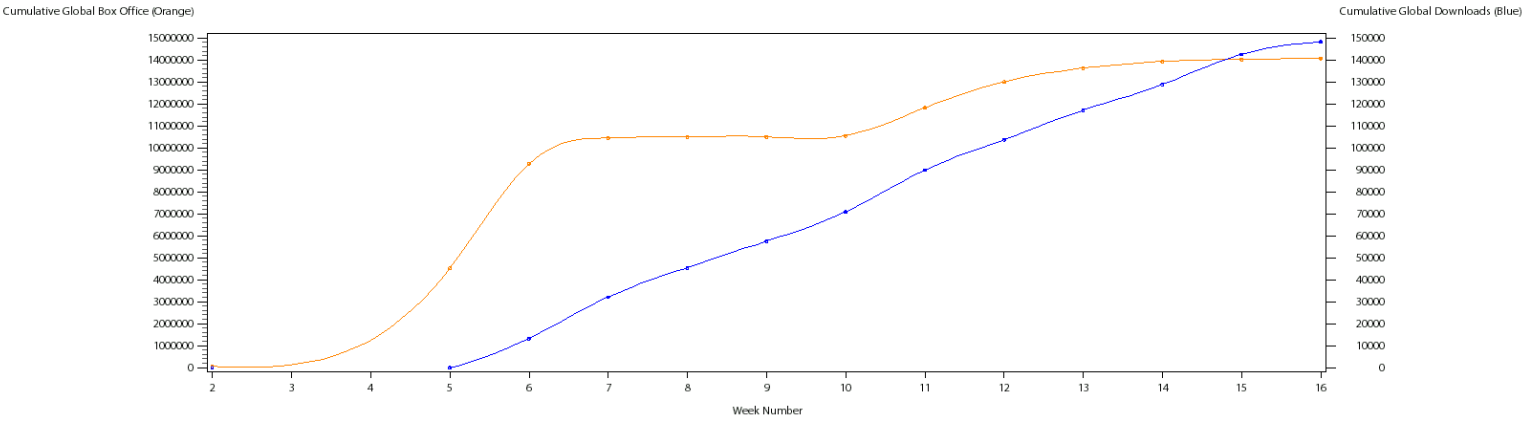
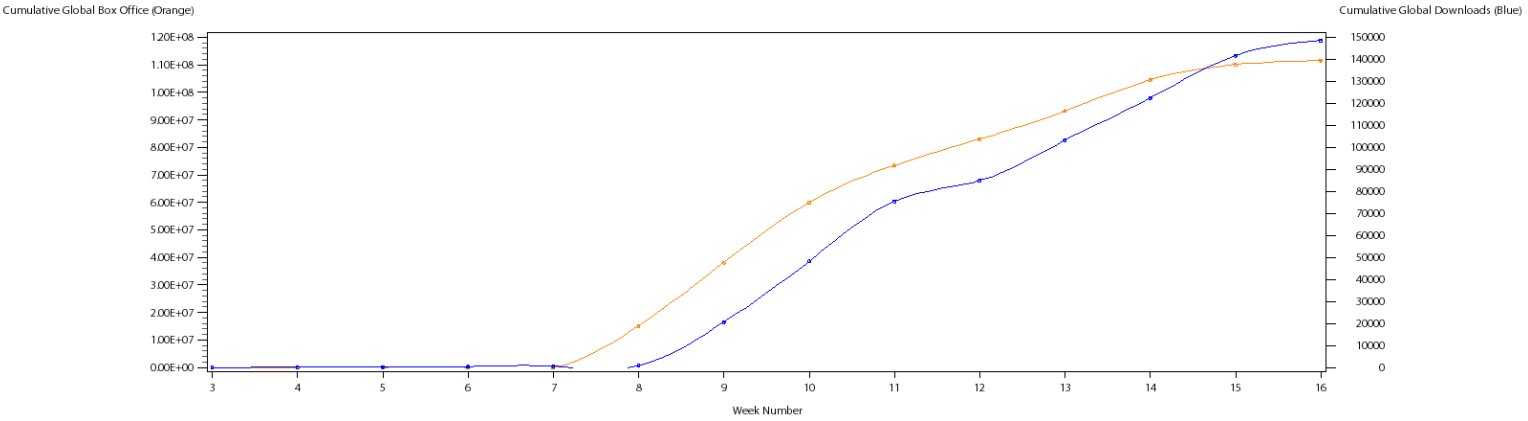
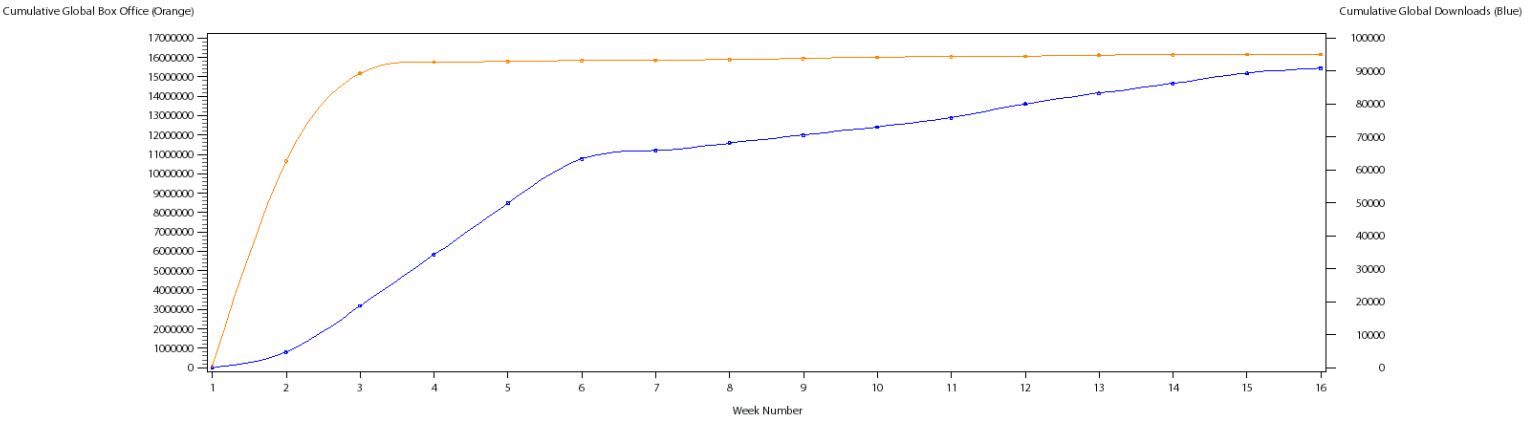


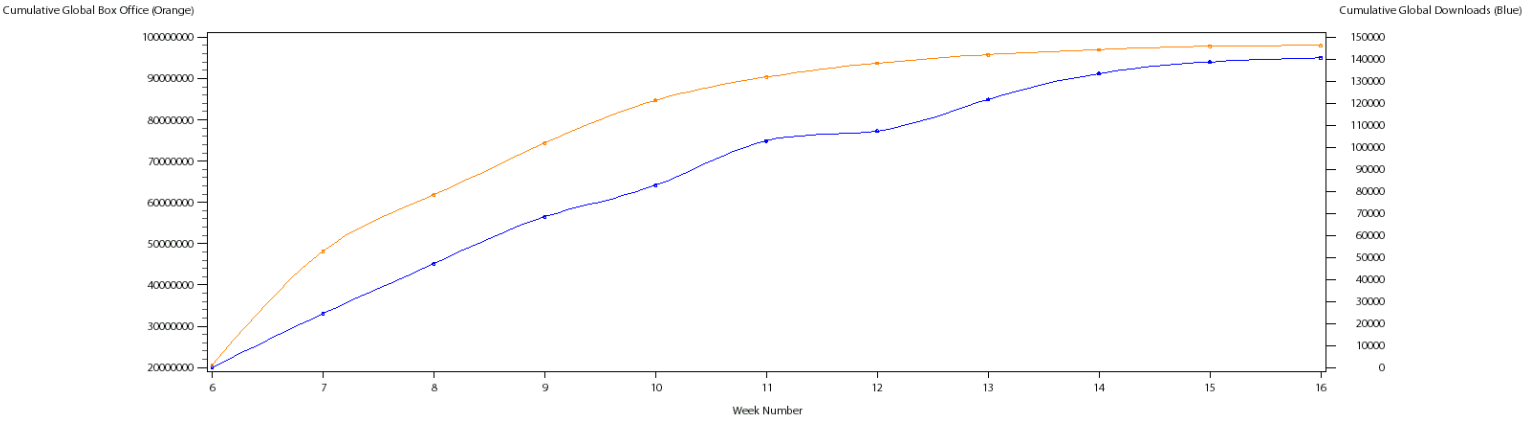
The Pink Panther



Wolf Creek



Big Momma's House 2



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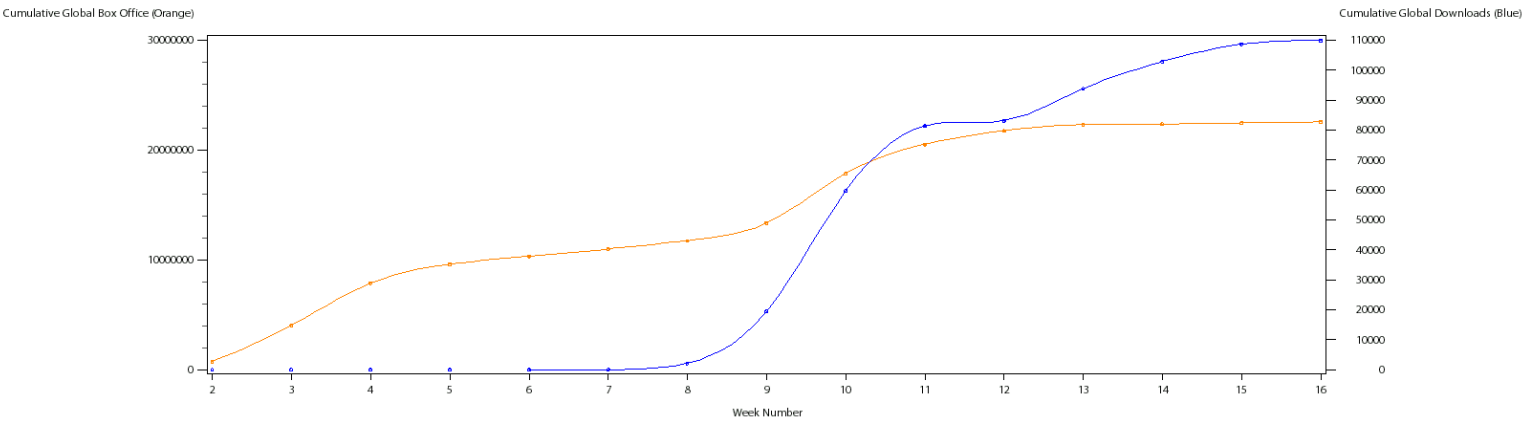
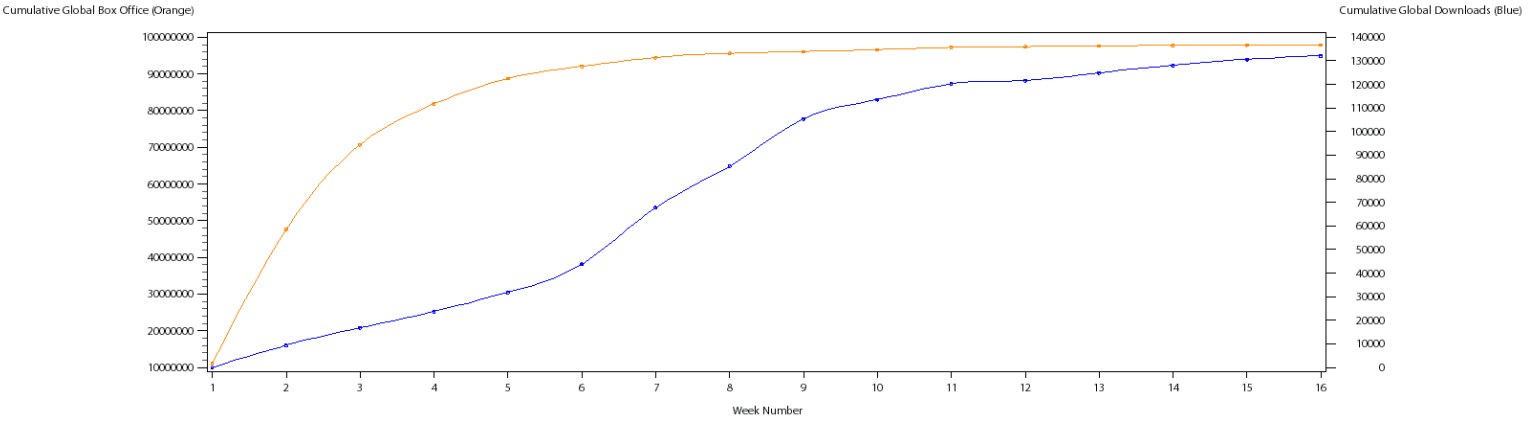


Cheaper by the Dozen 2



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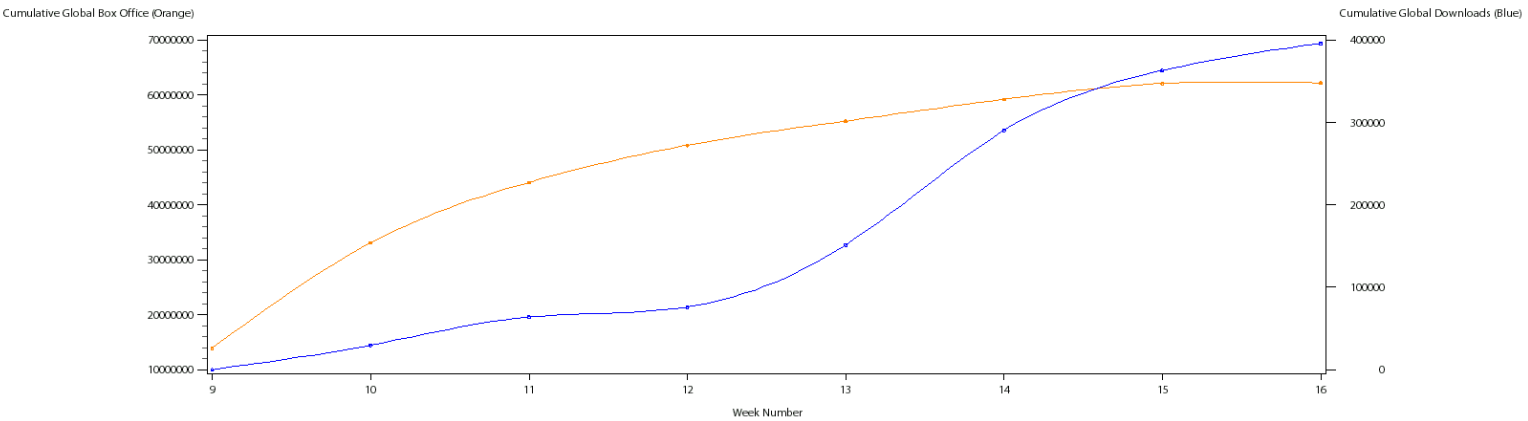
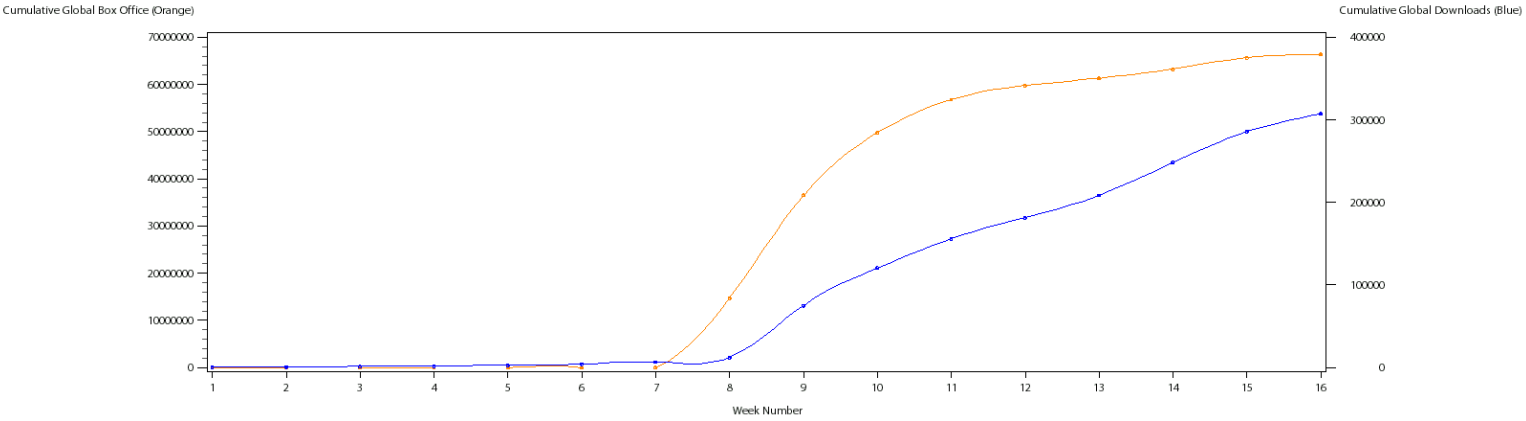
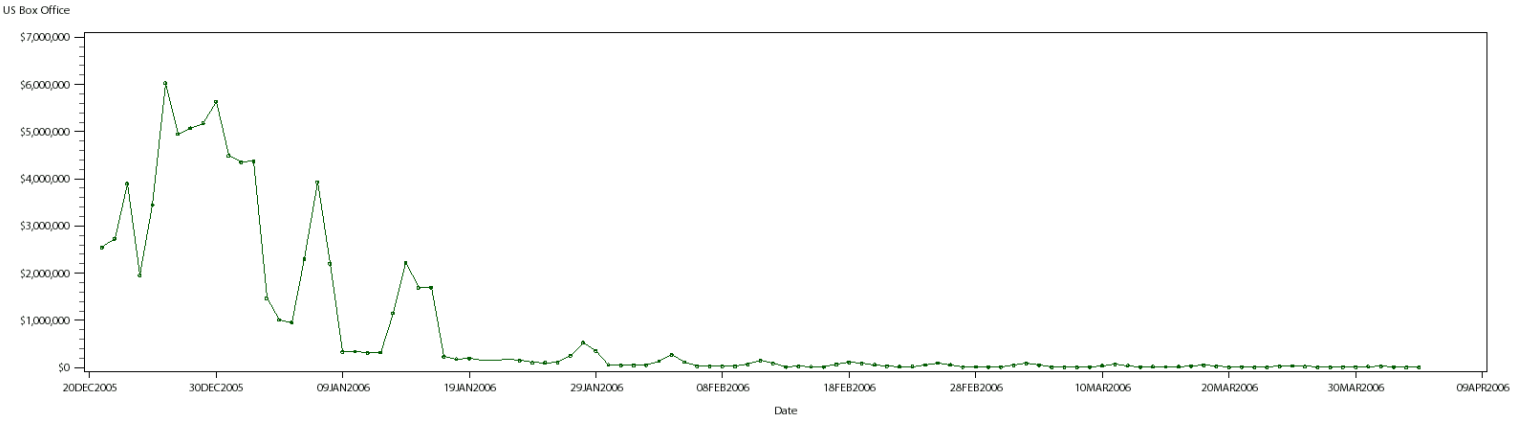


Final Destination 3



Cheaper by the Dozen 2



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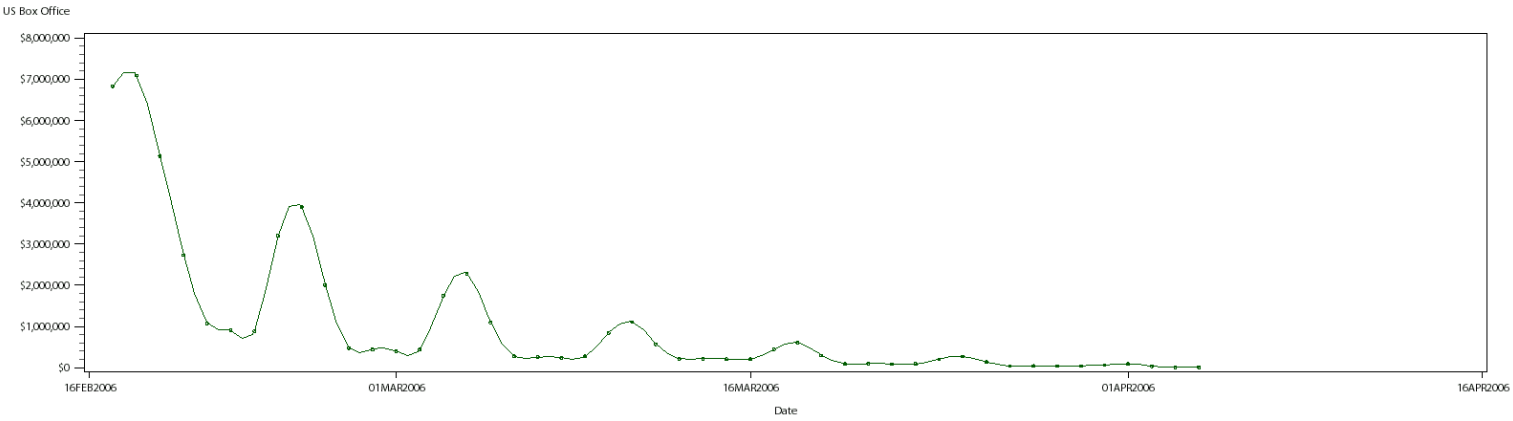

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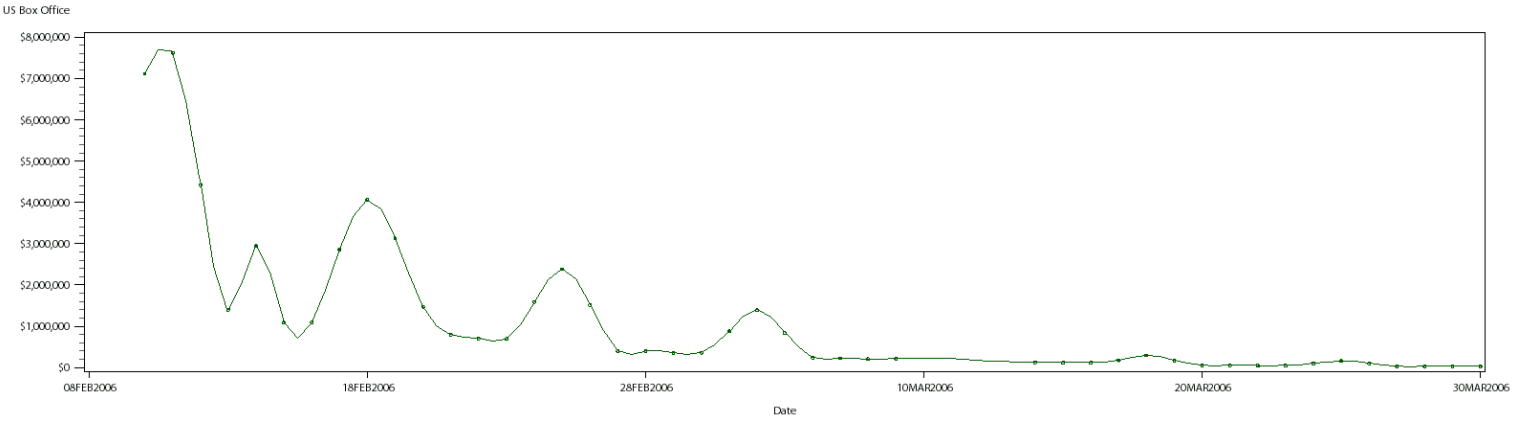
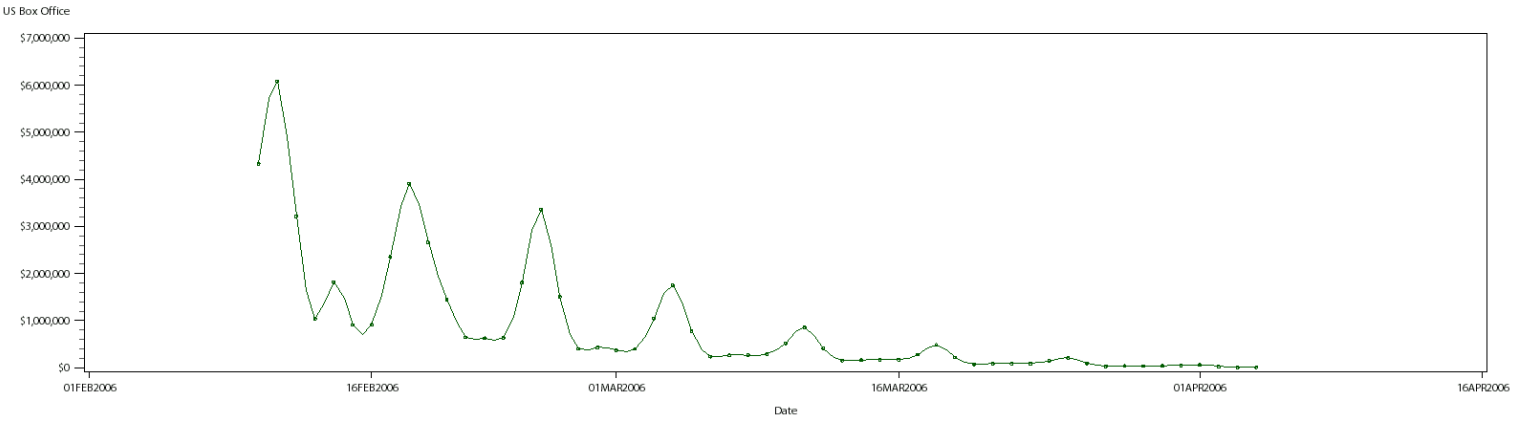


Firewall



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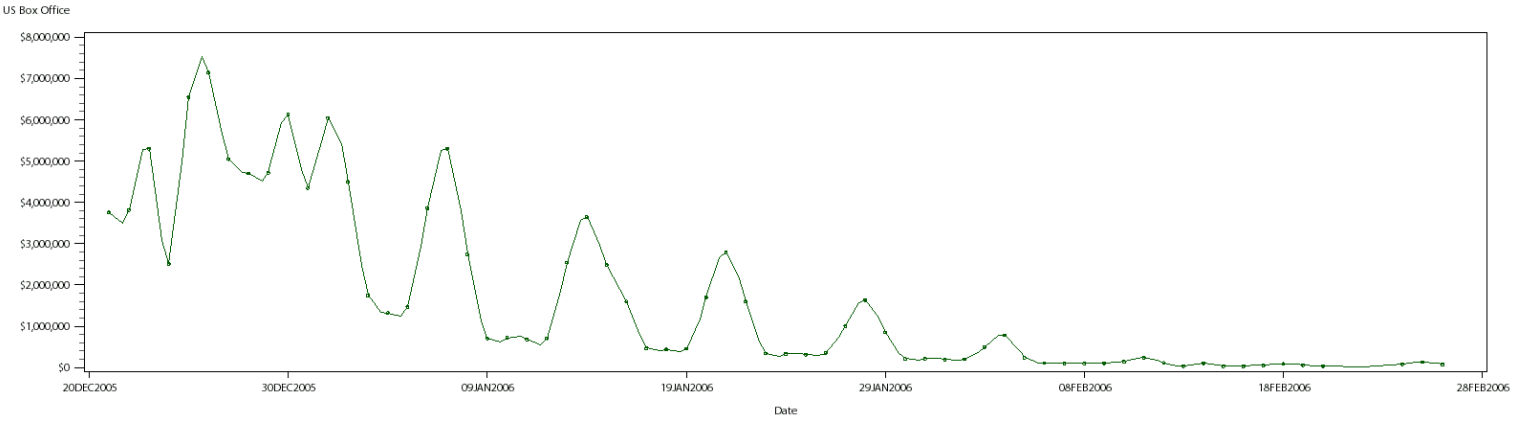

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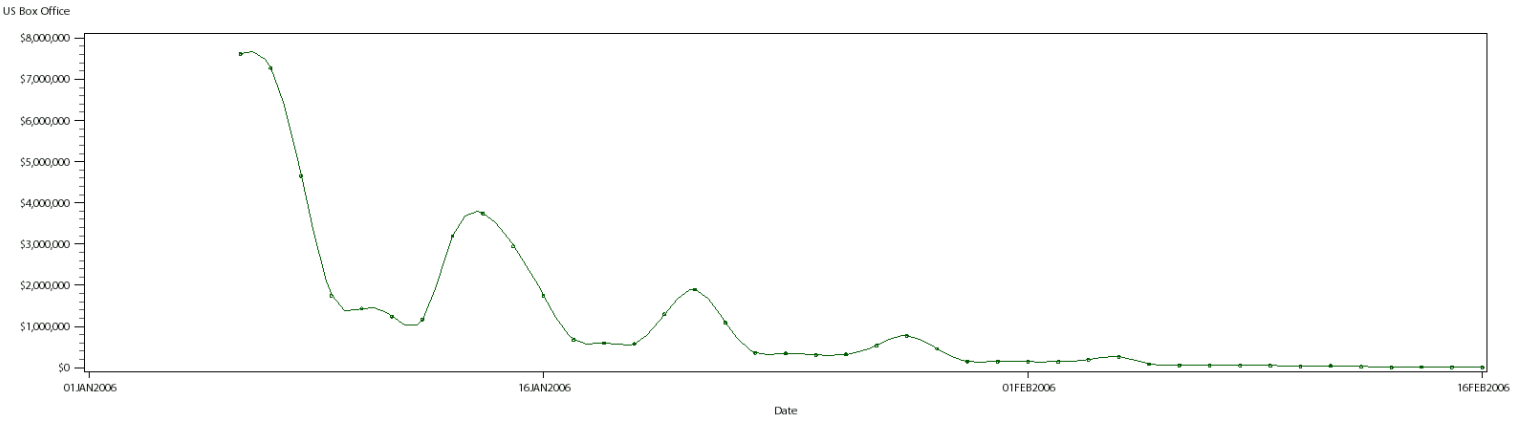
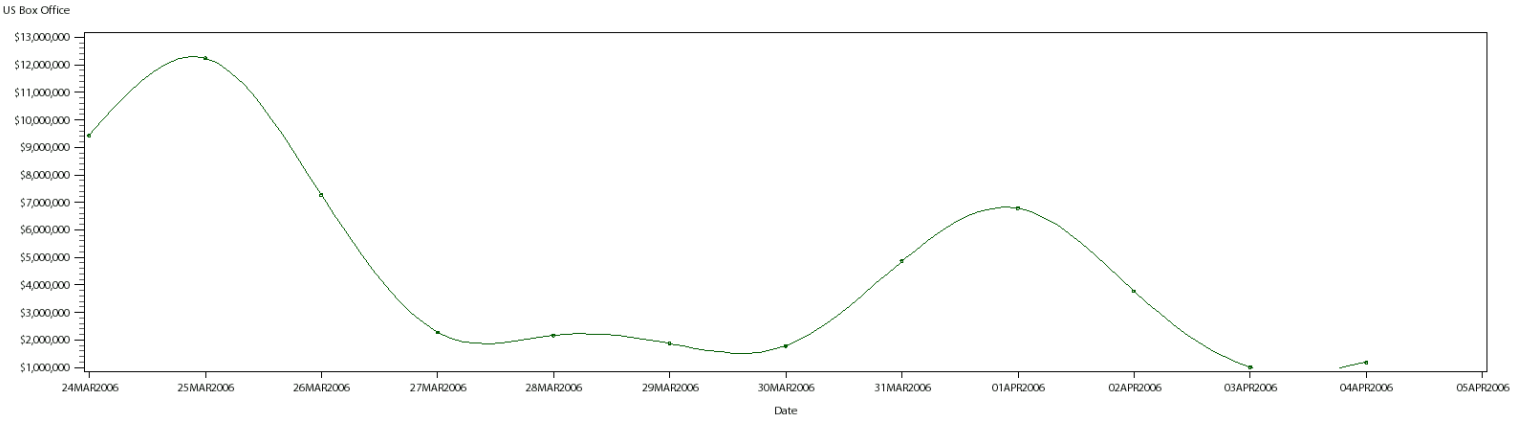


Inside Man



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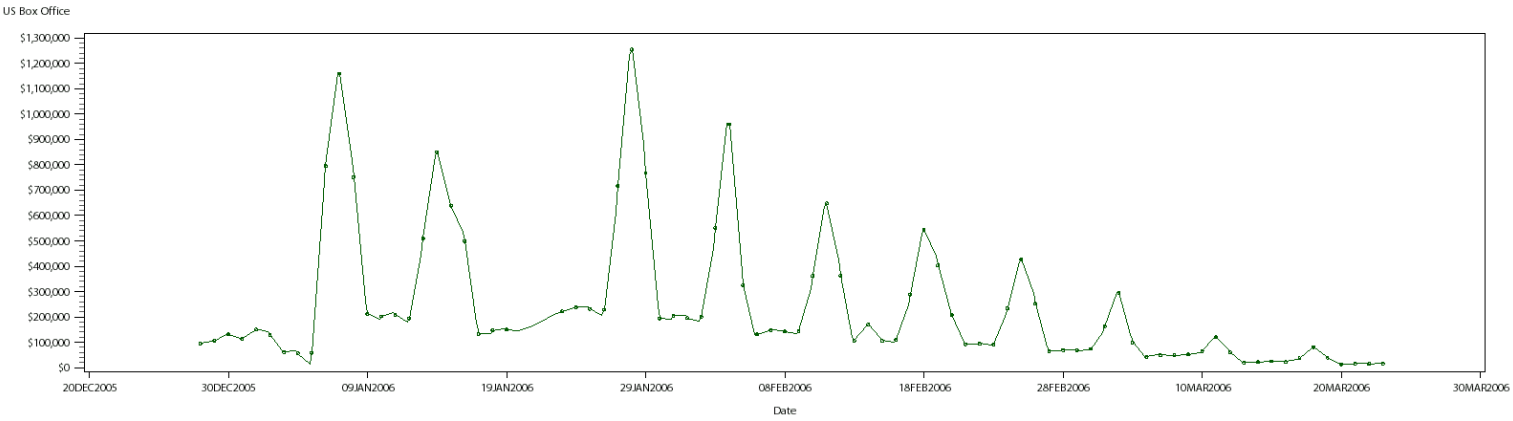

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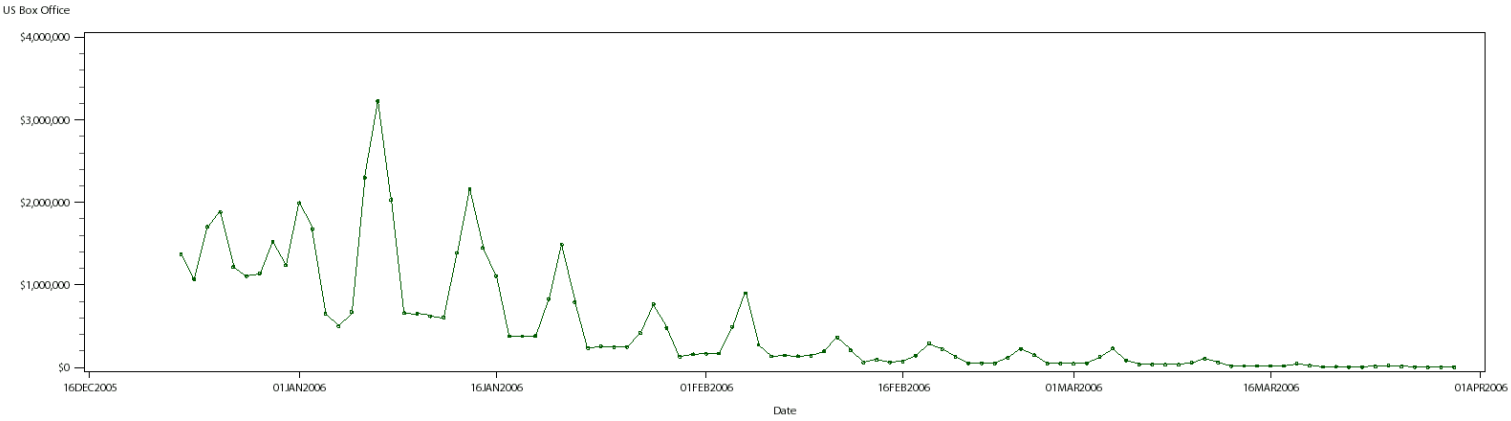
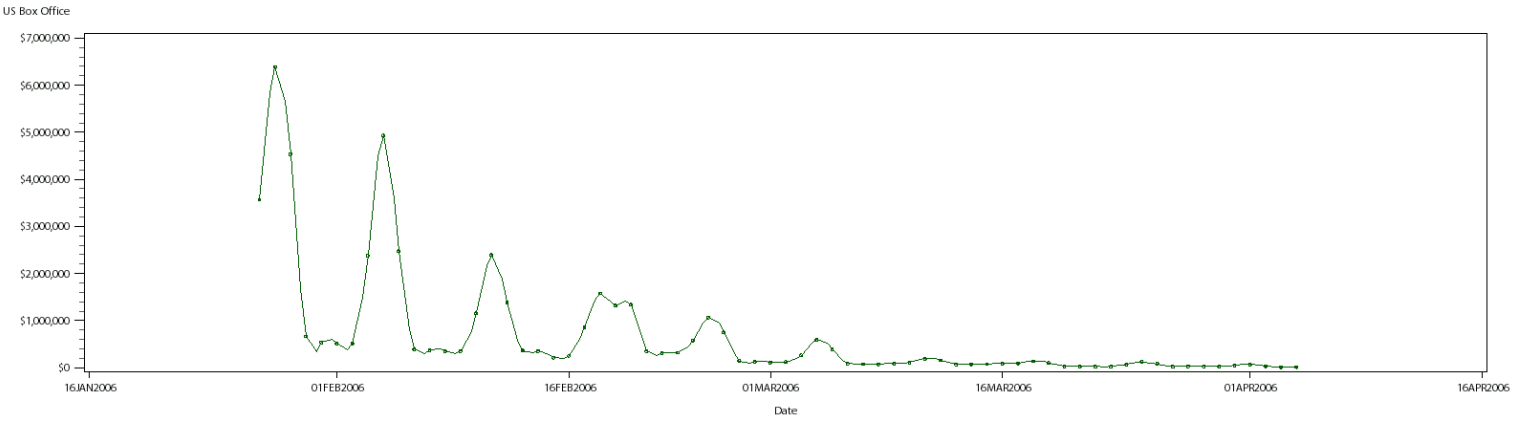
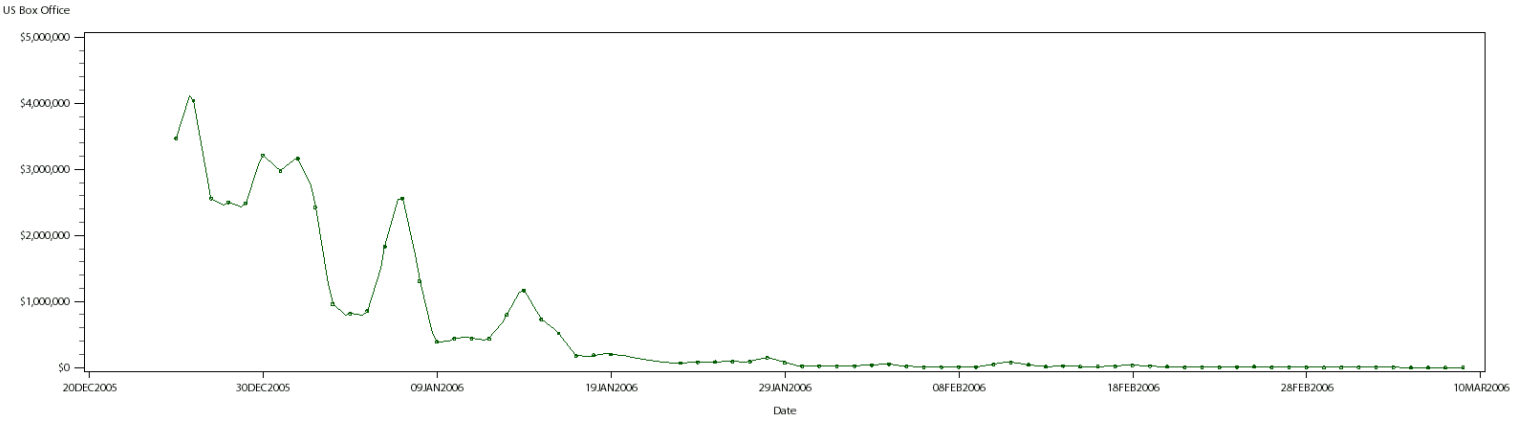


Nanny McPhee



Rumor Has It



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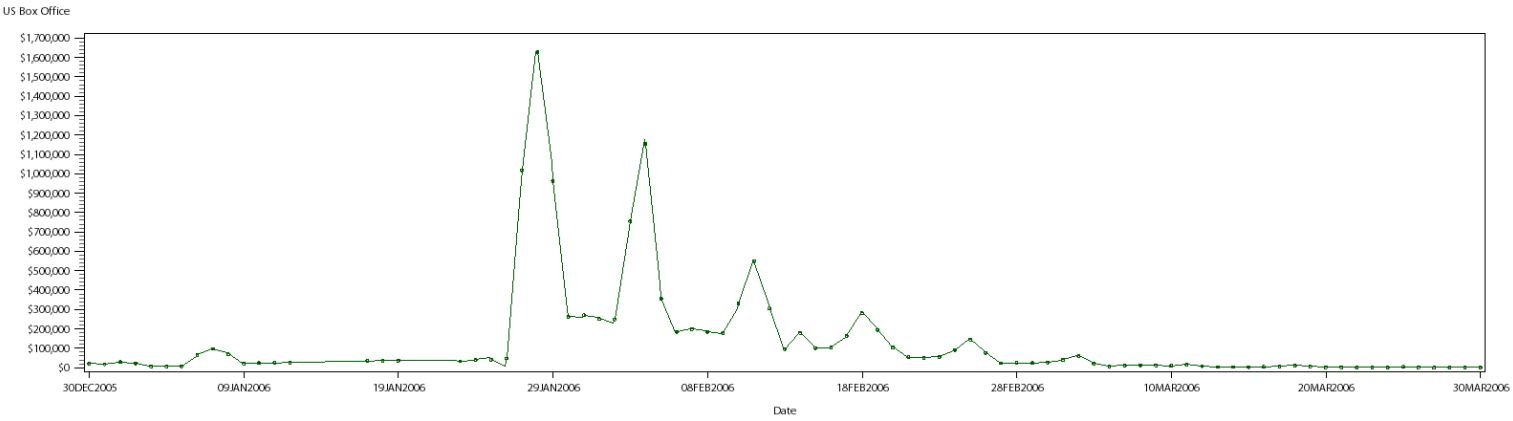

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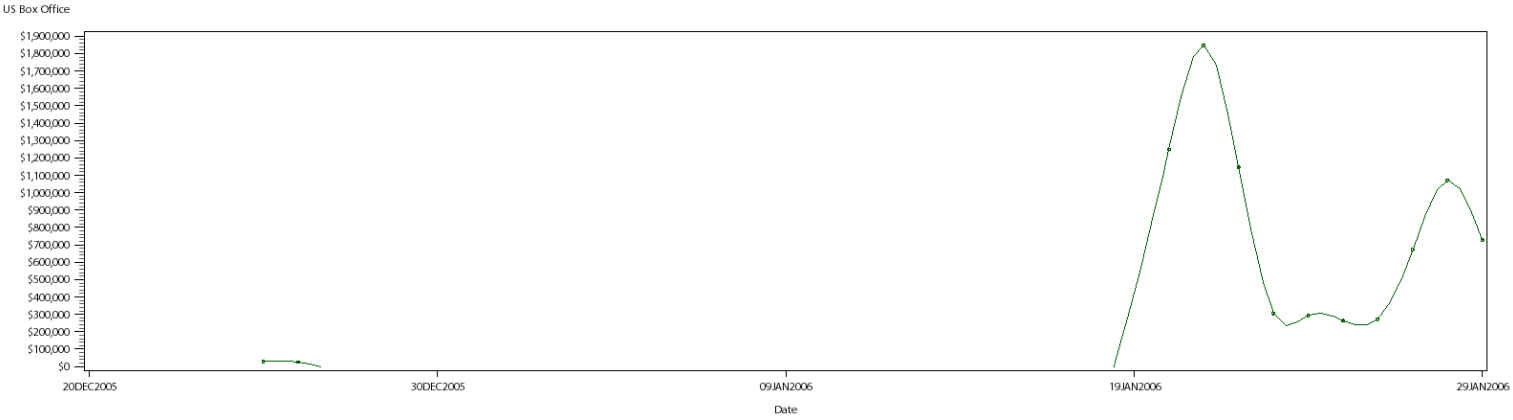

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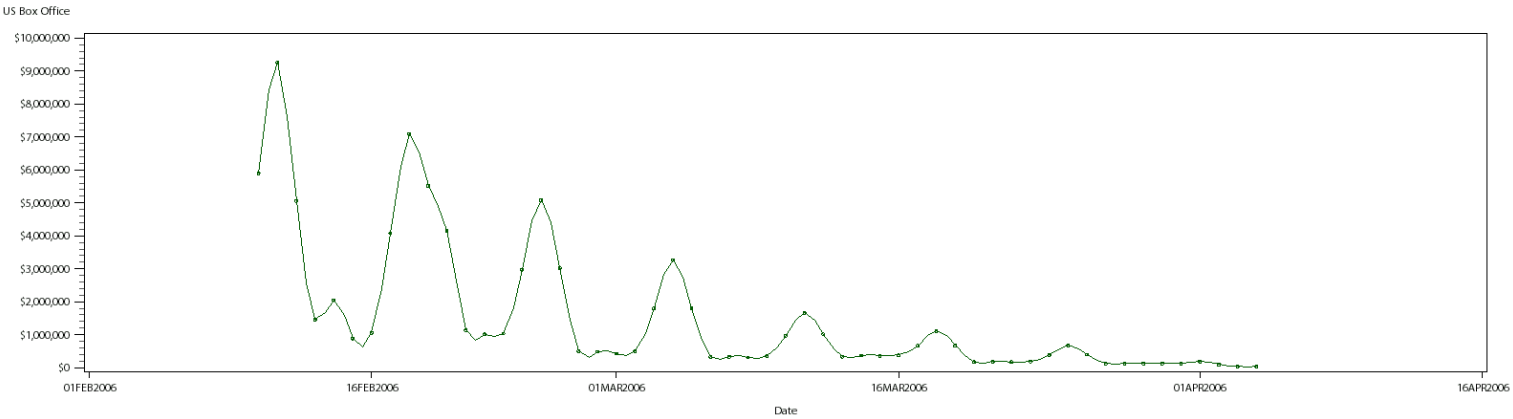

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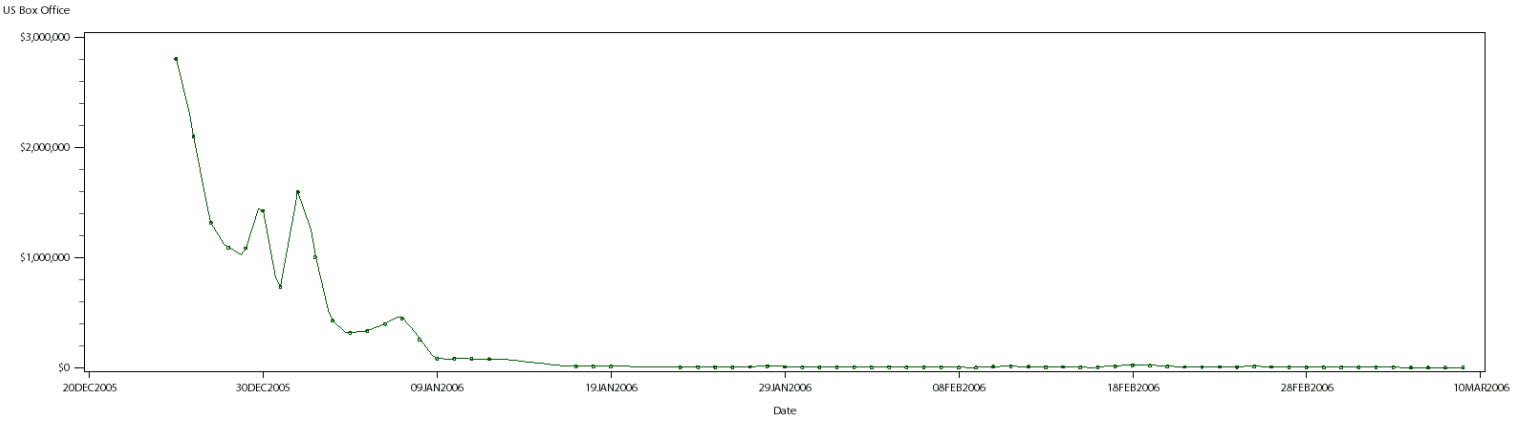
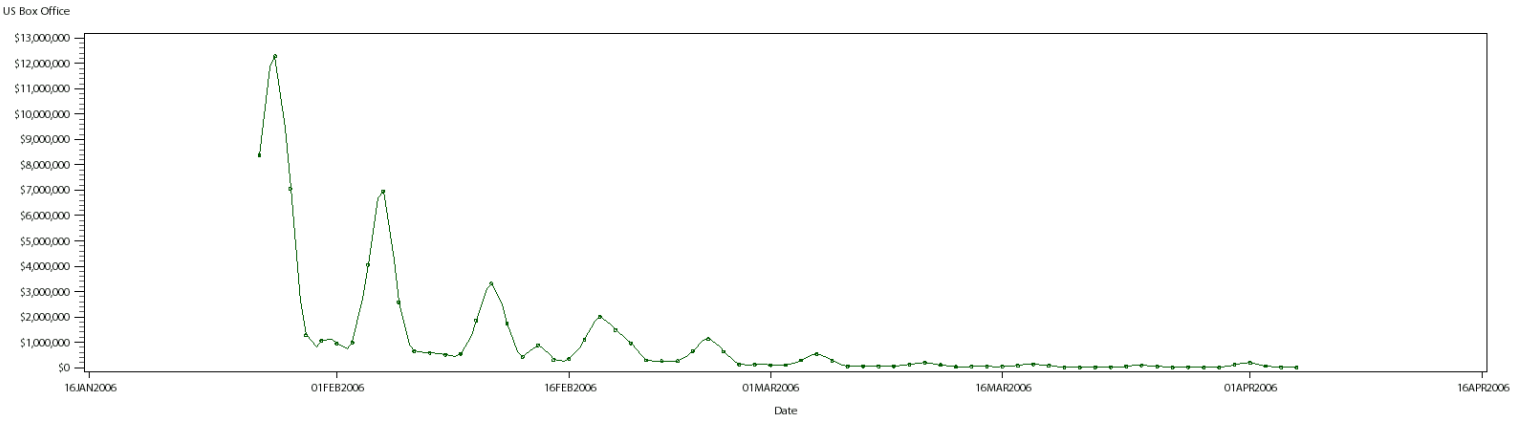
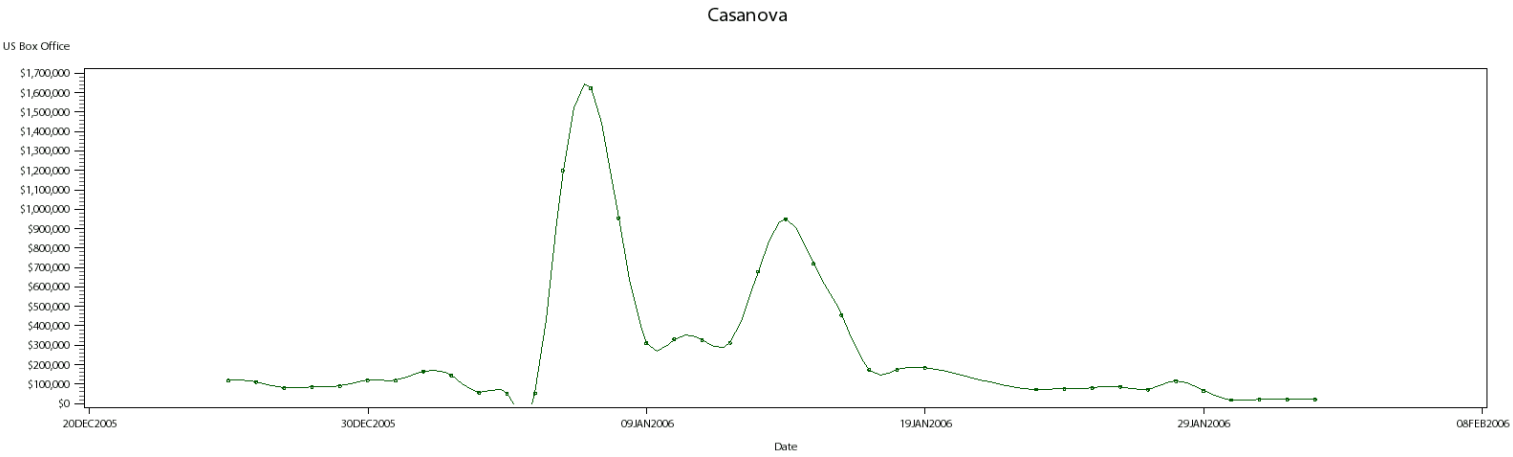


Big Momma's House 2




Casanova
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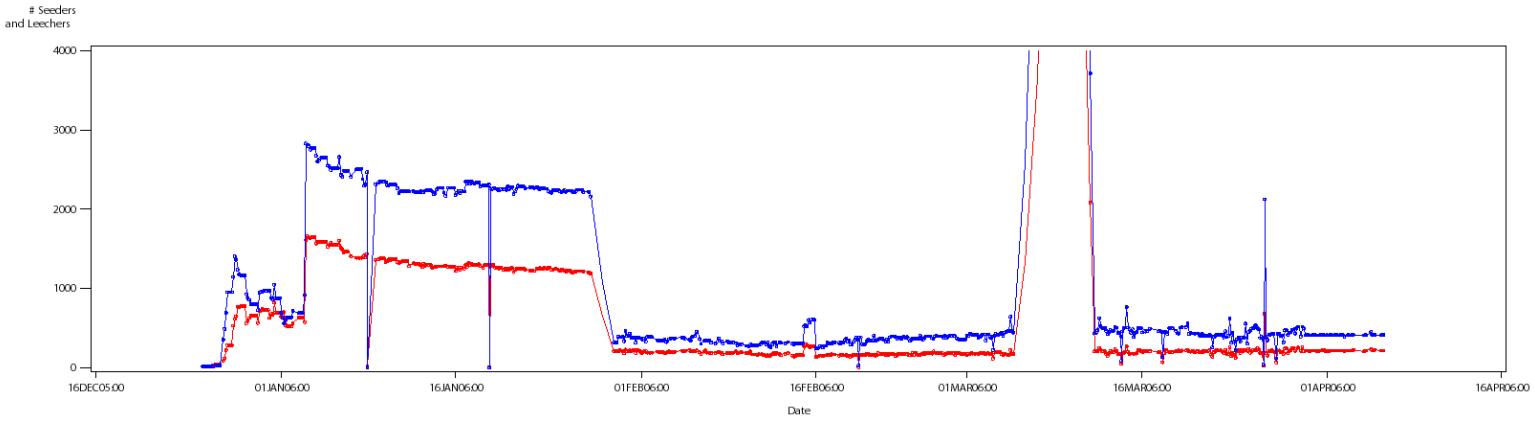
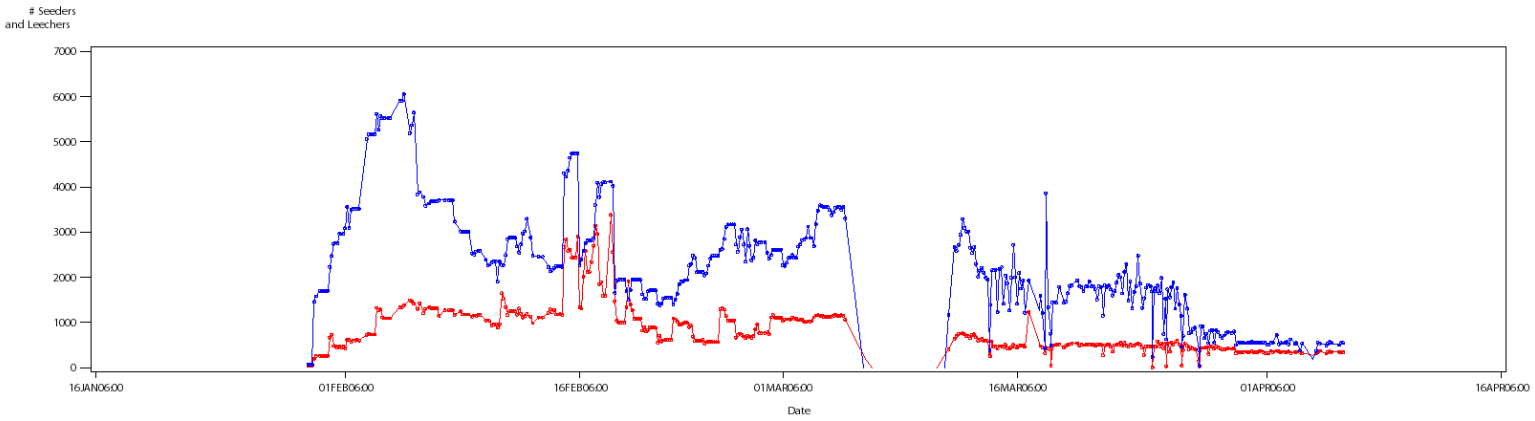


Big Momma's House 2



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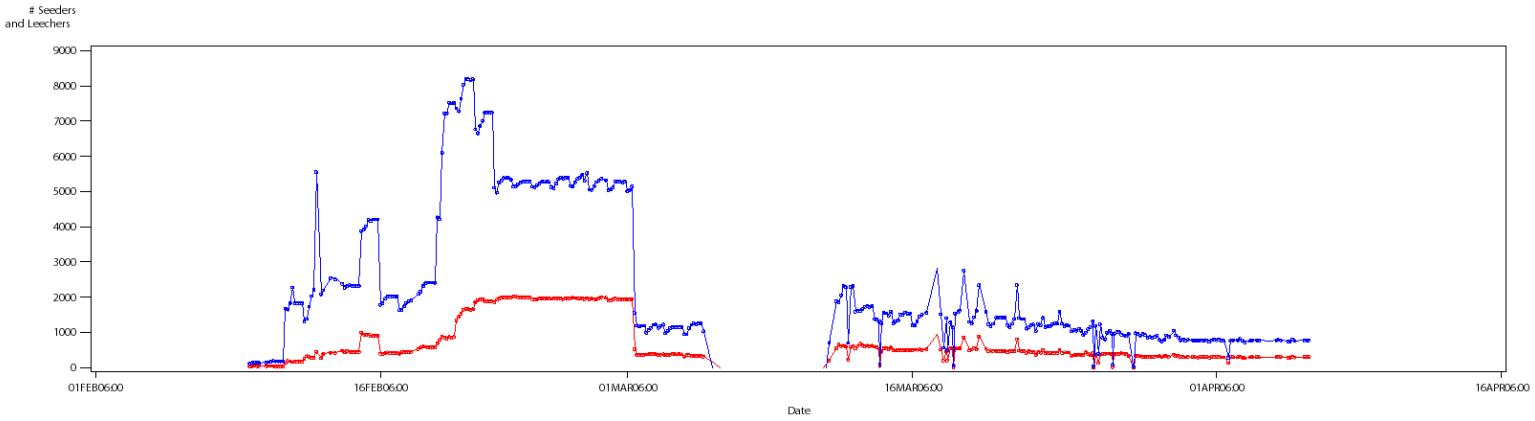

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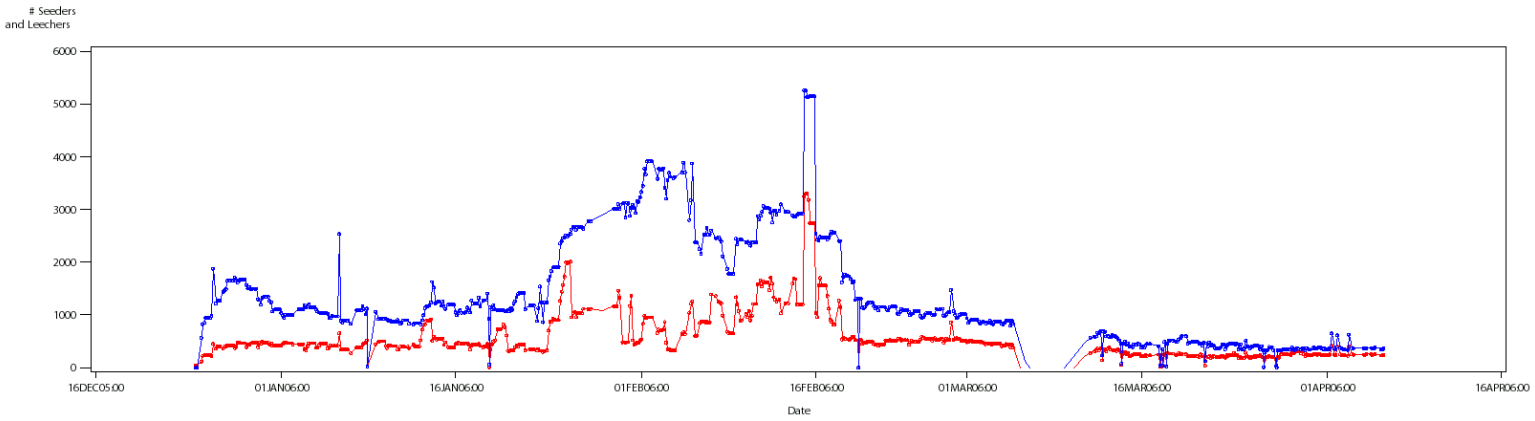

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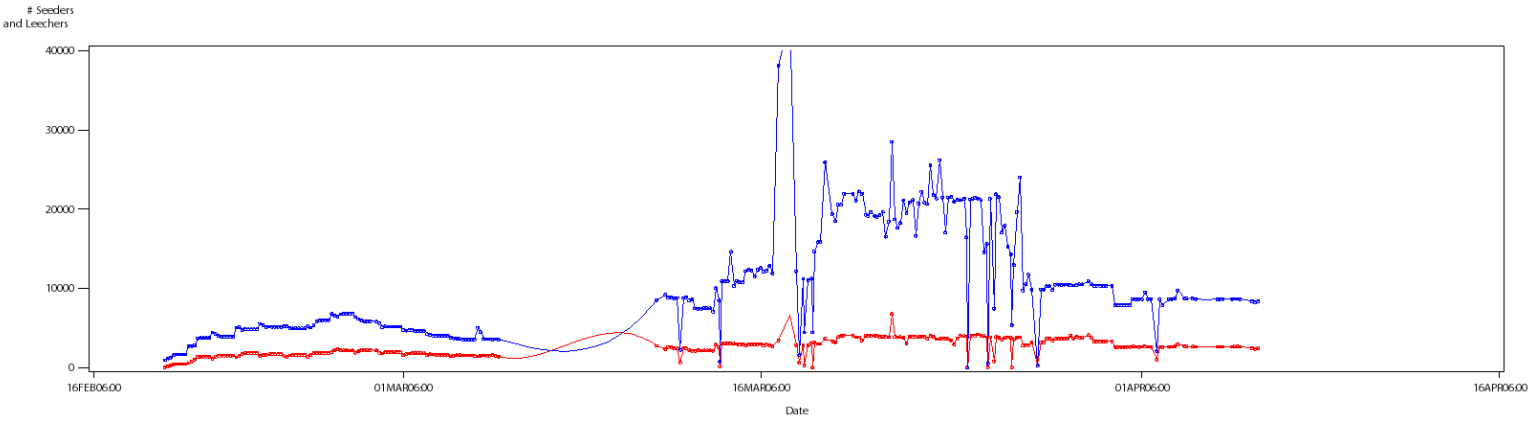
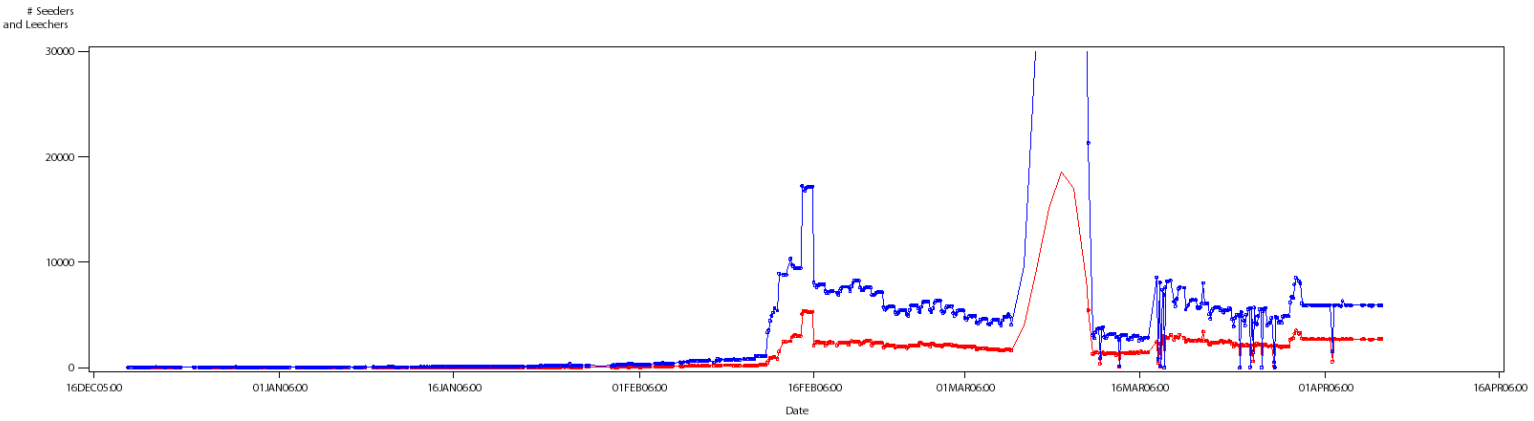
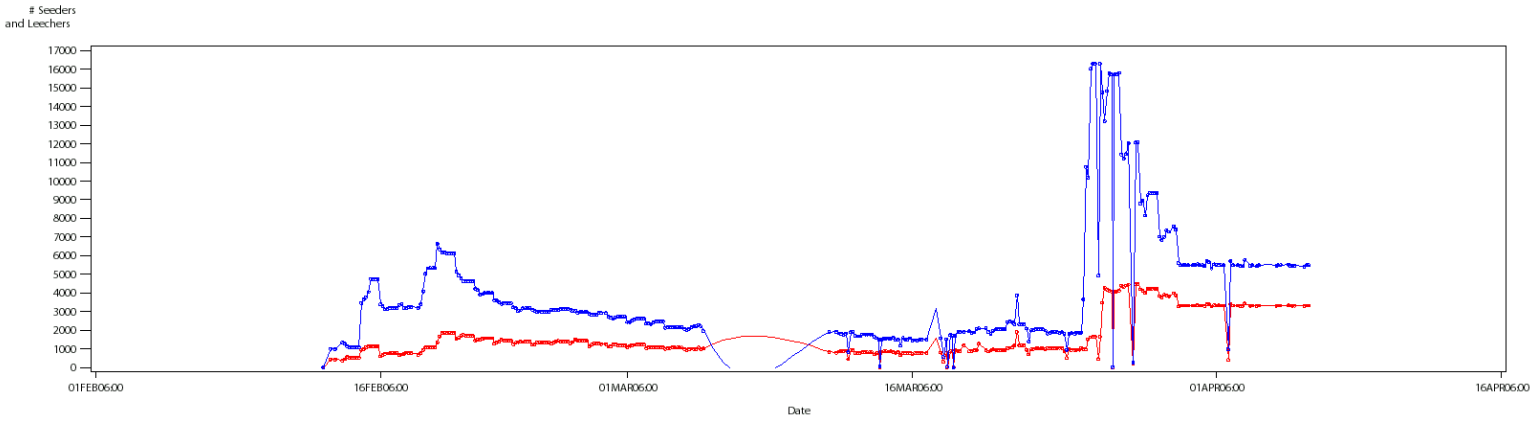


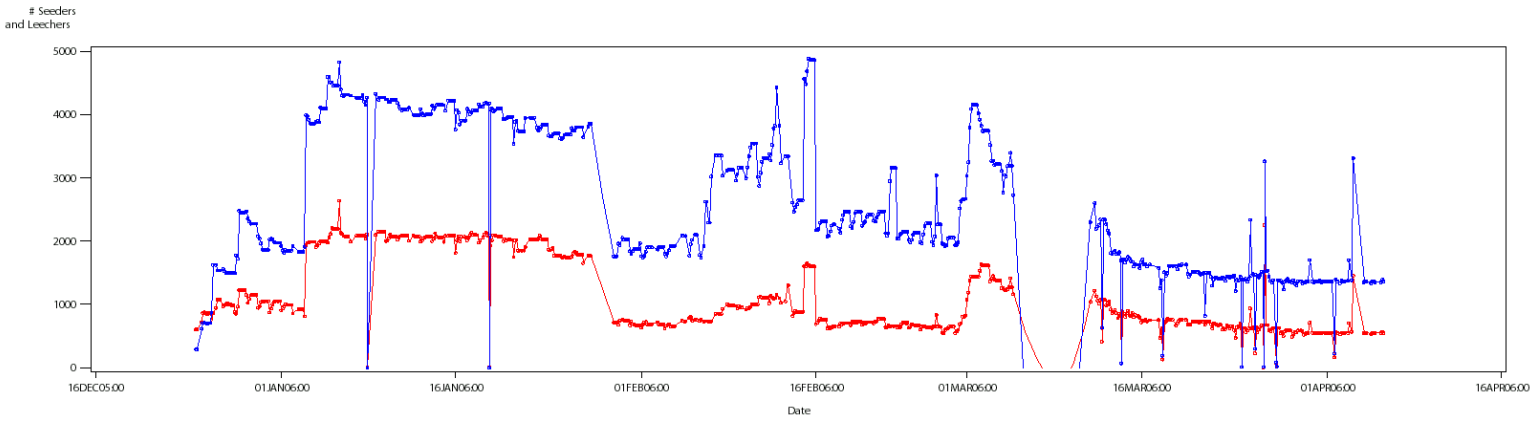
Final Destination 3



Firewall



Fun with Dick and Jane



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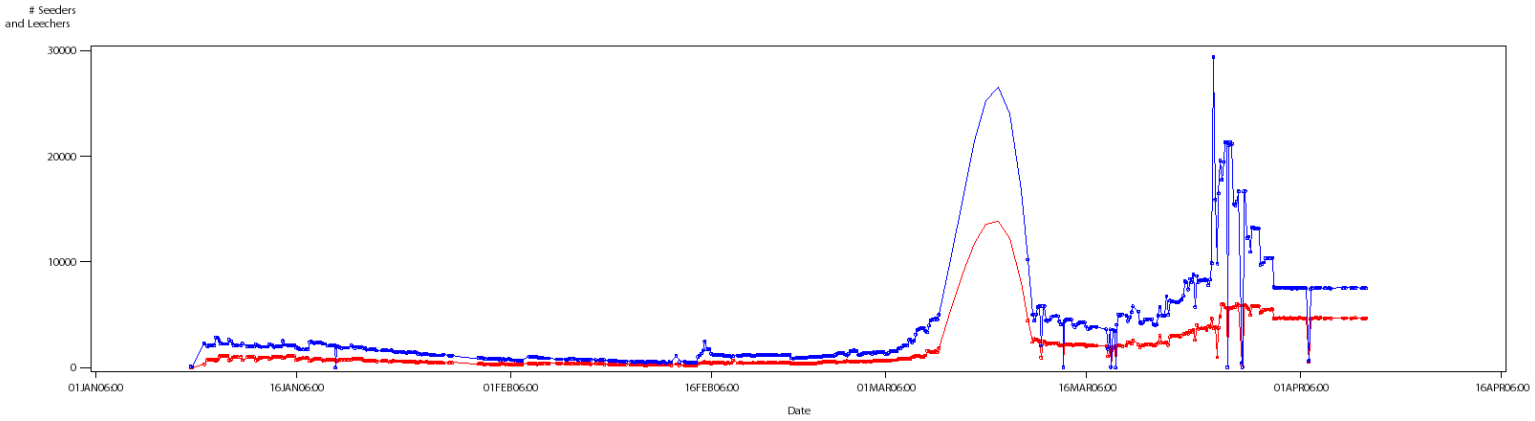
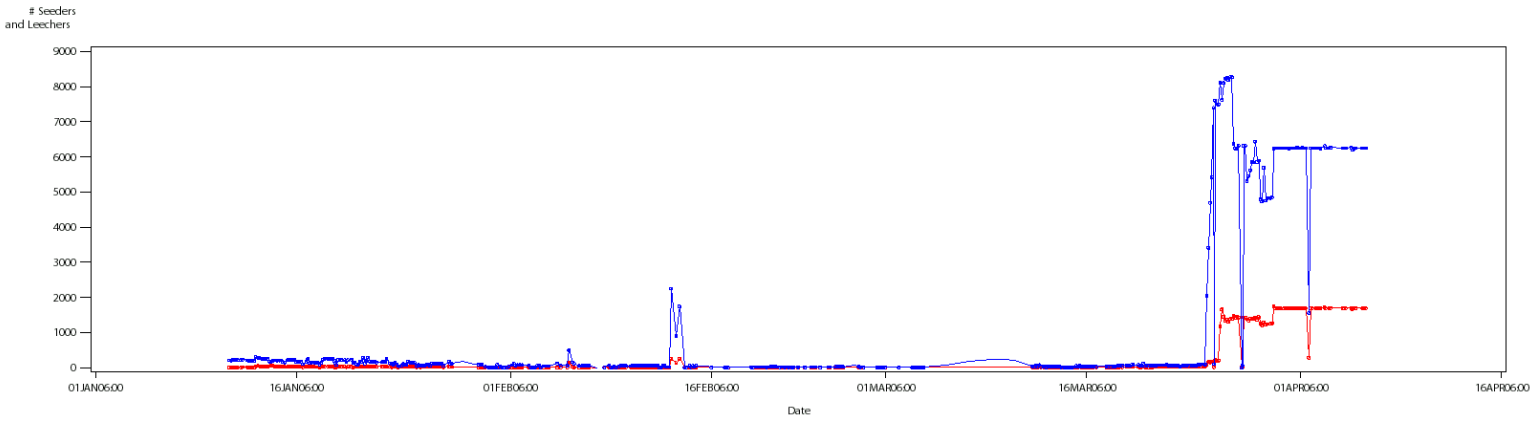


Inside Man



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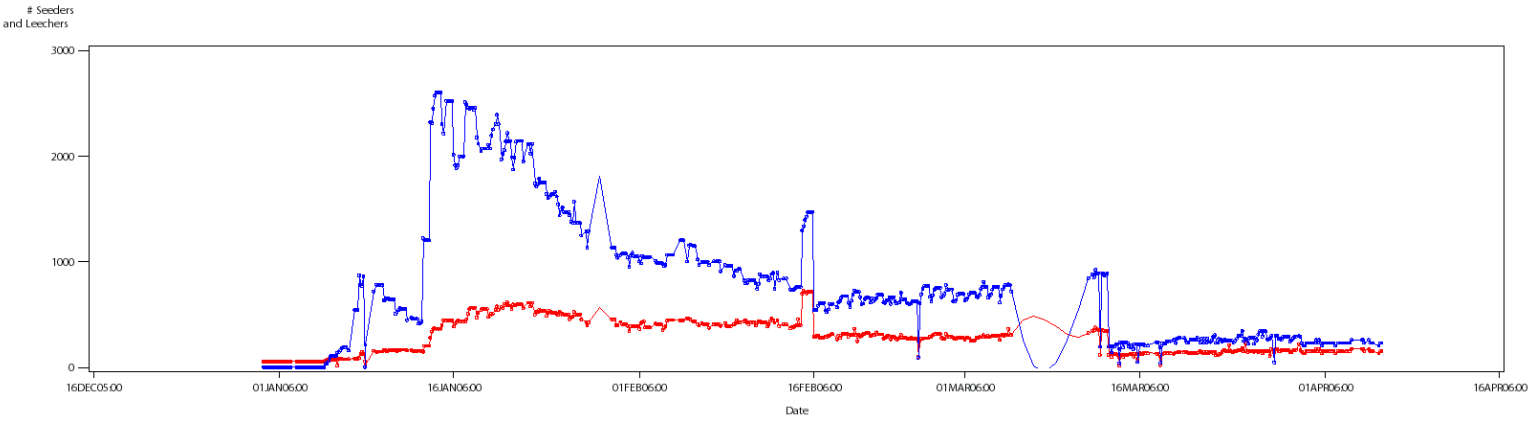
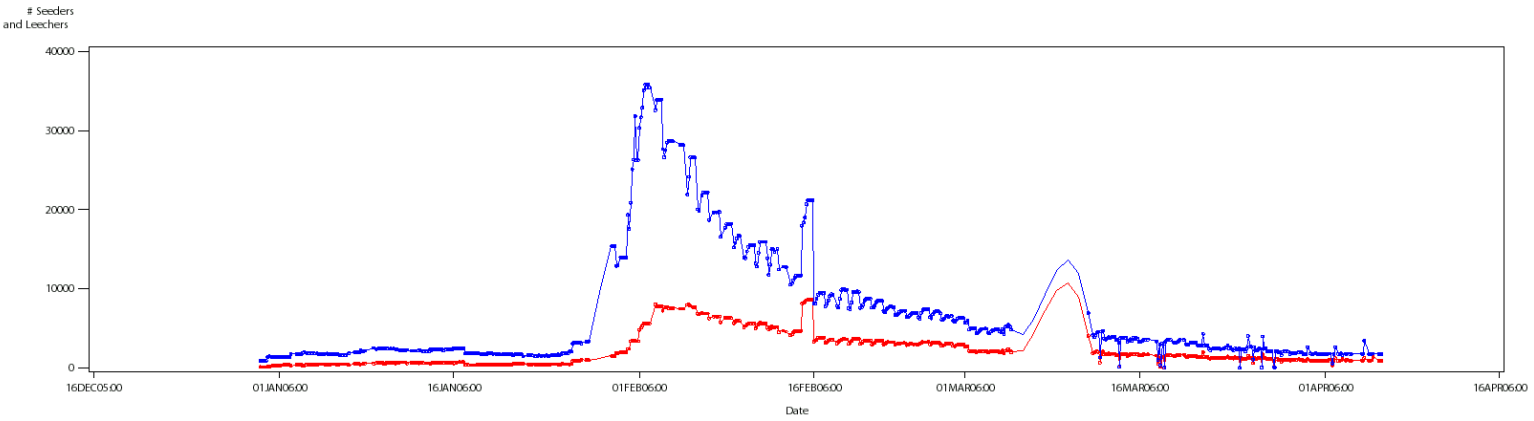


Munich



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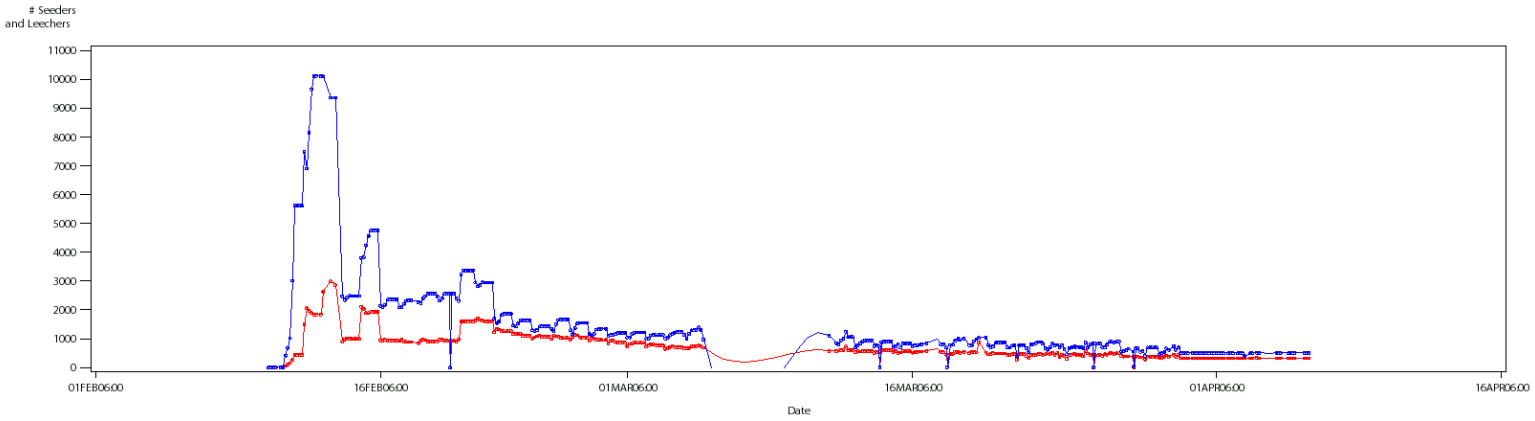
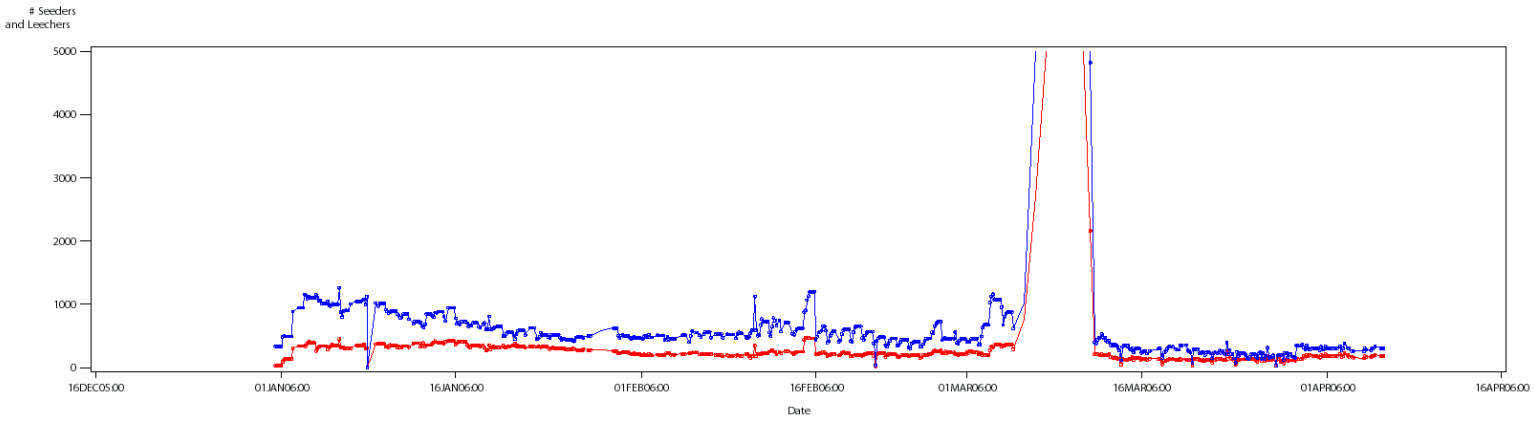
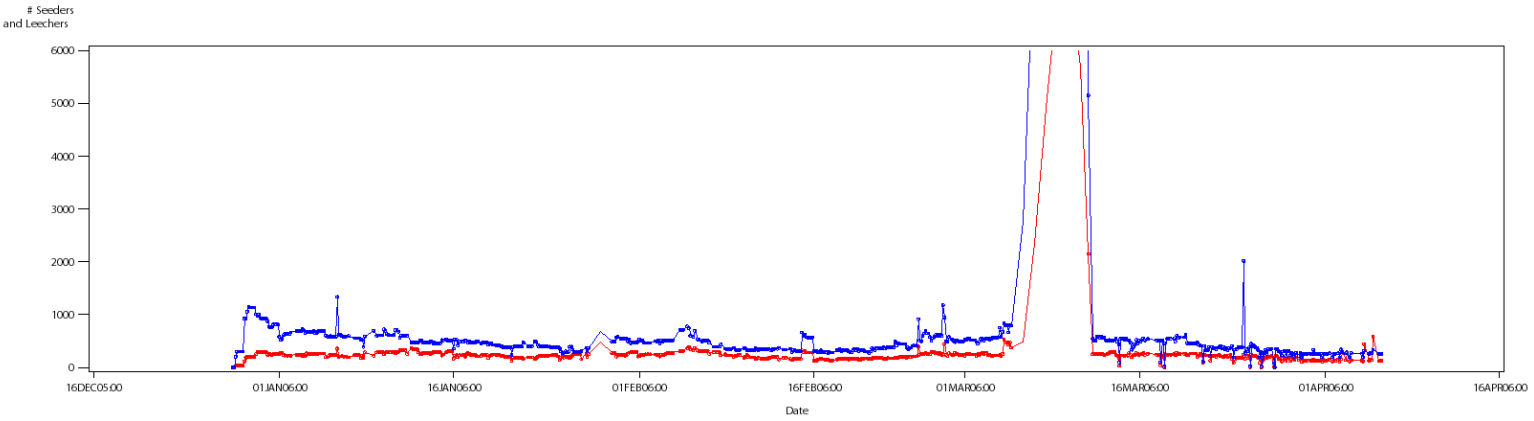


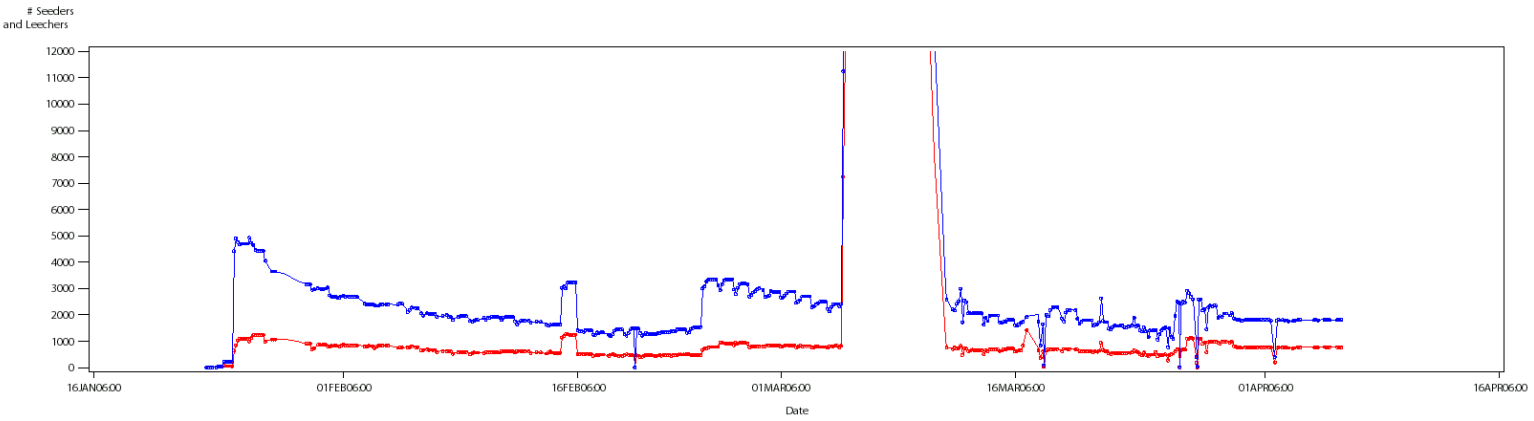
Rumor Has It

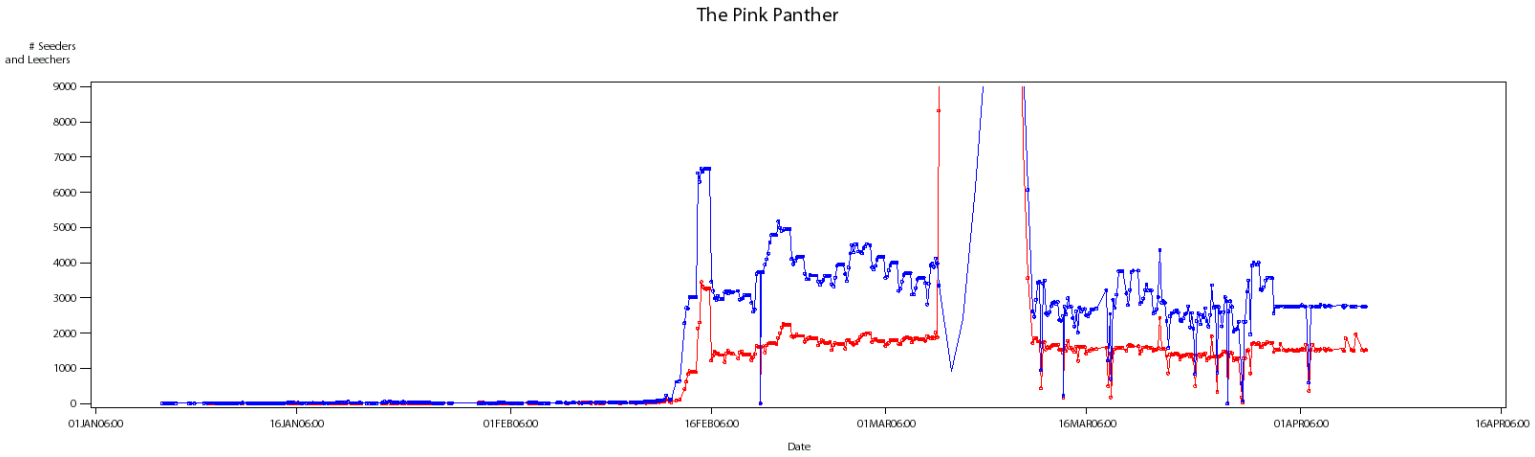


The Matador



The New World




The Pink Panther
Seeders
and Leechers
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
01JAN06:00
16JAN06:00
01FEB06:00
16FEB06:00
01MAR06:00
16MAR06:00
01APR06:00
16APR06:00
Date

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