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THE 1996 US TELECOMMUNICATIONS ACT AND ITS EFFECTS ON THE UNITED STATES' RADIO INDUSTRY

Master's Thesis

Philipp Huester (s1904159)

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Supervisor: Peter van Wijck, Second Reader: Hendrik Vrijburg

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Abstract

This research examines the effect of the 1996 Telecommunications Act on the market structure and programming diversity in the United States radio industry. The implementation of the Act led to oligopolies on a national, local and format level. The implementation of the Act further led to decreased programming diversity on the radio. Three hypotheses are stated to measure decreasing diversity levels. The results suggest that diversity increased based on the average number of songs per artists but decreased based on the number of independent artists and bands. The results further suggest that there are other factors that led to these changes, which are not directly related to the implementation of the Act.

Table of Contents

1. Introduction and Research Question 11

1.1. Research Question 14

1.2. Hypotheses and Causal Mechanisms 15

Hypothesis 1: The 1996 Telecommunications Act and Number of Songs per Artist 15

Hypothesis 2: The 1996 Telecommunications Act and Independent Artists 16

Hypothesis 3: The 1996 Telecommunications Act and Bands 17

2. The History of Radio Regulation before 1996 18

3. The 1996 Telecommunications Act 24

4. The Effects of the 1996 Telecommunications Act on the Radio Industry ..27

4.1. National Radio Ownership Concentration 28

4.2. Local Ownership Concentration 38

4.3. Format Oligopolies 42

5. Data Collection and Research Design 54

5.1. Data Collection 54

5.2. Research Design 61

Hypothesis 1: The 1996 Telecommunications Act and Number of Songs per Artist 62

Hypothesis 2: The 1996 Telecommunications Act and Independent Artists 63

Hypothesis 3: The 1996 Telecommunications Act and Bands 64

6. Analysis 66

6.1. Hypothesis 1: The 1996 Telecommunications Act and Diversity 70

6.2. Hypothesis 2: The 1996 Telecommunications Act and Independent Artists. 78

6.3. Hypothesis 3: The 1996 Telecommunications Act and Bands 87

7. Discussion of Results 97

8. Conclusion 104

9. Bibliography 108

10. Appendices 113

Table of Tables

TABLE 1: US RADIO STATIONS 1970-2000 21
TABLE 2: LOCAL RADIO OWNERSHIP AFTER 1996 25
TABLE 3: TOP FIVE OWNERS BY ESTIMATED REVENUE SHARE 31
TABLE 4: SUMMARY DEPENDENT, INDEPENDENT AND CONTROL VARIABLES 66
TABLE 5: ABSOLUTE VALUES ARTISTS, HHI AND TELECOMMUNICATIONS DUMMY 67
TABLE 6: CORRELATIONS DEPENDENT, INDEPENDENT AND CONTROL VARIABLES 69
TABLE 7: CHANGES IN THE NUMBER OF ARTISTS AND THEIR AVERAGE NUMBER OF SONGS 70
TABLE 8: H1 REGRESSION RESULTS 72
TABLE 9: H1 ROBUSTNESS RESULTS 74
TABLE 10: H1 HHI ONLY 77
TABLE 11: CHANGES IN NUMBER OF INDEPENDENT ARTISTS AND THEIR SHARE ON THE RADIO 78
TABLE 12: H2 REGRESSION RESULTS 80
TABLE 13: H2 TELCOMACT ONLY 81
TABLE 14: H2 YEAR ONLY 82
TABLE 15: H2 ROBUSTNESS RESULTS 83
TABLE 16: H2 ROBUSTNESS HHI ONLY 86
TABLE 17: H2 ROBUSTNESS YEAR ONLY 86
TABLE 18: CHANGES IN NUMBER OF BANDS AND THEIR SHARE ON THE RADIO 88
TABLE 19: H3 REGRESSION RESULTS 90
TABLE 20: H3 ROBUSTNESS RESULTS 92
TABLE 21: H3 ROBUSTNESS HHI ONLY 94
TABLE 22: H3 ROBUSTNESS YEAR ONLY 95

Table of Figures

FIGURE 1: COMMERCIAL RADIO REVENUE CONCENTRATION 32
FIGURE 2: ADVERTISING PRICES BASED ON HHI 33
FIGURE 3: MARKET LEVEL REGRESSION ESTIMATING EFFECTS ON ADVERTISING PRICES 35
FIGURE 4: LISTENER SHARE 2005 36
FIGURE 5: LISTENERSHIP BY HHI 37
FIGURE 6: EFFECT OF OWNERSHIP STRUCTURE ON LISTENERSHIP 37
FIGURE 7: SIGNAL-CONTOUR MARKET DEFINITION 39
FIGURE 8: ARBITRON MARKET CLASSIFICATION 41
FIGURE 9: TOP 4 OWNERSHIP SHARE IN TOP 30 SELF-REPORTED FORMATS 45
FIGURE 10: TOP 4 OWNERSHIP SHARE IN 19 BIA FORMATS 46
FIGURE 11: FORMAT MONOPOLIES 47
FIGURE 12: EFFECTS OF OWNERSHIP STRUCTURE ON FORMATS 48
FIGURE 13: OVERLAP BETWEEN RADIO FORMATS 50
FIGURE 14: FORMAT PAIRS WITH THE HIGHEST PERCENTAGE OVERLAP 51
FIGURE 15: OVERLAP BETWEEN STATIONS BY SAME OWNER IN SAME FORMAT 52
FIGURE 16: DEVELOPMENT OF ARTISTS AND BANDS 68
FIGURE 17: AVERAGE NUMBER OF SONGS PER ARTIST 71
FIGURE 18: SCATTERPLOT AND REGRESSION H1 73
FIGURE 19: SCATTERPLOT AND REGRESSION H1 ROBUSTNESS 76
FIGURE 20: DEVELOPMENT INDEPENDENT ARTISTS AND SHARE 79
FIGURE 21: SCATTERPLOT AND REGRESSION H2 81
FIGURE 22: SCATTERPLOT AND REGRESSION ROBUSTNESS H2 84
FIGURE 23: DEVELOPMENT NUMBER AND SHARE OF BANDS AND SONGS 89
FIGURE 24: SCATTERPLOT AND REGRESSION H3 91
FIGURE 25: SCATTERPLOT AND REGRESSION ROBUSTNESS H3 93

Table of Equations

EQUATION 1: MARKET LEVEL REGRESSION WITH DEMOGRAPHICS 34

EQUATION 2: REGRESSION H1 62

EQUATION 3: REGRESSION ROBUSTNESS CHECK H1 63

EQUATION 4: REGRESSION H2 63

EQUATION 5: REGRESSION ROBUSTNESS CHECK H2 64

EQUATION 6: REGRESSION H3 64

EQUATION 7: REGRESSION ROBUSTNESS CHECK H3 65

Table of Appendicies

APPENDIX 1: INTERVIEW CAMEL_KNIGHT 113
APPENDIX 2 118
APPENDIX 3 118
APPENDIX 4 119
APPENDIX 5 120
APPENDIX 6 120
APPENDIX 7 121
APPENDIX 8 121
APPENDIX 9 122
APPENDIX 10 122
APPENDIX 11 123
APPENDIX 12 123
APPENDIX 13 124
APPENDIX 14 124
APPENDIX 15 125
APPENDIX 16 125
APPENDIX 17 126
APPENDIX 18 126
APPENDIX 19 127
APPENDIX 20 127
APPENDIX 21 128
APPENDIX 22 128
APPENDIX 23 129
APPENDIX 24 129
APPENDIX 25 130
APPENDIX 26 130

APPENDIX 27 131
APPENDIX 28 131
APPENDIX 29 132
APPENDIX 30 132
APPENDIX 31 133
APPENDIX 32 133
APPENDIX 33 134
APPENDIX 34 134
APPENDIX 35 135
APPENDIX 36 135
APPENDIX 37 136

1. Introduction and Research Question

*"I think a lot of the time the reason that people pirate, is they want access to good music and they don't get it because the radio is so s**t."*
–Thom Yorke, Frontman Radiohead

People often like to criticise current pop music and are reminded of better times, when music meant something and was "actually" good. There are complaints about the topics discussed by rappers, such as drugs and violence, country artists only signing about drinking, their pick-up trucks and women, or the quality of pop music. Especially in pop music people often say that the artists are all the same and they are more concerned with building their own brand than with music. This might be true for some artists such as Nickelback, which is often accused of writing songs based on their desired target group and not based on their own beliefs, dreams or passion. This is also often seen as the reason why all the songs sound the same. People often argue that songs now are created for certain artists or an artist with a desired brand is found to perform a song. There is also evidence that this is not only due to people's perception of music but that there are certain similarities that can be found in most popular songs. These are things such as "pitch transitions, the homogenization of the timbral palette and the growing loudness levels" (Serra, Corral, Boguna, Haro, & Josep, 2012). Last year there was also the discovery of *The Millennial Whoop*. The Whoop is a melodic sequence that can be found in a variety of modern music (Epstein, 2016) (For a video compilation of the Millennial Whoop in various songs visit here). These similarities also lead to a blur between music genres, since they are used in a variety of genres. With the increase of pop country artists, such as Luke Bryan, Blake Shelton or Florida Georgia Line; country fans

argue that there is no ‘real’ country music anymore. Instead there are just good-looking men and women that sing country music, which all sounds the same and does not reflect the struggles of the rural parts of the United States of America. These arguments expand beyond genres as people say rock, hip-hop, rap, and more have changed towards lyrics and melodies more appealing to the desired target groups. Preferences for music however are almost purely subjective and it is impossible to say that music is better or worse than it used to be.

The same can be said for the quote of Thom Yorke. The changes in radio broadcasting and the songs that are played cannot be distinctly categorized as better or worse, as it all lies in the eye of the beholder. In discussions regarding the radio however, it is frequently argued that it is always the same songs and artists (DiCola & Thomson, 2002, p. 67). This goes hand in hand with people who argue that music in general has gotten worse, so must the radio. There is also the argument that not only over time the same artists are played on the radio, but also across all stations. This means that there are fewer local differences in radio programming. In online and personal discussions, people often blamed the 1996 Telecommunications Act for these changes. The claims are mostly made by users without providing any empirical evidence and can mainly be considered their personal opinions. There however has been extensive research into the effects of the 1996 Telecommunications Act on the market structure (Chipty, 2007) (DiCola, 2006) (DiCola & Thomson, 2002) (Drushel, 1998) (Sterling, 1997) (Wirth, 2007) (Wirth, 2001). My personal interest in the music industry and the suggested effects of the Telecommunications Act inspired this research to evaluate some these opinions and arguments empirically.

The researcher conducted an interview with a former radio DJ in a large metropolitan area. The DJ was employed by Clear Channel Communications, the largest radio owner group. A transcript of the questions and answers can be found in Appendix 1. The interviewee had to remain anonymous due to contractual obligations and non-disclosure agreements. The interviewee is referred to by his reddit username Camel_Knight. The interviewee has been identified in a recent AmA on the online community reddit. AmA stands for Ask-me-Anything and features questions asked by community members and answered by the creator of the thread. Politicians (Barack Obama, Bernie Sanders), celebrities (Gordon Ramsay, Chris Pratt), business leaders (Bill Gates, Elon Musk) and other people of interest with unique experiences (Edward Snowden) frequently start AmAs to answer questions by the community. Camel_Knight could not disclose his identity publicly on the website but has been verified by a moderator of the website. The verification by the moderators requires tangible documents such as work or personal IDs (reddit). Camel_Knight hosted an IAmA regarding his experience as radio DJ, after which he has been approached regarding further questions. The answers provided will be used to support documents throughout the paper.

As previously stated, whether 'radio is s**t' as Thom Yorke has put it and the music played on the radio is better or worse are subjective measures. It is therefore very difficult to obtain empirical results without extensive surveys of the population. This is even more difficult regarding the impacts of the 1996 Telecommunications Act, as it cannot be expected of people to remember their opinions on radio broadcasting from over 20 years ago. Hence, to research whether the statements about the diversity of music on the radio are true, a research question and hypotheses have to be formulated.

The research question and the underlying hypotheses are further explained below. After specifying the research, this thesis provides an overview of the history radio regulation in the United States before the Telecommunications Act of 1996. This is followed by the changes the Act brought to radio broadcasting and the effects of those changes, which is done for different relevant markets. These effects are discussed for the national and local level as well as changes in the various radio formats that affect diversity. This is followed by an explanation of the process of data gathering that has been conducted to get the necessary information, as well as the research design. The research design provides more detailed insights into how the analysis is conducted. The analysis chapter provides the results of the three hypotheses that have been testes, which then are discussed in the following chapter. Lastly there is a conclusion that summarizes the findings of this research paper, followed by a bibliography and appendices.

1.1. Research Question

How did the implementation of the 1996 Telecommunications Act affect the market structure and programming diversity of the United States radio industry?

The research question in this paper will seek to answer the question of the effects of the 1996 Telecommunications Act on the radio industry and more specifically on the market structure and the music played on the radio. One of the frequently stated opinions is that there has been a decrease in diversity on the radio, which is the first hypothesis that will be answered both in the literature review in terms of format diversity as well as in the analysis in form of artist diversity. This argument is further researched in the analysis. Since it is very difficult to measure the diversity of music, two different measures are introduced to see changes in radio programming. These measures are the

representation of independent artists and bands on the radio. Independent artists are often seen as more legitimate musicians compared to artists associated with a major label. Independent artists have a contract with an independent label, which is not controlled by one of the major label conglomerates. The major labels are Bertelsmann (BMG), EMI, MCA, Polygram, Sony, Vivendi Universal and AOL Time Warner (DiCola & Thomson, 2002, pp. I-1). Independent artists have the reputation to be less concerned about their brand and more involved in the songs they are singing. Using this assumption, the effect on independent artists can provide some indication of changes in radio programming. The same can be said for the representation of bands on the radio. Bands usually involve at least one person playing an instrument, which makes them in some people's eyes more legitimate musicians than solo artists, which often rely on electronic means to create music. The representation of bands on the radio therefore is also a good indication for the diversity of music programming on the radio. These two measures add another indicator for diversity. The tested hypotheses are that the 1996 Telecommunications Act led to less diversity in the number of artists, and fewer independent artists and bands.

1.2. Hypotheses and Causal Mechanisms

This section states the three hypotheses that are tested and provide information about the underlying assumptions that form the causal mechanisms for each hypothesis.

Hypothesis 1: The 1996 Telecommunications Act and Number of Songs per Artist

H1: The 1996 Telecommunications Act led to less artist diversity in the Billboard Radio Songs Top 50.

Causal Mechanism:

The 1996 Telecommunications Act eliminated national ownership levels for radio station owners and drastically increased the local ownership caps (DiCola & Thomson, 2002, p. 8). Radio station owners try to achieve economies of scale by increasing their holding of radio stations, which was not able to the same extend before the implementation of the act. These owners can save money by centralizing certain parts of the stations. One of the positions affect is the programming department. A radio station owner can centralize programming in one location and play the same or similar playlists on multiple stations (Camel_Knight, 2017). This decreases the number of decision makers that can now be more easily approached by record labels to introduce their artists. Record labels try to maximize their profits by presenting various songs of their artists. This saves them money on finding and scouting new talents and they can build on the brand of already established artists. This led to fewer artists with more songs, which represents a decrease in programming diversity on the artist level.

Hypothesis 2: The 1996 Telecommunications Act and Independent Artists

H2: The 1996 Telecommunications Act led to fewer independent artists in the Billboard Radio Songs Top 50.

Causal Mechanism:

The implementation of the 1996 Telecommunications Act improved the negotiation position of labels as mentioned in Hypothesis 1. Independent labels have less resources and connections than major labels to approach the few decision makers to convince them of their artists (Camel_Knight, 2017). This makes it increasingly difficult for independent artist to receive the required playtime to increase their exposure significantly. Therefore

the implementation of the Telecommunications Act and the resulting increased concentration of radio station ownership led to fewer independent artists considered by the programming departments. This decreased diversity as major labels produce the majority of music played on the radio.

Hypothesis 3: The 1996 Telecommunications Act and Bands

H3: The 1996 Telecommunications Act led to fewer bands in the Billboard Radio Song Top 50.

Causal Mechanism:

Like the other two hypotheses, Hypothesis 3 is based on the improved negotiation position of record labels with radio stations due to the implementation of the 1996 Telecommunications Act. The costs associated with a solo artist are lower than for a band, as some costs such as travel, accommodation and tour costs increase with every person associated with an act. Therefore labels increasingly lobby for their solo artists to decrease costs, while revenues are not affected by the composition of the musical act. This leads to decreased diversity as bands can be seen as more diverse than solo artists.

These hypotheses are tested in the analysis chapter of this paper. The following chapters will provide context on the 1996 Telecommunications Act and its previously researched effects on the market structure and format diversity in the radio industry.

2. The History of Radio Regulation before 1996

This chapter provides an overview of radio regulation in the United States before 1996. This includes the founding of the Federal Communications Commission (FCC), its predecessor and implemented regulations.

The United States of America first started regulating radio broadcasting through a dedicated federal agency in 1927. The created agency was called the Federal Radio Commission (FRC). The commission was created by the Radio Act of 1927, which had the intent to "regulate all forms of interstate and foreign radio transmissions and communications within the United States, its Territories and possessions" (69th Congress, 1927, p. 1). The FRC received the mandate to serve the public interest, convenience and necessity. The mandate to operate in the public interest has been remained throughout the existence of the FRC and Federal Communications Commission (Huntemann, 1999, p. 394). In the years before the FRC, radio licenses were granted by the Secretary of Commerce as established in the Radio Act of 1912. The FRC was granted the power to "classify radio stations, assign frequencies and wave-lengths, and regulate interference". (Friedrich & Sternberg, 1943, pp. 798-800). These were the first steps in regulating the increasingly popular medium.

In 1934, with the passing of the Federal Communications Act, the FRC was abolished and the Federal Communications Commission (FCC) was established. This was done based on a letter to congress from President Roosevelt. The creation of the FCC was done to increase clarity and effectiveness in the relationship of the federal government and utility providers. The newly founded FCC took over the responsibilities

of the FRC and the Interstate Commerce Commission, which now includes all services relying on wires, cables and radio waves for transmission (Roosevelt, 1934). The recommendation for the FCC was preceded by various discussions in congress focussing, which focussed on five areas of interest. These areas were: broadcasting by congressmen, concentration of control, adequacy of service - technical, adequacy of service – programming, and censorship and free radio (Friedrich & Sternberg, 1943, pp. 808-815). The most relevant issues for the purpose of this paper are the concentration of control and the programming adequacy of service.

Competition has been very important in the US economy, especially guaranteeing competition in the radio broadcasting has been deemed important by the congress. This is due to the radio being a medium to influence public opinion and it being an instrument for politicians to convey their message. It has already been established in the Radio Act of 1927 that no licences are to be granted to parties that have acted as an unlawful monopoly in a market. The 1934 act further added that a broadcasting license could be revoked in case of violation of anti-trust laws. (Friedrich & Sternberg, 1943, pp. 809-810). The act further included a section that limited the ownership of communication facilities with the goal to preserve competition in the industry. (73d Congress. Session II., 1934, p. 1078). These restrictions have already been amended before the 1996 act to allow higher levels of ownership. The limits were first expanded in the early 1980's to 12 stations nationwide before further being raised to 18 and later 20 (Sterling, 1997, p. 3).

The requirement for adequacy of service in terms of programming was included in the previously mentioned mandate to serve the public interest, convenience and necessity. The main focus herein lies with the definition of the public interest, which was

not clearly defined by the 1934 Act (Huntemann, 1999, p. 394). One aspect of the adequacy of service in programming was the importance of local culture and its representation on radio. There was a concern in congress that without local radio broadcasting the culture of the creative centres in Los Angeles and New York would overpower local American music, dancing and humour (Friedrich & Sternberg, 1943, p. 813). The conservation of localism in radio broadcasting was deemed important to act in the public interest.

Already before the 1996 Telecommunications Act, there were many changes to radio regulation in the United States aimed at the deregulation of the medium. Over the years there have been various changes that led to deregulation. In the 1970's under President Carter, the United States experienced an ideological shift towards the deregulation of various industries, as it was generally believed that the free market would result in increased efficiency (DiCola & Thomson, 2002, p. 8). The idea was that increased competition would result in higher efficiency and more diversity in the radio industry. Underperforming actors would be driven out of the market and replaced my more efficient entities.

Increased numbers of radio stations further lead to arguments favouring deregulation. The US experienced a constant increase in radio stations over the years. In the early 1980's the FCC decided to increase the number of stations that can operate on both the AM and FM bandwidths, which lead to a further increase in broadcasting stations (see Table 1: US Radio Stations 1970-2000) (DiCola & Thomson, 2002, p. 8; Federal Communications Commission).

Table 1: US Radio Stations 1970-2000[1]

Year	AM	FM	FM Education	Total
1970	4,269	2,083	399	6,751
1980	4,984	4,372	1,438	10,794
1990	4,978	4,357	1,435	10,770
2000	4,685	5,892	2,140	12,717

The rapid increased in the number of radio broadcasters led to the argument that the industry has grown to a sufficient level at which the market forces would guarantee that stations act in the public interest. Critics also argued that social utility would be increased through deregulation and that the radio could therefore better serve the public (Fowler & Brenner, 1981-1982, p. 210).

The increased number of stations also supported the argument that relaxed radio regulations would lead to increased format diversity. This argument is mainly based on Peter O. Steiner's 1952 dissertation "*Workable Competition in the Radio Broadcasting Industry"*. Steiner argues that a single owner of various stations would diversify their broadcasting to reach the largest audience, while multiple owners might imitate the most successful formats, which would lead to duplication of efforts and decreased diversity (Sterling, 1997, p. 5). This is in line with the theory of isomorphism, in which organisations try to copy other actors that they perceive to be more successful (DiMaggio & Powell, 1983, p. 152). A single owner of various stations was therefore argued to be increasing diversity in order to not compete with its own stations. The owners were

[1] The data for the years 1970, 1980 and 2000 is taken from the FCC and the data for 1990 from the paper by DiCola & Thomson as it was not available from the FCC

expected to use their stations to reach niches and minorities to get the largest possible audience in a market. If the single owner did not directly address a niche, it gave the competition an opportunity to change their programing to address the niche market and therefore increased diversity. With this argument in mind, in 1981, the FCC changed its definition of diversity. Before, the FCC guaranteed diversity of broadcasting, as they required the broadcasters to vary their broadcasting on a weekly basis. In light of the 1981 changes, diversity was now only based on the number of broadcasters based in a market (Bates & Chambers, 1999, p. 24).

In addition to the previously mentioned reasons, the US radio industry was in decline. In the 1980's radio faced increased competition from cable and broadcast television. In a study commissioned by the FCC, the situation was shown to be severe, with 50% of radio stations being unprofitable. At the turn of the decade, profits for AM and FM stations dropped by 50% and 33% respectively (Drushel, 1998, p. 4). This increased the pressure on the FCC to further deregulate the radio industry to increase efficiency. The radio station owners argued that only by increasing ownership levels, they would be able to regain profitability. The inability to spread fixed-costs over various stations made it impossible for owners to take advantage of economies of scale. Robert F.X. Sillerman of SFX Broadcasting argued that by just adding a second station to the portfolio, radio owners could cut costs equal to 25% in the first year. The radio industry also hoped for higher revenues as they could reach a bigger share of listeners (Grover, 1996).

The discussion on more lenient ownership caps already began before the first changes in the 1980's. Many large radio broadcasters did not agree with nationwide

ownership caps, while local ownership caps were generally accepted. The argument was often based on the definition of the relevant market. The radio industry argued that the relevant market for competition considerations should be on a local level and not on a national level, as they did not see any economic harm in ownership in various regional markets (Levi, 2000, p. 586). In order to further support their argument, radio station owners argued that the relevant product market also included cable and broadcasting television as they provide the same information and entertainment resources. This made these media direct competitors for radio stations (Levi, 2000, p. 595). This has guided the FCC to gradually increase nationwide ownership caps over the years, with a complete eradication of national caps by the 1996 Telecommunications Act. In 1953, station owners were allowed to control 7 AM and 7 FM stations nationwide. This limit was first increased in 1984 to 12 AM and 12 FM stations. In 1992 and 1994 the FCC increased the limits to 18 AM and 18 FM and then to 20 AM and 20 FM respectively. Local ownership caps were still in place with 1 AM and 1 FM station until 1992, when the local caps were increased to 2 AM and 2 FM in any local market (DiCola & Thomson, 2002, p. 10).

The general political viewpoint of deregulation, financial pressure on the radio industry, pressure from other media, increased number of actors on the radio and a redefinition of the relevant market for competition purposes led finally to the creation and implementation of the 1996 Telecommunications Act. The goals were to reduce the number of owners, increase profits, increase competition, and provide more diverse broadcasting.

3. The 1996 Telecommunications Act

This chapter provides an overview of the changes that were implemented in the 1996 Telecommunications Act.

In 1996, the FCC faced its first major overhaul since its creation in 1934. The 1996 Act did not only affect radio broadcasting but also other elements of the communication spectrum. The goal was to increase competition and to eliminate regulatory barriers in order to increase innovation and price competition. Besides the changes to radio broadcasting, the Act also affected cable television, telephone services and television broadcasters. The biggest change for these sectors was the permission of cross-ownership between the sectors. Local telephone services, for example, were now allowed to enter the long distance and cable market. (Drushel, 1998, p. 3).

The changes to radio broadcasting implemented in the Act affected both nationwide and local ownership caps. Nationwide caps have been eliminated completely and local caps have been increased drastically compared to the pre-1996 era. The local ownership caps were not uniform for all markets anymore, but depend on the number of stations active in the market, as can be seen in Table 2: Local Radio Ownership after 1996 (DiCola & Thomson, 2002, p. 11).

Table 2: Local Radio Ownership after 1996[2]

Market Size	Local Ownership Caps
45 or more stations	8 stations, no more than 5 in same band
30 - 44 stations	7 stations, no more than 4 in same band
15 - 29 stations	6 stations, no more than 4 in same band
Less than 14 stations	5 stations, no more than 3 in same band

The new local ownership limit in a market with more than 45 stations is now higher than the nationwide limit was until 1981. There is also an exemption to the local caps that states that the limit might be increased if the number of radio stations is increased (Sterling, 1997, p. 4). This refers to exceeding the local limits through a newly given licence and not through the merger with another broadcaster.

The new ownership caps were not the only changes affecting radio broadcasting in the 1996 Telecommunications Act. The act also included an extension of the license term from seven to eight years. The license term has previously been extended in 1981 from 3 years to seven. The extension does not have a large effect on competition in the industry, but the 1996 Act furthermore changed the process of renewing a license. Pre-1996, radio stations had to renew their licenses with the FCC, which was often a costly process. In the new FCC regulations however, radio stations are guaranteed to have their license renewed, called "renewal expectancy", if they are serving the public interest, have not seriously violated any rules or shown a "pattern of abuse" (Sterling, 1997, p. 2). If

[2] With no single owner being allowed to own more than 50% of stations in a market. In a local market with 9 stations, the local ownership cap is 4 stations, instead of the 5 shown in Table 2: Local Radio Ownership after 1996

these conditions are not met, the FCC can deny the renewal or grant reduced license terms based on certain conditions that have to be met. This new process heightened the entry-barriers for new stations drastically. Before 1996, already established stations had to compete for their license with new applicants. This process has now been suspended and even if there has been an infringement of the regulations, the FCC was not allowed to consider new applicants until the renewal has been formally denied (Sterling, 1997, p. 3).

In order to monitor the developments in the communications sector, the 1996 Telecommunications Act also included biennial reviews. These are used to see whether the changes had the desired effects of increased competition and diversity. These reviews however have not led to any changes in ownership caps in the timeframe examined in this thesis (Federal Communications Commission, 2016).

The implementation of the 1996 Telecommunications Act has eliminated all national ownership caps and drastically increased local ownership limits. The Act further introduced renewal expectancy, which leads to the automatic renewal of an existing station's license if it serves the public interest and has not violated any rules by the FCC.

4. The Effects of the 1996 Telecommunications Act on the Radio Industry

This chapter outlines the effects the 1996 Telecommunications Act had on the market structure and format diversity in the radio industry. The effects are categorised on a national, local and format level.

The implementation of the 1996 Telecommunications Act led to an immediate surge in mergers and acquisitions of radio stations. Within days after the act was passed on February 8th, Jacor acquired Citicasters Inc. and the Noble Broadcast Group Inc. for $774 million. Through the acquisition of Noble, Jacor became the first company to reach the local ownership cap of 8 stations (Petrozello & Rathbun, 1996). The acquisition of Granum Holdings LP's 12 stations by the Infinity Broadcasting Corp. for $410 million set a new record for a single radio-only transaction less than one month after the Telecommunications Act was passed. This acquisition increased Infinity's holdings to 46 stations. Another notable transaction was the acquisition of U.S. Radion's 13 stations through Clear Channel Communications Inc. for $140 million, which boosted them to 52 stations nationwide (Petrozello & Rathbun, 1996). These acquisitions happened immediately after the Act and the development further continued throughout 1999, after which the number of mergers started to slow down.

Various studies have identified the emergence of oligopolies in both the national and local markets and in form of format oligopolies (DiCola & Thomson, 2002, p. 17). Format oligopolies occur when few owners have significant holdings across radio formats, such as Top 40 or Country. Most researchers agree on the development of

national and local oligopolies, but provide different measures (DiCola, 2006) (DiCola & Thomson, 2002) (Wirth, 2007). The National Association of Broadcasters (NAB) however disagrees with the evaluation of the radio industry as a national oligopoly. The NAB publicly contested DiCola's findings in a press release. The NAB argues that radio is one of the least consolidated mediums with almost 4,000 individual station owners. They further use music labels, movie studios and cable TV providers as example for more consolidated industries, since between 5-10 companies in these markets account for 84%, 99%, and 89% of revenues in their fields respectively. In contrast, the NAB argues that the top ten radio owners only account for 49% of industry revenues nationwide (National Association of Broadcasters, 2002).

The effects on format diversity are more contested, as different researchers use different variables for their studies (DiCola, 2006) (DiCola & Thomson, 2002) (Chipty, 2007). Some researchers further argue that an increase in formats in local markets does not represent diversity of programming due to large overlaps between the formats (DiCola, 2006, p. 7). The effects on music programming diversity based on different artists in the Billboard Radio Songs Top 50 is analysed in the analysis chapter.

4.1. National Radio Ownership Concentration

This section provides information on radio consolidation on a national level resulting from the Telecommunications Act of 1996 and its effects on advertising prices and listenership ratings.

In order to assess competition in a market one has to first define the relevant market. This includes both the geographic and product market. These are the two relevant markets the European Commission and the US Federal Trade Commission use in

evaluating mergers. The definition of the relevant market helps to more precisely define the competition problem and helps to gain a preliminary assessment. The competition authority defines the relevant market by considering all products or services that can be used as a substitute (Bishop & Walker, 2010, p. 109).

The geographic market for radio broadcasting in this case is the United States of America. The definition of the product market is however slightly more complex. The FCC in their 2002 Biennial consider the radio advertising market, radio listening market and radio program production market to be the relevant markets for the analysis of competition problems (Federal Communications Commission, 2002, pp. 96-99). There have been some discussions on whether television broadcasting and cable are to be considered effective substitutes for radio, with which the FCC disagrees in its Biennial reviews (National Association of Broadcasters, 2002) (Federal Communications Commission, 2002). Their decisions are based on various studies that state that these three markets are distinct from other media such as television and newspapers and therefore only radio is included in the relevant product market definition. DiCola also based the analysis on the advertising and listener share as well as ownership of stations to calculate concentration levels (2002 & 2006).

The national ownership levels clearly show that radio broadcasting has developed into an oligopoly after 1996. In 1997, the largest owner of radio stations was Capstar Broadcasting Partners with 299 stations nationwide. In the same year, the 10 largest holdings owned 1,128 stations of the 10,257 commercial stations (DiCola & Thomson, 2002, p. 21; Chipty, 2007, pp. 6-7). Eight years later, in 2005, the largest national owner of radio stations was Clear Channel Communications, owning 1,183 stations, which is

more than the largest 10 owned in 1997. The top 10 in 2005 now owned 2,400 stations, which represents 22 percent of all stations. (Chipty, 2007, p. 7). This does not represent a nationwide oligopoly based on ownership, but shows that there are a few large players and many smaller players. These smaller players however faced increased dangers of acquisition. The number of owners experienced a decline of 39% between 1996 and 2007. Before the wave of mergers and acquisition, there were 5,133 individual owners. This number has declined to 3,121 in 2007 (Williams, 2007, p. 5). Radio broadcasting with the relevant geographic market being the whole United States measured on ownership levels leads to the conclusion that there is no ownership oligopoly, but that concentration of ownership has increased.

Besides the measuring concentration based on ownership levels, the literature also analyses whether there is a nationwide oligopoly based on advertising revenue. Due to large differences in market size and their demographics, some stations can charge higher prices for their advertising slots. As can be seen in Table 3: Top Five Owners by Estimated Revenue Share, the top five commercial station owners have revenues of 53.10% of all stations, while only holding a market share of just under 15%.

Table 3: Top Five Owners by Estimated Revenue Share

Name	Number of Stations [3]	Revenue Share[4]	Station Market Share
Clear Channel	1,183	26.30%	10.9%
Infinity	178	16.30%	1.6%
Cox Radio	78	3.60%	0.7%
Entercom	85	3.50%	1.0%
ABC/Disney	71	3.40%	0.7%
Total:	**1,595**	**53.10%**	**14.9%**

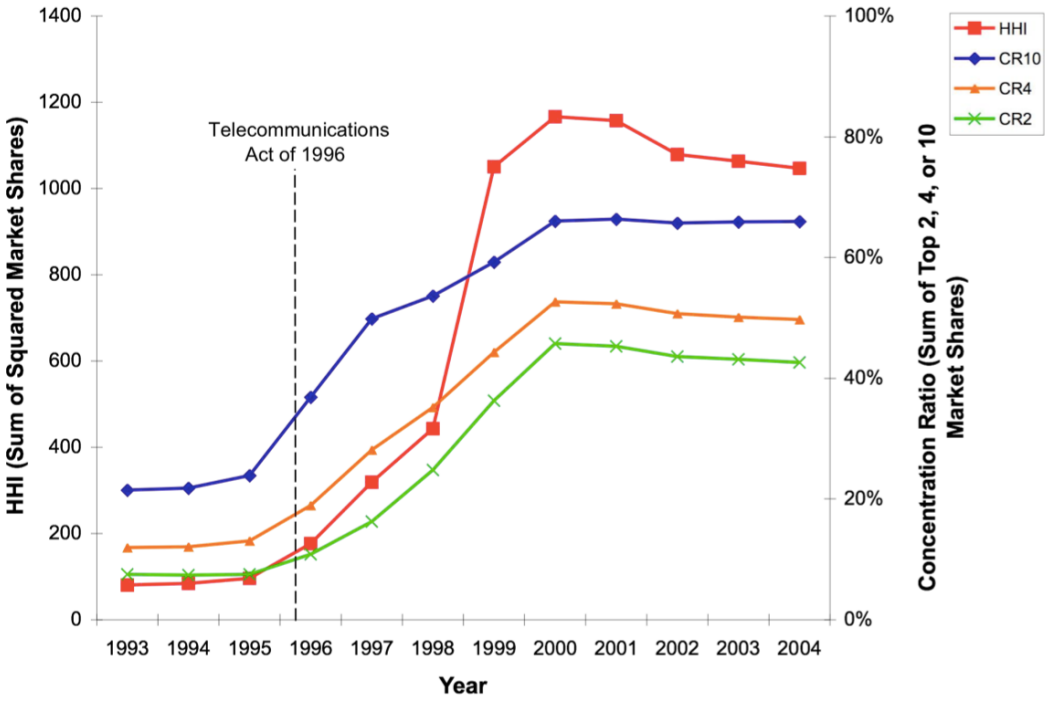
The large share of revenues by the 5 highest earners is pointing towards an oligopoly in radio broadcasting, with a revenue share of over 50%. In order to better understand the market concentration, DiCola (2006) calculates the Herfindahl-Hirschman Index (HHI) as well as the concentration ratios for the 2, 4 and 10 largest actors, denoted CR2, CR4 and CR10 respectively for the years 1993-2004 as shown in Figure 1: Commercial Radio Revenue Concentration. The concentration ratios in Figure 1 as well as Table 3 however do not take the relative size of the companies or the total number of actors into account, which makes the HHI a more complete measurement of market concentration (Bishop & Walker, 2010, p. 67). As can be seen in Figure 1, there has been a steep increase after the implementation of the 1996 Telecommunications Act in all four measures. A flattening or decline of the measures follows the steep increase after 2000. The HHI at its peak reached 1166 before it decreased slightly to 1046 in 2004. This is not an excessively high number, but high enough to raise concerns regarding future mergers in the industry. The justice department considers industries with a HHI of 1000-1800 to

[3] The number of stations and the market share are taken from Chipty (2007) Table 2 for the year 2005. The station data was not available for 2004, but the market share data has not changed significantly between 2004 and 2005

[4] The revenue share is taken from DiCola (2006) Table 1-4 for the year 2004.

be concentrated. The radio broadcasting reached a level above 1000 as measured by the HHI in 1999 (DiCola, 2006, p. 42).

Figure 1: Commercial Radio Revenue Concentration[5]



The concerns with a highly concentrated industry are that it leads to increased prices as compared to perfect competition. There has been previous research regarding the price levels of advertising based on various markets (Chipty, 2007). The research differentiates between cost per point ("CPP") and cost per thousand ("CPM"). CPP represents the advertising costs to reach 1% of the listeners, while CPM measures the costs of reaching 1000 listeners is a market. The AM drive should not be confused with the radio band AM, but stands for the morning rush hour, during which the costs are the highest. (Chipty, 2007, p. 39). The results are displayed in Figure 2: Advertising Prices based on HHI. It is visible that the CPP decreases with increased competition, this is

[5] DiCola (2006) used the Media Access Pro database by BIA Financial Networks, which is a commercial database and therefore not accessible to the researcher of this paper.

according to Chipty (2007) due to the fact that more highly concentrated markets tend to be smaller and reaching an additional percentage point can be achieved at lower costs. The local ownership caps allow only up to 8 stations in a market with 45 or more stations but up to 5 stations in markets with below 14 total stations, which represents 35%-50% in the smallest markets and 18% in the largest markets. There is however an increase in all three CPP categories, for HHI values above 3,000. This can lead to the conclusion that advertising prices increase slightly in markets with very high concentration. The CPM increases steadily with increased concentration of market power, during morning rush hours, the evening and the daily average. This leads to show that increased market concentration in a radio broadcasting market leads to higher advertising costs. This holds true for both radio bands as well as only FM stations.

Figure 2: Advertising Prices based on HHI[6]

		Means for Stations in Markets with HHI in Range				
Variable	Mean for All Stations	0 ≤ HHI < 1,000 [1]	1,000 ≤ HHI < 2,000 [2]	2,000 ≤ HHI < 3,000 [3]	3,000 ≤ HHI < 4,000 [4]	4,000 ≤ HHI [5]
All Stations						
CPP, AM Drive	67.1	227.5	54.5	25.8	31.3	31.4
CPP, Evening	43.1	126.8	35.5	20.9	28.6	27.4
CPP, Average	61.3	200.3	50.6	24.9	30.5	31.0
CPM, AM Drive	12.2	8.4	10.6	13.3	17.5	21.5
CPM, Evening	9.9	5.0	7.8	11.4	17.0	19.6
CPM, Average	11.8	7.5	10.1	13.0	17.4	21.0
Number of Stations	24.2	47.7	26.0	16.9	13.0	8.6
FM Only Stations						
CPP, AM Drive	67.1	227.5	54.5	25.8	31.3	31.4
CPP, Evening	43.1	126.8	35.5	20.9	28.6	27.4
CPP, Average	61.3	200.3	50.6	24.9	30.5	31.0
CPM,AM Drive	12.2	8.4	10.6	13.3	17.5	21.5
CPM,Evening	9.9	5.0	7.8	11.4	17.0	19.6
CPM,Average	11.8	7.5	10.1	13.0	17.4	21.0
Number of Stations	14.4	23.5	15.8	11.2	8.8	5.6

Chipty (2007) further conducts a regression analysis based on all stations using Equation 1: Market Level Regression with Demographics (Chipty, 2007, p. 21).

[6] The data is complied by Chipty (2007) by using the FCC Ownership Database, Edison Airplay Database and SQAD. The last to databases are commercial databases, which made it not possible for me to access the data directly.

Equation 1: Market Level Regression with Demographics

$$Outcome_i = \beta_o + \beta_1 HHI_i + \beta_2 Stations_i + \beta_3 HHI_i \text{ x } Stations_i + \beta_4 Stations^2 + \beta_5 Local\ Newspaper_i + \beta_6 Local\ Television_i + \beta_7 National\ Radio_i + \beta_8 Demographics + u_i$$

In this equation, HHI_i represents the ownership HHI, $Stations_i$ is the number of stations, HHI-x-Stations is the interaction term to control for the effect of concentration in different sized markets, $Stations^2$ is the number of stations squared, Local $Newspaper_i$ and Local $Television_i$ are stations that are commonly owned by a newspaper or TV channel. National $Radio_i$ is the total number of radio stations the owner in market i owns nationally. The $Outcome_i$ in this case measured is advertising prices. Demographics includes various characteristics, such as total population, number of retail establishments and racial diversity that predict station outcomes (Chipty, 2007, pp. 21-22). Using these parameters, Chipty runs an OLS regression. The results can be found in Figure 3: Market Level Regression Estimating Effects on Advertising Prices. The results estimate that there is no significant correlation for market concentration and advertising prices. The increase of stations in a market however shows a significant negative correlation between the number of stations and the price of advertising. An additional radio station in the market represents increased competition that leads to decreased advertising prices as radio stations lower their prices to attract more advertisements.

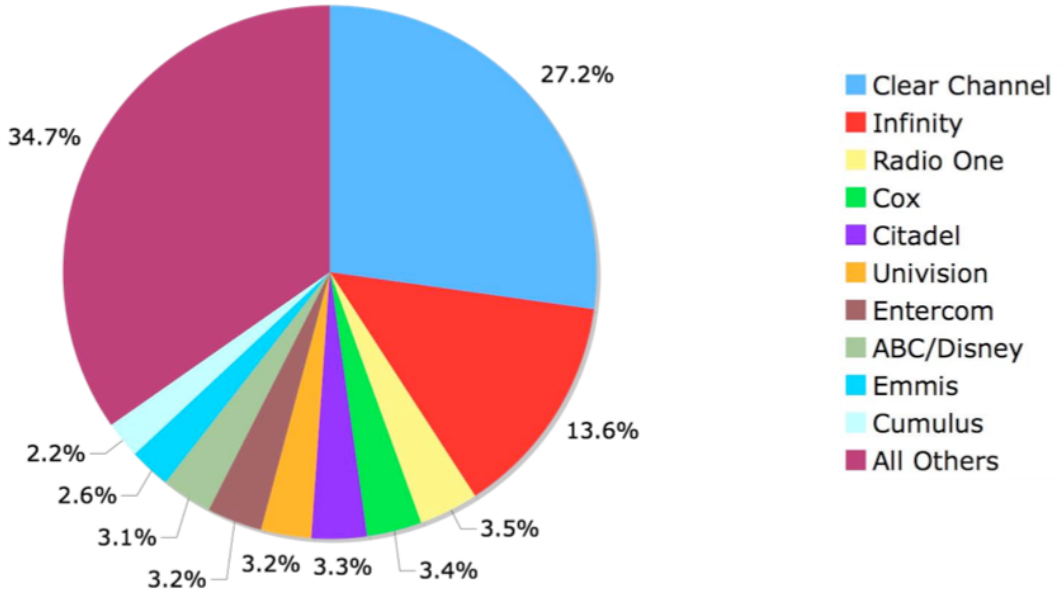
Figure 3: Market Level Regression Estimating Effects on Advertising Prices[7]

	All Stations											
	HHI		Stations		Percent of Stations with Cross-Owned Newspaper		Percent of Stations with Cross-Owned TV Station		Number of Commercial Stations Owned Nationally by In-Market Owners			
Dependent Variable	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Adj R-Squared	N
CPP, AM Drive	-150.96	(1.42)	1.35	(1.47)	-59.43	(-0.25)	109.01 *	(2.12)	0.0117	(1.56)	0.70	241
CPP, Evening	-91.33	(1.47)	0.60	(1.11)	29.59	(0.21)	57.01	(1.90)	0.0061	(1.38)	0.64	241
CPP, Average	-129.84	(1.39)	1.15	(1.43)	-44.72	(-0.21)	104.83 *	(2.33)	0.0105	(1.59)	0.70	241
CPM, AM Drive	-1.97	(0.24)	-0.30 *	(4.24)	3.44	(0.19)	0.95	(0.24)	-0.0006	(-1.08)	0.33	241
CPM, Evening	-3.72	(0.40)	-0.39 *	(4.81)	24.20	(1.14)	0.85	(0.19)	-0.0005	(-0.70)	0.41	241
CPM, Average	-2.44	(0.31)	-0.33 *	(4.83)	8.25	(0.46)	2.53	(0.66)	-0.0004	(-0.70)	0.38	241
With Demographics:												
CPP, AM Drive	49.87	(0.94)	-1.02 *	(2.17)	6.30	(0.05)	38.64	(1.53)	-0.0069	(-1.79)	0.94	236
CPP, Evening	26.55	(0.77)	-0.60 *	(1.98)	41.45	(0.53)	14.51	(0.88)	-0.0041	(-1.64)	0.90	236
CPP, Average	48.54	(1.06)	-0.85 *	(2.11)	9.58	(0.09)	40.89	(1.87)	-0.0057	(-1.73)	0.94	236
CPM, AM Drive	1.96	(0.25)	-0.24 *	(3.54)	8.99	(0.52)	-1.30	(-0.36)	-0.0011	(-1.91)	0.47	236
CPM, Evening	-7.14	(0.75)	-0.33 *	(3.96)	16.53	(0.77)	1.58	(0.35)	-0.0008	(-1.18)	0.44	236
CPM, Average	-1.38	(0.18)	-0.26 *	(4.00)	12.02	(0.71)	1.01	(0.28)	-0.0008	(-1.49)	0.50	236

The advertising revenue share, as previously mentioned depends strongly on the size of a market and the share of listeners a radio broadcaster reaches. This in turn depends on the strength and location of the antenna. With an increase of radio stations per owner, the share of listeners also increases. The popularity of a radio station depends besides the location or size of the market also on other factors. These factors are the type and quality of radio programming, the frequency, personal preferences and the advertising a radio stations airs. The listener share of the ten largest stations can be seen in Figure 4: Listener Share 2005. Arbitron (now Nielson) gathers this type of data. The percentages are based on the number of people listening to a radio station for at least 5 minutes within a fifteen-minute period, (DiCola, 2006, pp. 38-39). Figure 4 shows that the five largest station owners reach 51% of all listeners in the United States and the 10 largest owners reach almost two-third of all listeners. Besides the 2005 figures, there is no additional information available on how this has developed. It can however be assumed that Clear Channel could not have reached 27.2% of all listeners with the allowed maximum of 40 stations before 1996 (DiCola, 2006, p. 41).

[7] See footnote 5 for data sources. Asterisk shows significance at 5% level.

Figure 4: Listener Share 2005[8]



Besides listenership's relation to possible advertising revenue, listenership can also be used as a proxy for radio consolidation's effect on public welfare. Chipty (2007, p. 41) argues that if consolidation leads to a decrease in programming quality, people spend less time listening to the radio and vice versa. The argument is based on the assumption that listeners would switch to other media to replace radio. This is tracked using the so-called average quarter hour or AQH ratings for adults 18 and older. These AQHs are based on diaries conducted by Arbitron, in which respondents track if they have listened to the radio and for how long (Chipty, 2007, p. 15). Figure 5: Listenership by HHI shows that markets with higher market concentrations have greater listenership. Overall listenership in concentrated markets is higher than in less concentrated markets,

[8] Figure taken from DiCola (2006, p. 40). The data again is taken from BIA Financial Networks

even though there are fewer radio stations available (Chipty, 2007, p. 42). This might be due to the fact that in higher concentrated markets, fewer alternatives to broadcast radio are available, as these are usually smaller markets and less metropolitan.

Figure 5: Listenership by HHI[9]

		Means for Stations in Markets with HHI in Range				
Variable	Mean for All Stations	0 ≤ HHI < 1,000 [1]	1,000 ≤ HHI < 2,000 [2]	2,000 ≤ HHI < 3,000 [3]	3,000 ≤ HHI < 4,000 [4]	4,000 ≤ HHI [5]
All Stations						
Average Rating	0.009	0.006	0.008	0.010	0.012	0.018
Average Rating, AM Drive	0.012	0.008	0.010	0.014	0.016	0.025
Average Rating, Evening	0.003	0.002	0.003	0.003	0.004	0.006
Number of Stations	24.199	47.677	26.000	16.851	13.000	8.571
FM Only Stations						
Average Rating	0.009	0.006	0.008	0.010	0.012	0.020
Average Rating, AM Drive	0.012	0.008	0.011	0.013	0.015	0.028
Average Rating, Evening	0.003	0.002	0.003	0.003	0.004	0.007
Number of Stations	14.359	23.471	15.802	11.203	8.767	5.571

Chipty further conducts an OLS regression showing the effects of the radio ownership structure on listenership, as can be seen in Figure 6: Effect of Ownership Structure on Listenership.

Figure 6: Effect of Ownership Structure on Listenership[10]

	All Stations											
	HHI		Stations		Percent of Stations with Cross-Owned Newspaper		Percent of Stations with Cross-Owned TV Station		Number of Commercial Stations Owned Nationally by In-Market Owners			
Dependent Variable	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Adj R-Squared	N
Average Rating	0.0023	(0.54)	-0.0002 *	(5.28)	0.0202 *	(2.13)	-0.0028	(-1.31)	0.0000005	(1.53)	0.5141	249
Average Rating, AM Drive	-0.0019	(0.30)	-0.0003 *	(6.07)	0.0318 *	(2.26)	-0.0036	(-1.13)	0.0000010 *	(2.22)	0.5154	249
Average Rating, Evening	0.0002	(0.11)	-0.0001 *	(3.76)	0.0061	(1.48)	-0.0015	(-1.57)	0.0000002	(1.63)	0.3308	249
With Demographics:												
Average Rating	-0.0035	(0.83)	-0.0002 *	(5.75)	0.0125	(1.42)	0.0009	(0.47)	0.0000006 *	(1.99)	0.6190	242
Average Rating, AM Drive	-0.0106	(1.75)	-0.0003 *	(6.41)	0.0202	(1.58)	0.0016	(0.56)	0.0000012 *	(2.70)	0.6235	242
Average Rating, Evening	-0.0016	(0.89)	-0.0001 *	(4.47)	0.0024	(0.64)	-0.0002	(-0.28)	0.0000002	(1.41)	0.4830	242

The results suggest that increased concentration in ownership does not have a significant effect on listenership. It can therefore be argued that people do not stop listening to the radio when the concentration in their market increases. The data suggests that listenership however does increase if the local stations are owned by a large national station owner. Whether this is due to increased programming quality however is beyond the scope of the data and this research. A survey conducted by DiCola and Thomson

[9] Taken from Chipty (2007, Table 33)
[10] Taken from Chipty (2007, Table 34)

however suggest that 29% of the people interviewed, said that they listen more to the radio than they did 5 years ago, while another 29% of the interviewees answered that they listen to the radio less. Amongst the 29% listening less, only 21% indicated that they do not like the music on the radio anymore (DiCola & Thomson, 2002, pp. 69-72).

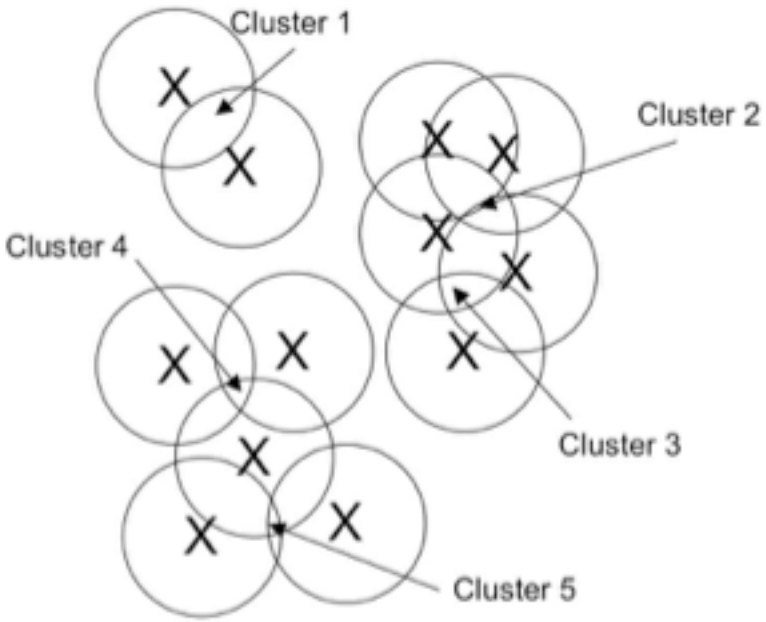
The existing literature shows that the implementation of the 1996 Telecommunications Act led to increased ownership concentration on a national level. While the ownership concentration has increased, it cannot be called an oligopoly. The largest five owners based on revenue only own 14.9% of all stations as seen in Table 3. Research by Chipty shows that increased ownership concentration does not have a significant effect on advertising prices. Due to the large differences in station reach and audience however, ownership concentration is not the most appropriate definition. The effects on advertising prices should therefore be further researched based on other concentration measures, this is however outside the scope of this paper. When considering the concentration based on listenership, one can see that the largest five stations reach just over 50% of all radio listeners. The same can be said for the concentration of advertising revenues, where the top five stations earn about 53% of the national revenue. It can therefore be concluded that the 1996 Telecommunications Act did not result in an ownership oligopoly in the radio industry. The Act however did lead to an oligopoly based on revenues and listenership.

4.2. Local Ownership Concentration

The 1996 Telecommunications Act did not only remove nationwide ownership caps in the radio industry, but also increased local ownership caps substantially. Before 1992, any one owner was allowed to own a maximum of 1 AM and 1 FM in any local market.

The local ownership caps were first increased in 1992 to allow owners to control up to 4 stations but no more than 2 AM and 2 FM stations in any local market. The local markets were defined using the FCC's Single-Contour Market Definition. The FCC used this approach from 1992 until 2004. Local markets were based on station clusters in areas with a lot of overlap (DiCola, 2006, p. 61). This can be seen in Figure 7. Each cluster defines one local market. After 2004, the FCC changed its market definition to represent the Arbitron metropolitan areas, which redefined a local market based on geographic boundaries. All the clusters in Figure 7 could now be within a single market, if they happen to be in the same geographic metropolitan. The changes in the definition led to surpassing of the local ownership caps in 104 of the 297 Arbitron markets. The excessive holdings are grandfathered into the new market definition and radio station owners do not have to divest from their holdings in these markets (DiCola, 2006, p. 62).

Figure 7: Signal-Contour Market Definition[11]



[11] Taken from DiCola (2006) p. 61

In 1996, the FCC changed its 2 AM and 2 FM local station ownership rule and increased it to limits based on local market size, as can be seen in Table 2: Local Radio Ownership after 1996. Besides the ownership caps in Table 2, no single owner was allowed to own more than 50% of stations in the local market. This was also a slight change compared to 1992. Pre-1996, owners were allowed to own up to 50%, while the 1996 Act allowed ownership to no more than 50%. This now allows stations to own 50% of station, while before the Act the limit was less than 50% (DiCola, 2006, p. 59). The new ownership caps allow for more concentration in all local markets.

The changes in concentration on a local level are analysed by Drushel (1998). In his research of the 50 largest US radio markets as defined by Arbitron, the research shows an HHI increase from 717.23 in the spring of 1992 to an HHI of 1423.65 in the spring of 1997 (Drushel, 1998, p. 12). The HHI represents ownership concentration in these markets. Using the standard definition of the HHI, values below 1000 can be interpreted as unconcentrated, 1000-1800 represents a concentrated market and values above 1800 represent heavy concentration. In the research, Drushel finds that in 1992 there were 41 unconcentrated markets and 9 concentrated markets. In 1997 there were 7 unconcentrated, 32 concentrated and 11 heavily concentrated local markets amongst the largest 50 US radio markets. He concludes that concentration in almost all, except three markets increased. The increased concentration can be found across all market sizes (Drushel, 1998, p. 13).

DiCola (2006) expands this research into local ownership concentration by looking at all 297 Arbitron markets. The markets are categorized into 12 groups, based on the population range and the local concentration share (LCS). The LCS represents the share

of listeners that listen to stations in their defined home market. In small markets, people often prefer the radio stations from larger neighbouring market. Another reason for people to listen to stations outside their defined home market is the overlap of market as can be seen in Figure 7. Here clusters 2 and 3, and 4 and 5 overlap. In these places people might listen to stations that are outside their home market (DiCola, 2006, p. 54). Using population size and LCS ranges, all stations are classified into groups as can be seen in Figure 8.

Figure 8: Arbitron Market Classification[12]

Group	Population Range	LCS Range	Number of Markets
1	4,000,000 +	70% +	12
2	2,000,000 – 4,000,000	55% +	13
3	1,000,000 – 2,000,000	55% +	27
4	600,000 – 1,000,000	55% +	23
5	350,000 – 600,000	45% +	38
6	200,000 – 350,000	70% +	32
7	200,000 – 350,000	45% - 70%	23
8	50,000 – 200,000	70% +	39
9	50,000 – 200,000	45% - 70%	39
10	50,000 – 350,000	0% - 45%	23
11	350,000 – 1,000,000	0% - 45%	23
12	1,000,000 – 4,000,000	0% - 45%	5

Using these 12 groups, DiCola researches the changes in concentration based on a listenership HHI and advertising revenue HHI from 1996 until 2005. In 1996 the listenership HHI in the different groups ranges from 616 in Group 12 to 2214 in Group 8. The concentration in 1996 is already relatively high with only groups 12, 1 and 11 being below a HHI of 1000. In 2005 however all 12 groups have a listenership HHI above 1000. The lowest and highest HHI can still be found in groups 12 and 8, respectively with 1396 and 3634. Steadily increasing concentration can be observed in all markets from

[12] Taken from DiCola (2006) p. 55

1996-2005 (DiCola, 2006, p. 68). The listenership concentration measured by the HHI exceeds 1800 in 232 of the 297 Arbitron markets.

An analysis by DiCola based on the revenue share measured HHI provides similar results suggesting increased concentration in all market groups. These developments include data from 1993-2004. The revenue based HHI ranged from 840 (Group 1) to 5017 (Group 10) in 1993. These values increase to a range of 1646 (Group 12) to 5533 (Group 10) in 2004. Overall 281 of the 297 Arbitron markets have a HHI above 1800 in 2004 (DiCola, 2006, pp. 67-68).

These three research papers show that there has been increased concentration in the US radio industry on a local level. HHI based on ownership, listenership and revenue share all increase throughout all local markets after the implementation of the 1996 Telecommunications Act.

4.3. Format Oligopolies

This section reviews the effects of the 1996 Telecommunications Act on format diversity on the radio. Format diversity does not concern itself with ownership, listener ratings or revenue concentration of stations, but with the similarities or differences between various radio formats and their control by station owners. There is quite some research trying to understand the effects of the Telecommunications Act on format diversity (Wirth, 2001) (DiCola & Thomson, 2002) (DiCola, 2006) (Chipty, 2007) (Wirth, 2007). The two papers by Wirth focus on the ownership concentration of radio formats in the United States, which is also discussed in the papers by DiCola. The paper by Chipty analyses whether increased format concentration has an effect on the number of formats offered in a market. DiCola's papers from 2002 and 2006 further analyse if

format variety also represents programming diversity. This analysis shows whether there has been increased overlap amongst the various formats. The papers by DiCola therefore do not only focus on the diversity of formats that are offered but also the diversity between those formats.

In his 2001 paper, Wirth identifies ten nationwide format oligopolies. These oligopolies are documented, when over 50% of radio listeners in a specific format are reached by four station groups (Wirth, 2001, p. 249). The creation of a format oligopoly has various advantages for station owners. The owner groups can save money on format research and centralize the decision making process in the programming departments, as they do not have to employ a director in every station. This development has been confirmed in the conducted interview, in which the interviewee says that the programming director of his station was responsible for various stations in different markets (Camel_Knight, 2017). The concentration does not only create cost savings when centralizing the programming decisions, these savings can also be achieved, by only focusing on certain formats (Wirth, 2001, pp. 251-252). In other words, a station owner can reduce costs by focussing on only a few formats and by acquiring as many stations as possible in these formats. By focussing on certain formats, the stations can increase their knowledge and the associated audiences of these formats, and become more efficient. Wirth however also argues that there are disadvantages to this strategy, as radio is still dominantly a local business (Wirth, 2001, p. 253). This might be true for factors such as advertising sales, but does not seem to be true for the programming departments. The interviewee Camel_Knight responds largely negative on the question whether local artists were of interest to the programming departments and offers an

example of a project to promote local artists, which was shut down by Clear Channel (Camel_Knight, 2017).

Wirth finds ten format oligopolies in the fourteen examined station formats in 1991, based on an ownership level of over 50% by the four largest station groups. The formats are based on the Arbitron designations and based on the fourteen most popular formats. The research shows ownership levels ranging from 53%-74%[13] by the four largest owners in these formats (Wirth, 2001, pp. 255-256). DiCola and Thomson expand the research in 2002. In the research, DiCola and Thomson examine both the format consolidation based on the stations self-reported formats and the formats categories used by the Media Access Pro database (DiCola & Thomson, 2002, pp. 37-38). Their findings suggest that there is a format oligopoly in 28 of the Top 30 self-reported music formats and in 17 of the 19 Media Access Pro categories by BIA Financial Networks. The results can be seen in Figure 9 and Figure 10.

[13] Top 40: 63%, Country: 56%, Oldies: 56%, Soft Rock/Lite Rock: 56%, Hot Adult Contemporary: 62%, Urban 58%, Rock: 59%, Adult Album Alternative: 53%, Adult Standards: 54%, 70s: 74%.

Figure 9: Top 4 Ownership Share in Top 30 Self-Reported Formats[14]

Self-Reported Format	Listeners (in Millions)	Top 4 Firms, by Listeners	Top 4 Share
Country	33.9	Clear Channel, Viacom, Citadel, Cox	52.6%
CHR	27.3	Clear Channel, Viacom, Entercom, Citadel	73.5%
Oldies	21.9	Viacom, Clear Channel, Cox, Entercom	67.8%
AC	21.7	Clear Channel, Viacom, Bonneville, Entercom	51.1%
Classic Rock	19.8	Clear Channel, Viacom, Citadel, Susquehanna	55.0%
Urban	15.5	Radio One, Clear Channel, Inner City, Viacom	64.9%
Alternative	13.5	Viacom, Clear Channel, Emmis, ABC Radio	71.5%
Hot AC	11.6	Clear Channel, ABC Radio, Viacom, Entercom	58.4%
Urban AC	10.3	Clear Channel, Radio One, Emmis, Cox	71.9%
Rock	9.2	Clear Channel, Viacom, Entercom, Greater Media	65.5%
AOR	9.0	Clear Channel, ABC Radio, Citadel, Cox	51.4%
Soft AC	8.2	Clear Channel, Viacom, Bonneville, Cox	66.4%
Top 40	7.4	Clear Channel, Jefferson-Pilot, Bonneville, Viacom	73.1%
CHR/Rhythmic	6.8	Clear Channel, Viacom, Cox, Radio One	75.0%
Smooth Jazz	6.1	Clear Channel, Viacom, Radio One, ABC Radio	69.7%
Spanish	5.1	SBS, Entravision, Lotus, Big City Radio	77.1%
Mexican	4.8	HBC, Liberman, Entravision, SBS	80.7%
Classical	4.5	New York Times, Bonneville, Mt Wilson FM, WttW	63.8%
Classic Hits	4.1	Greater Media , Clear Channel, Bonneville, Viacom	57.7%
Modern Rock	4.0	Clear Channel, Entercom, Susquehanna, Citadel	54.2%
80s Hits	4.0	Clear Channel, Viacom, Cox, Beasley	61.4%
Lite AC	3.9	Clear Channel, Entercom, Viacom, South Central	88.7%
Modern AC	3.5	Clear Channel, Viacom, ABC Radio, Bonneville	71.4%
Gospel	3.2	Radio One, Clear Channel, Mortenson, Viacom	56.1%
Soft Rock	3.0	WEAZ-FM Radio, Viacom, Clear Channel, Cox	68.9%
Christian Contemp.	2.7	Salem, Crista Ministries, Crawford, Clear Channel	68.9%
Adult Standards	2.6	Clear Channel, Cleveland Classical, Crawford, Cumulus	38.2%
Nostalgia	2.3	Clear Channel, Sandusky, Renda, Entercom	49.9%
AAA	2.3	Susquehanna, Clear Channel, Greater Media, Viacom	55.8%
Spanish AC	1.9	HBC, Big City Radio, Entravision, Lotus	92.8%

[14] Taken from DiCola & Thomson (2002), p. 37

Figure 10: Top 4 Ownership Share in 19 BIA Formats[15]

BIA Format Category	Listeners (in Millions)	Top 4 Firms, by Listeners	Top 4 Share
Adult Contemporary	58.7	Clear Channel, Viacom, Entercom, Bonneville	54.1%
CHR/Top 40	50.7	Clear Channel, Viacom, Cox, Citadel	69.0%
News	38.0	Viacom, Clear Channel, ABC Radio, Entercom	66.6%
Urban	37.9	Clear Channel, Radio One, Emmis, Inner City	64.2%
Rock	36.5	Clear Channel, Viacom, Greater Media, Entercom	55.4%
Country	34.0	Clear Channel, Viacom, Citadel, Cox Radio	52.5%
AOR/Classic Rock	29.3	Clear Channel, Viacom, Citadel, ABC Radio	52.1%
Oldies	22.6	Viacom, Clear Channel, Cox, Entercom	65.8%
Spanish	22.1	HBC, SBS, Entravision, Liberman	76.2%
Talk	10.8	Clear Channel, Viacom, ABC Radio, Inner City	66.9%
Religion	9.5	Salem, Clear Channel, Radio One, Crawford	49.2%
Sports	9.2	Viacom, Clear Channel, Susqhna., ABC Radio	64.3%
Jazz/New Age	9.0	Clear Channel, Viacom, Emmis, Jefferson-Pilot	70.2%
Nost./Big Band	6.1	Clear Channel, Cox, Entercom, Greater Media	40.6%
Classical	4.5	New York Times, Bonneville, Mt Wilson FM, WttW	63.4%
MOR	2.0	Clear Channel, ABC Radio, Cumulus, Barnstable	71.4%
Miscellaneous	0.8	Cox, ABC Radio, Citadel, Clear Channel	68.7%
Easy Listening	0.7	Plymouth Rock, Alpine, WMUU, Glen Barnett	60.9%
Ethnic	0.2	Inner City, Radio WAVS , New Wave, 2 firms tied	86.9%

This shows that only a few companies control a majority of the radio formats. This makes economic sense for the station owners, as it lets them take advantage of the economics of scale previously mentioned. Wirth further expands on these developments in his paper from 2007. The purpose of the paper is to see if the trend of format oligopolies has continued. The research is further expanded to now include 26 formats. The research shows that this was indeed the trend. The results of Wirth, Format Monopolies: The Evolution of "Nationwide Format Oligopolies", 2007 show that there are five formats that can now be considered a monopoly, seven formats that can be considered duopolies and thirdteen formats that constitute an oligopoly in 2005[16]. The five formats that can be considered a monopoly can be seen in Figure 11.

[15] Taken from DiCola & Thomson (2002), p. 38
[16] Wirth used Spring 2005 data from BIA Financial Networks

Figure 11: Format Monopolies[17]

Format	Format's Popularity Rank	# of Listeners Accounted for in this Format	Name of the Station Group that Possesses this Format Monopoly	% of Total Audience Accounted for
Contemporary Hit Radio (See Table A1 in Appendix A)	2	22,842,500	Clear Channel Communications	59.08%
News (See Table A2 in Appendix A)	9	12,306,700	Infinity Broadcasting	74.76%
Top 40 (See Table A3 in Appendix A)	16	8,073,000	Clear Channel Communications	61.77%
Lite AC (See Table A4 in Appendix A)	29	3,478,600	Clear Channel Communications	75.18%
70s (See Table A5 in Appendix A)	136	119,100	Clear Channel Communications	60.23%

Note: The Contemporary Hit Radio and Top 40 formats were combined to represent a single format in Wirth's (2001) original study. For comparative purposes, this combined format designation is presented here. Clear Channel accounts for 60.30% of Contemporary Hit Radio/Top 40's 31,855,000 listeners (see Table A6 at www.cofc.edu/~ferguson/Wirth.pdf).

The results show that Clear Channel Communications has a monopoly in four of the five monopolized markets in 2005. This is not surprising as Clear Channel is the single largest station owner. Clear Channel is also part of a duopoly in five of the seven identified markets (Appendix 2).

The research clearly shows that there has been increased consolidation of radio formats (DiCola & Thomson, 2002) (Wirth, 2001) (Wirth, 2007). This was to be expected regarding the economics of scale that can be achieved through format concentration.

The previous papers mainly focus on ownership in certain formats, but do not offer empirical evidence for the concentration's effect on content diversity. Chipty (2007) empirically analyses if increased concentration leads to more formats offered in the markets. This is based on Steiner's (1952) argument that a single owner would increase the variety of formats in order to not compete with itself. Chipty uses three different datasets for his analysis. The formats are defined based on the BIA Financial Networks

[17] Taken from Wirth (2007), page 151

database. Format 101 represents the 101 reported formats, Format 20 combines the 101 formats into 20 less narrowly defined categories and Format 11 represents eleven more broadly defined categories that minimize the overlap of the Format 20 formats (Chipty, 2007, pp. 7-8). The resulting effects can be seen in Figure 12.

Figure 12: Effects of Ownership Structure on Formats[18]

	All Stations											
	HHI		Stations		Percent of Stations with Cross-Owned Newspaper		Percent of Stations with Cross-Owned TV Station		Number of Commercial Stations Owned Nationally by In-Market Owners			
Dependent Variable	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Marg. Effect	T-Stat	Adj R-Squared	N
Format 101 Count	-0.600	(0.18)	0.426 *	(14.76)	3.682	(0.50)	2.235	(1.34)	0.000747 *	(3.13)	0.878	251
Format 101 HHI	-0.101 *	(2.38)	-0.003 *	(8.16)	-0.082	(-0.88)	0.012	(0.55)	-0.000007 *	(-2.38)	0.531	251
Format 20 Count	2.091	(0.86)	0.230 *	(10.94)	3.411	(0.64)	0.761	(0.63)	0.000357 *	(2.05)	0.740	251
Format 20 HHI	-0.200 *	(3.64)	-0.004 *	(7.54)	-0.217	(-1.79)	0.031	(1.14)	-0.000007	(-1.69)	0.404	251
Format 11 Count	-0.354	(0.23)	0.103 *	(7.60)	1.026	(0.30)	-0.008	(-0.01)	0.000201	(1.80)	0.607	251
Format 11 HHI	-0.173 *	(3.09)	-0.003 *	(6.90)	-0.221	(-1.79)	0.003	(0.09)	-0.000003	(-0.73)	0.361	251
With Demographics:												
Format 101 Count	3.399	(1.00)	0.405 *	(13.68)	0.920	(0.13)	1.526	(0.93)	0.000426	(1.73)	0.892	244
Format 101 HHI	-0.109 *	(2.51)	-0.003 *	(7.03)	-0.037	(-0.40)	0.002	(0.11)	-0.000006	(-1.91)	0.582	244
Format 20 Count	4.374	(1.70)	0.208 *	(9.31)	1.894	(0.35)	0.369	(0.30)	0.000159	(0.85)	0.751	244
Format 20 HHI	-0.200 *	(3.61)	-0.003 *	(6.61)	-0.129	(-1.10)	0.022	(0.81)	-0.000007	(-1.62)	0.491	244
Format 11 Count	-0.212	(0.13)	0.090 *	(6.34)	0.089	(0.03)	0.070	(0.09)	0.000105	(0.89)	0.638	244
Format 11 HHI	-0.148 *	(2.56)	-0.003 *	(5.75)	-0.186	(-1.51)	-0.005	(-0.18)	-0.000003	(-0.68)	0.426	244

The dependent variables represented as HHI in the table are based on the format concentration in the various formats. The results suggest that increased ownership concentration leads to a lower format HHI. This means that increased ownership in a market results in lower format pile-up. Format pile-up is when there is high concentration in a format, meaning various stations competing in the same format. This means that in markets with higher ownership concentration, the stations are more spread out over the various formats. The results further suggest that the number of formats in a market increases with every additional station. This is in line with Steiner' argumentation that increased concentration leads to less format overlap, as the station owners try to reach every audience in every format. It is therefore argued that increased concentration leads to more diversity in radio formats.

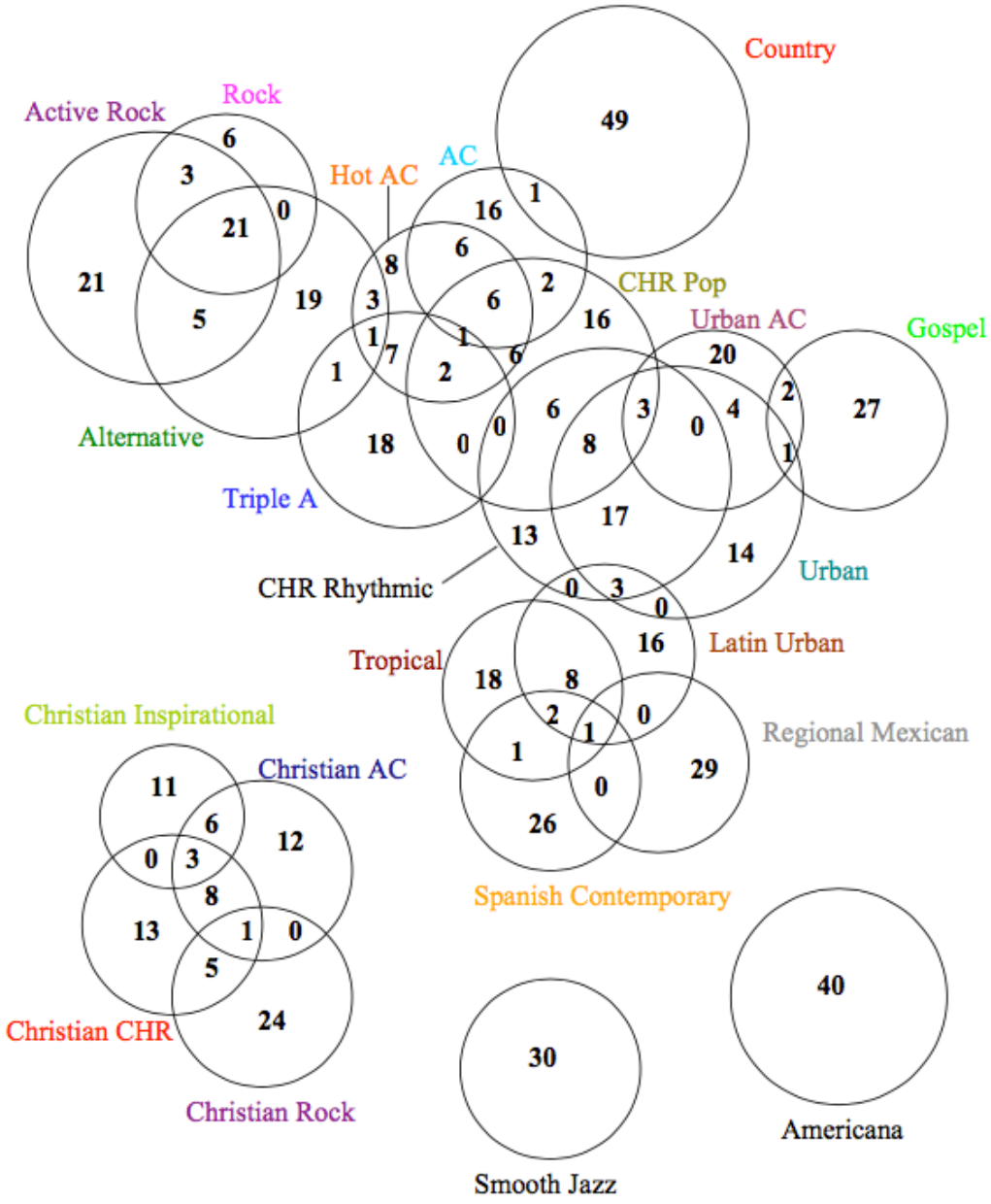
DiCola & Thomson (2002) however argue that format variety does not imply programming diversity. Format variety is defined as the number of different formats

[18] The table is taken from Chipty (2007), Table 11.

available in a defined market. DiCola & Thomson however introduce three factors that the definition is not sufficient to analyse diversity. These factors are faux-mat variety, format homogeneity and format redundancy (DiCola & Thomson, 2002, p. 42). Faux-mat variety is defined as changes in reported formats that do not represent changes in programming. This might be done for marketing purposes to redefine a format to appeal to a larger audience. This is closely related to format homogeneity. This is defined as the overlap in programming across formats. This is especially true for closely related formats such as Urban and Hip-Hop. There are songs in different genres, like rap that fit both formats' programming. Format redundancy is similar to format pile-up, but does not consider all stations in the same format, but only the stations owned by the same radio group.

Due to the direct relation of faux-mat variety and format homogeneity, these two factors can be measured together in term of the overlap between formats. DiCola conducts research into playlist overlap between formats in both his 2002 paper with Thomson and again in 2006. The overlaps are measured based on Radio and Records' chart formats (DiCola, 2006, p. 100). The Radio and Records chart formats are similar to the BIA formats and have been fitted in a Venn diagram to visualize the overlap between formats in May 2006 as seen in Figure 13.

Figure 13: Overlap between Radio Formats[19]



The diagram shows that there is a lot of overlap between various formats, especially in the rock and contemporary formats. Large overlaps, such as between CHR-Rhythmic and Urban can be seen as faux-mat variety, as out of the Top 50, both formats only have 13 and 14 songs that are not present in the others playlist. The analysis of the

[19] Taken from DiCola (2006) p. 100

overlap is furthermore conducted in 4-year steps between 1994 and 2006 to see if this development was due to the 1996 Telecommunications Act. The results can be seen in Figure 14.

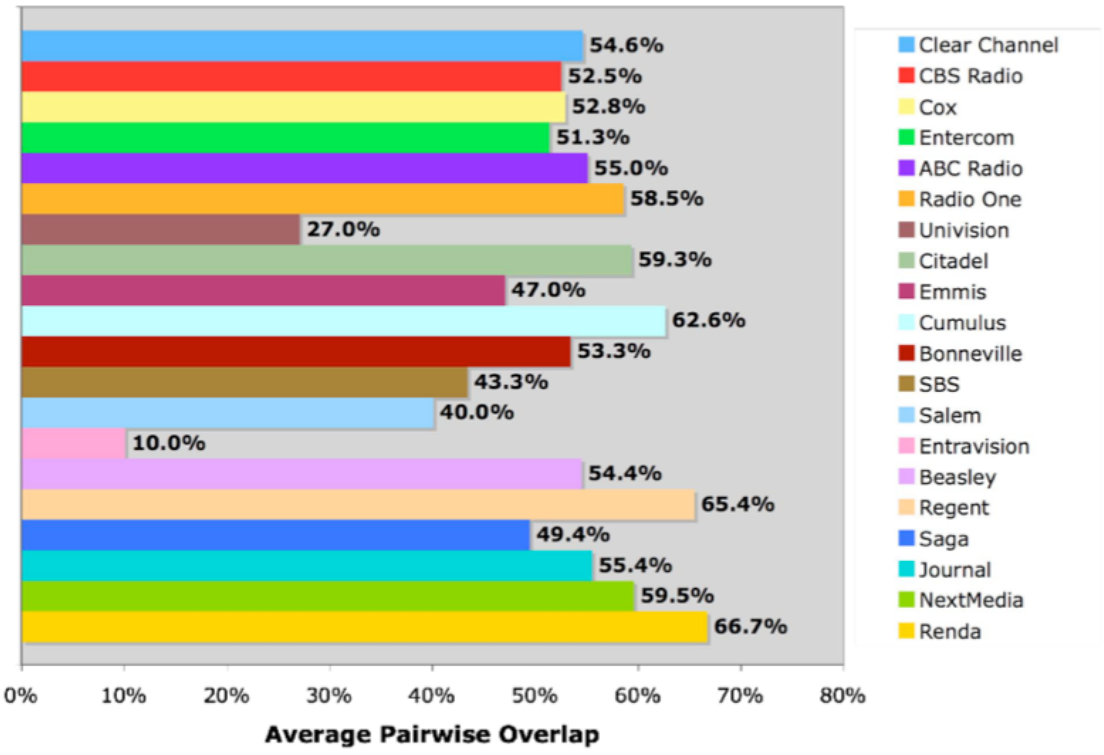
Figure 14: Format Pairs with the Highest Percentage Overlap[20]

Format 1	Format 2	1994 Overlap	1998 Overlap	2002 Overlap	2006 Overlap
CHR Rhythmic	Urban	63%	58%	76%	62%
Alternative	Active Rock	n/a	48%	58%	52%
Rock	Active Rock	n/a	66%	73%	80%
CHR Pop	CHR Rhythmic	28%	32%	42%	40%
Alternative	Rock	35%	40%	60%	70%
Hot AC	CHR Pop	50%	80%	40%	43%
Hot AC	AAA	n/a	37%	50%	37%
CHR Pop	Urban	18%	10%	30%	30%
Urban	Urban AC	n/a	53%	30%	27%
AC	Hot AC	73%	27%	27%	43%

The results show that there is significant overlap between some formats and that it has increased over the years. DiCola therefore argues that diversity in radio programming has decreased as a result of increased overlap between radio formats. There is also further research into the overlap between stations by the same owner in the same format. The results from 2006 can be seen in Figure 15.

[20] Taken from DiCola (2006), p. 101

Figure 15: Overlap between Stations by Same Owner in Same Format[21]



The figure has to be interpreted as the overlap between two stations by the same owner in the same format. These are averages between all stations per owner in one format. There are overlaps of up to 93% between playlists by stations controlled by the same radio group. The figure therefore can be interpreted as the overlap of any two stations across the country owned by the same owner group in the same format. This would mean for example for Clear Channel that all stations in the Urban format share on average 54.6% of their playlist. This is not surprising regarding the centralization of programming that has developed to achieve economics of scale. These findings are also supported in the interview with the former radio DJ Camel_Knight. The playlists of radio stations are created by the programming directors responsible for a set of stations. This is

[21] Taken from DiCola (2006), p. 107

done using a list of songs provided by Clear Channel's corporate office with ratings for the songs. The programming directors are required to play the top songs once an hour, silver songs every two hours and bronze songs every three hours. Assuming that every programming director receives a similar list, the overlap is easily explained. Other songs could only be included in the programming if they were previous hits or currently in the Top 40, which further narrows the selection of songs and increases possible overlap (Camel_Knight, 2017).

Overall, scholars agree that the implementation of the 1996 Telecommunications Act led to increased concentration in format ownership, the effects however are more contested. While Chipty argues that increased concentration led to more format diversity, DiCola argues that format diversity is a flawed measure for true diversity. This argument is mainly made based on the large overlap of the radio formats. This paper introduces further measures for diversity on the radio, based on the number of artists, independent artists and bands on the radio in Chapter 5.2.

5. Data Collection and Research Design

This chapter provides explanations for the data and research methods used in the analysis. The Data Collection chapter explains how the data has been gathered, followed by the Research Design chapter explaining the methods used in the analysis.

5.1. Data Collection

The data was gathered from the Billboard Radio Songs Top 50 between 1991 and 2005. This time frame is chosen as it provides sufficient data for the time before and after the 1996 Telecommunications Act to study its effects. The time frame after the Act was chosen because after 2005, more alternatives to radio emerged that made the discovery of new music and publishing by artists easier. The upper limit 2005 was before the emergence of services such as YouTube, Spotify and SoundCloud, which were founded in 2005, 2006 and 2007 respectively (Crunchbase). Satellite radio services already existed before, but since they are paid services that require additional hardware, they cannot be seen as direct substitute to radio broadcasting. The most prominent provider in the United States is SiriusXM, which was founded in 1990. The costs of a SiriusXM subscription are currently $11-$20 per month, do not make it an efficient substitute for AM and FM radio as they are provided free of charge (SiriusXM). The same can be said about cable broadcasting, while cable also provides a platform to discover new music, the channels can only be received on a TV at home. Access to cable radio is furthermore bundled with cable TV and costs a monthly subscription fee. The illegal P2P downloading platform Napster was founded in 1999, but it was more likely used to substitute CD purchases and its main function was not the discovery of new music but the

download of already known songs. The same can be said for digital music providers such as the iTunes Store. The iTunes Store was first released in 2003. Similarly to Napster and other P2P file-sharing platforms, its main function is the distribution of music and not the promotion. The store also does not provide music free of charge; users have to pay per song, which makes it an unlikely platform to look for new music. Television channels such as MTV and VH1 were founded in 1981 and 1985 respectively, but also should not be seen as substitutes for radio. While they provide a platform for discovering new music, they are not available in the car or on the move such as radio. The costs of releasing new music through these stations are furthermore significantly higher than through the radio. While radio broadcasting only requires audio, TV music channels need a music video, which has to be produced edited and synced with the audio track. Brick-and-mortar record retailers are another platform for people to find new music as well as for musicians to promote their music. These stores, besides the big-box stores, are however extremely local and less convenient than radio. These stores are increasingly substituted through digital retailers such as iTunes, which has meanwhile become the largest music retailer in the United States (Passman, 2014, p. 70). The emergence of digital retailers further decreased the need of a distribution deal with major labels, as there is no need for manufacturing plants, warehouses, etc. This is another reason 2005 is chosen as last year of the analysis to control for changes in distribution practices. In conclusion, the upper boundary in 2005 is chosen to minimize the interference of new platforms for both artists and listeners as well as new distribution methods that might affect the independent variables.

The data gathered from the Billboard Radio Song Top 50 includes the airplay of all genres across the United States. The decision was made to use these charts instead of genre specific data to get a better overview of the overall effects on the music industry in contrast to only certain genres. Another reason is that as previously mentioned the increased homogeneity of music formats, which make it more difficult to categorize certain singles. The data is gathered at three points every year. The first chart sample is analyzed at the beginning of February of every year. This spot is chosen as it is after Christmas, which might influence the airplay figures, as Christmas songs can be played further into January. Another reason is that it is shortly before the SXSW, which is an annual conference and festival celebrating the convergence of the interactive, film and music industries (SXSW). SXSW attracted 512 showcasing artists in 1991 and grew to over 1330 in 2005 and is a prime location for artists to gain exposure (SXSW). The second data point is 5 months later; the last charts in May. This point is taken as the singles released before and SXSW are established in the charts at this point (Rogers, 2014). The last data point is 3 months later; the first charts in September. At this time there are new releases before the CMJ Music Marathon and because May and August are considered the ideal time for releases for both emerging and established artists (Rogers, 2014). There is another 5-month gap until the February sample for the following year, which again is chosen to account for the seasonal influence of Christmas music. The collected data from the three data points is then aggregated into yearly data. This is done by adding the number of songs of each artist from the three data points to get 150 songs per year.

The data is as previously mentioned taken from the Billboard Radio Songs Top 50, which provide the artist and name of the single. Using this information, a data sheet is created for all samples including the artists' names and the number of singles each artist has at that point in time. Using the provided names of the artists it is then determined whether the act was a solo artist or a band, which is recorded with a dummy variable (0= Solo, 1= Duo/ Trio/ Band). Collaborating artists that do not form a band in the sense of an album released together are included as individual artists. These so called joint recordings usually also provide payment to the artists based on their proportional share. A duet would split the royalties 50/50 (Passman, 2014, p. 161). An example would be "Somebody To Love" by Jon B. featuring Babyface. Both artists are listed individually as they usually release music as solo artists. The reason is that it provides airplay for both artists, who might have solo singles in the Top 50 at the same time. The decision is also made on the basis that a song by more than one artist also increases the exposure for all artists involved. In cases were two artists or more collaborated on an album together, they are considered a band for songs released under that album, but as solo artists for all other songs. This is for example the case for Lil' Jon in 2004. He released a solo song as well as a song with The East Side Boyz. Lil' Jon & The East Side Boyz is considered a band as they released an album and multiple singles together, but Lil' Jon also released solo songs during that periode. Both are therefor added as separate artists in the data.

Using the artist's name and single, it is determined if the release was done under a major label or by an independent label. The information was collected from Discogs.com. Discogs is a user generated database and marketplace for vinyl and CD recordings and provides information on release dates and labels as well as the parent companies of the

labels. The current database includes over 8.4 million recordings and 5.0 million artists (Discogs). The categorization of the labels is based on the major label classification scheme in Appendix 1 of *Radio Deregulation: Has It Served Citizens and Musicians?* (DiCola & Thomson, 2002, pp. Appendix I-1 - I11). The categorization includes labels from 1992 to 2001. The categorization as independent or non-independent for the years before 1992 and after 2001 is done using the information provided by Discogs. DiCola & Thomson's classification scheme furthermore only includes US American labels and is missing a categorization for foreign labels, which is also done using Discogs. The labels not included in DiCola & Thomson's paper are classified based on label information on Discogs and the corporate websites. A label is denoted as independent if no major label owns more than 50% and if they have no affiliation or distribution agreements with a major label. These labels are called true independent labels as they also use independent distributors (Passman, 2014, pp. 68-69). This is an important characteristic of the labels. Independent labels with a major-distribution deal rely on the distribution system of the major label and therefore do not promote their artists to the radio stations themselves. These labels usually only focus on signing new artists and have their records distributed and promoted by the major label. The Buena Vista label is considered as non-independent label. It is not considered a major label conglomerate, but it is owned by Disney. The Disney group owns various radio stations and has the financial power to be considered a major label. The categorization of artists regarding their label status is done on a song basis, as artists sometimes change labels and majors acquire labels or, which happens less frequently, major label subsidiaries become independent. The categorization is also displayed as a dummy variable (1= Independent, 0= Major Label). The collected data

does not include the name of the label or the single as it is irrelevant for the analysis and was not feasible due to time constraints. The collected data is used to determine the number of independent artists, the number of bands as well as the number of individual acts for every given data point and year.

The effects of the 1996 Telecommunications Act are represented by a dummy variable. The dummy variable has a value of 0 for the years before the Telecommunications Act and a value of 1 for the years following the Act. Since the effects of the Act are not immediately appearing in 1996, the dummy variable has a time lag of three years. Therefore the values before and including 1998 are 0 and the values from 1999 onwards are 1. Company mergers and acquisitions can take some time, as they have to be approved by anti-trust institutions in some cases. The time needed for mergers to be finalized justifies the use of a three-year time lag. The three-year time lag is also chosen as the effects of the Act on the radio market structure changed rapidly until 1999. After 1999, the number of mergers and acquisitions remained stable as shown in Figure 1 based on revenue concentration. The introduction of a time lagged dummy variable helps to better test the effects of the 1996 Telecommunications Act compared to using concentration indices.

The concentration in the radio industry is measured based on the Herfindahl-Hirschman Index. There are three different HHIs to be considered in the analysis. A HHI based on the share of radio stations owned would best represent the concentration levels that have developed through mergers. It however has the disadvantage that each station has the same weighting. This does not accurately represent the number of listeners or potential market size, as a radio station in New York City reaches more people than lets

say a station in Buffalo, New York. The second option is the HHI based on listener ratings. This would include the share of listeners reached by the radio stations and therefore represents the concentration of the stations reach more accurately. Record labels prefer a station in which they can reach the most people and are not necessarily interested in reaching the most stations. The third option is based on the revenue concentration of the commercial radio stations as seen in Figure 1: Commercial Radio Revenue Concentration. This measure not only takes listeners ratings into account, but also the demographics in those markets. Advertising revenues for radio stations increase with their share of listeners as well as with the disposable income in the market, the share of the most valued target groups and other marketing related demographics. The data used in the analysis is based on the revenue concentration, as they include listener share in the markets as well as indications about income. The HHI data is however only available from 1993 through 2004. The years 1991, 1992 and 2005 are therefore omitted from the robustness tests for the regression analysis[22]. Revenue concentration is relevant, as the record labels prefer large high-income markets to smaller low-income markets. The expectation is that people will buy the music of their artists after hearing it on the radio. This is more likely in markets with larger disposable income, which tend to be the markets with higher listener ratings and advertising costs. All radio stations in 2nd ranked New York City, New York earned $1.17 Billion in 2005, while stations in 44th ranked Buffalo, New York only earned $74.9 Million in the same year (Duncan, 2001, p. 15).

[22] The author of *False Premises, False Promises* Peter DiCola as well as the publishing organization The Future of Music Coalition have been contacted, but the data was not provided. The distributor of the Media Access Pro Database, BIA Financial Networks was also contacted for access of the database to no avail.

Therefore the Herfindahl-Hirschman Index based on revenue concentration is the most appropriate for the analysis.

5.2. Research Design

The three hypotheses test changes in diversity based on the number of artists, independent artists and bands in the charts. This is done by using the dummy representing the introduction of the 1996 Telecommunications Act as explanatory variable in three different Ordinary Least Square (OLS) regressions, one for each hypothesis.

Hypothesis 1: The 1996 Telecommunications Act led to less artist diversity in the Billboard Radio Songs Top 50.

Hypothesis 2: The 1996 Telecommunications Act led to fewer independent artists in the Billboard Radio Songs Top 50.

Hypotheses 3: The 1996 Telecommunications Act led to fewer bands in the Billboard Radio Songs Top 50.

The robustness of the results is tested by regressions replacing $TelcomAct_t$ with HHI_t. The Telecommunications Act had a statistically significant effect on the revenue based HHI, as can be seen in Appendix 3.

The OLS regressions use the implementation dummy as explanatory variable and the year as control variable. The validity and fit of the OLS regressions is tested by ensuring homoscedasticity, the independence of errors and the normality of error. These three factors are required assumptions for OLS regressions. Homoscedasticity is assessed based on the chi^2 of each regression and the corresponding p-value. Heteroscedasticity does not affect the coefficients of the outcome but might result in biased standard errors. The independence of errors is assessed by analysing the distribution of the residuals. This

ensures that the data follows a linear trend line. Lastly, OLS regressions require normally distributed data. The normality of errors is shown in a distribution plot of the residuals.

Hypothesis 1: The 1996 Telecommunications Act and Number of Songs per Artist

Hypothesis 1 is tested using the dependent variable Average Songs per Artist. The number of artists represented in the Billboard Radio Songs Top 50 varies due to artists with multiple songs and collaborations. The average number of songs per artist mitigates these fluctuations to some degree. The independent variable for this hypothesis is the dummy variable representing the implementation of the 1996 Telecommunications Act. The control variable for the hypothesis is the year. The specifications can be seen in Equation 2.

Equation 2: Regression H1

$$AvgSongPerArtist_t = \beta_0 + \beta_1 TelcomAct_t + \beta_2 Year_t + \varepsilon_t$$

$AvgSongPerArtist_t$ is the outcome measure, which is represented by the average number of songs per artist in the Billboard Top 50 Airplay Charts. This was chosen as the number of artists per sample varied based on collaborations and multiple songs by artists in the charts. The average number of songs per artists further gives a good indication on diversity, as higher numbers represent less diversity. This diversity also represents the types of music that are more dominant as most artists can be categorized in the same genre within a year. The outcome further best reflects the exposure artists get through the radio, which is the main purpose of having songs aired on the radio. The outcome variable $AvgSongPerArtist_t$ therefore is a valid representation for diversity of artists.

The independent variable $TelcomAct_t$ is the time lagged dummy variable representing the implementation of the Telecommunications Act.

Year_t is included as control variable for the analysis. This is done to control for general trends in the average number of songs per artist. The variable Year_t controls for changes in diversity based on other variables that change over the years, which might have an effect on the outcome. ε_t is the constant error term added to Equation 2. Hypothesis 1 is that $\beta_1 > 0$. This represents an increase in the average number of songs per artist due to the 1996 Telecommunications Act.

The robustness of the results will be tested using Equation 3

Equation 3: Regression Robustness Check H1

$$Diversity_t = \beta_0 + \beta_1 HHI_t + \beta_2 Year_t + \varepsilon_t$$

As concentration has increased with the implementation of the Telecommunications Act, the results from Equation 2 will be tested for robustness using HHI_t, representing the revenue based market concentration. This helps verifying the results, if the results show similar effects.

Hypothesis H1 is rejected if $\beta_1 \leq 0$. An effect of $\beta_1 \leq 0$ represents an decrease or no change in the average number of songs per artists, which leads to more artists in the charts and therefore increased diversity. This would lead to the rejection of H1.

Hypothesis 2: The 1996 Telecommunications Act and Independent Artists

The effects of the 1996 Telecommunications Act are analyzed based on the dependent variable ShareIndArt_t. The corresponding parameters can be seen in Equation 4: Regression H2

Equation 4: Regression H2

$$ShareIndArt_t = \beta_0 + \beta_1 TelcomAct_t + \beta_2 Year_t + \varepsilon_t$$

The dependent variable $\mathrm{ShareIndArt_t}$ represents the share of independent artists as part of all artists. Due to the fluctuations in the absolute numbers of artists every year, the share of independent artists offers a better representation of the developments. As in Equation 2: Regression H1, the independent variable is the time lagged dummy variable $\mathrm{TelcomAct_t}$ representing the implementation of the Telecommunications Act. The control variable is the $\mathrm{Year_t}$ to control for general trends and ε_t is the constant error term. The robustness of the results is again tested using the concentration index $\mathrm{HHI_t}$ instead of the dummy variable $\mathrm{TelcomAct_t}$, as can be seen in Equation 5. Hypothesis 2 is stated as $\beta_1 < 0$. This represents a decreased share of independent artists in the Billboard Radio Songs Top 50.

Equation 5: Regression Robustness Check H2

$$ShareIndArt_t = \beta_0 + \beta_1 HHI_t + \beta_2 Year_t + \varepsilon_t$$

Hypothesis H2 is rejected if $\beta_1 \geq 0$. An effect of $\beta_1 \geq 0$ represents an increase or no change in the share of independent artists in the charts based on the implementation of the Telecommunications Act.

Hypothesis 3: The 1996 Telecommunications Act and Bands

The Ordinary Least Square equation for Hypothesis 3 is represented in Equation 6: Regression H3 below. Hypothesis 3 states that $\beta_1 < 0$ as a result of the 1996 Telecommunications Act.

Equation 6: Regression H3

$$ShareBand_t = \beta_0 + \beta_1 TelcomAct_t + \beta_2 Year_t + \varepsilon_t$$

The dependent variable for Hypothesis 3 is the share of bands as part of the total number of artists in the Billboard Radio Songs Top 50. Similarly to Hypothesis 2, the

representation as share of all artists is more appropriate due to the changes in the number of artists per year. The independent variable again is the time lagged dummy variable $\mathrm{TelcomAct_t}$ representing the implementation of the Telecommunications Act. The control variable $\mathrm{Year_t}$ controls for general trends over the years. The constant errors term is represented by ε_t.

As with the previous two hypotheses, the robustness of the results is tested by another regression substituting $\mathrm{TelcomAct_t}$ for $\mathrm{HHI_t}$, as can be seen in Equation 7. The results are considered to be robust if the HHI has a similar effect as the implementation of the Act on the dependent variable

Equation 7: Regression Robustness Check H3

$$ShareBand_t = \beta_0 + \beta_1 HHI_t + \beta_2 Year_t + \varepsilon_t$$

Hypothesis H3 is rejected if $\beta_1 \geq 0$. An effect of $\beta_1 \geq 0$ represents an increased or no change in the share of bands in the charts based on the implementation of the 1996 Telecommunications Act.

6. Analysis

This section presents the statistical analysis of the three hypotheses as well as some descriptive statistics for the used dataset. The independent and control variables for all hypotheses are the same, the dependent variables however change. Hypothesis 1 uses the dependent variable: $AvgSongPerArtist_t$, Hypothesis 2 will be measured based on the share of independent artists and the analysis of Hypothesis 3 will be based on the share of bands.

Besides the three regression results, there are some other descriptive statistics that are relevant for the analysis. Table 4: Summary Dependent, Independent and Control Variables shows the number of observations, means, standard deviations as well as minimum and maximum values of the variables relevant to the regression analysis. The dummy variable for the introduction of the Telecommunications Act is not included as the values are either 0, before 1999 or 1 after.

Table 4: Summary Dependent, Independent and Control Variables

	Number of Observations	Mean	Standard Deviation	Minimum (Year)	Maximum (Year)
HHI	12[23]	643.4167	474.9209	81 (1993)	1,166 (2000)
Average Number of Songs per Artist	15	1.416837	0.1041711	1.240 (2003)	1.596 (1994)
Share of Independent Artists	15	8.133%	4.730%	3.42% (1999)	17.76% (1992)
Share of Bands	15	40.258%	11.835%	22.32% (2002)	55.14% (1993)

[23] As previously mentioned, the HHI data for 1991, 1992 and 2005 was not available to the researcher.

Table 5: Absolute Values Artists, HHI and Telecommunications Dummy below shows the absolute values for all artists, independent artists, bands and artists with more than 2 songs per year, as well as the HHI and the time-lagged dummy variable for the implementation of the Act over the analysed timeframe.

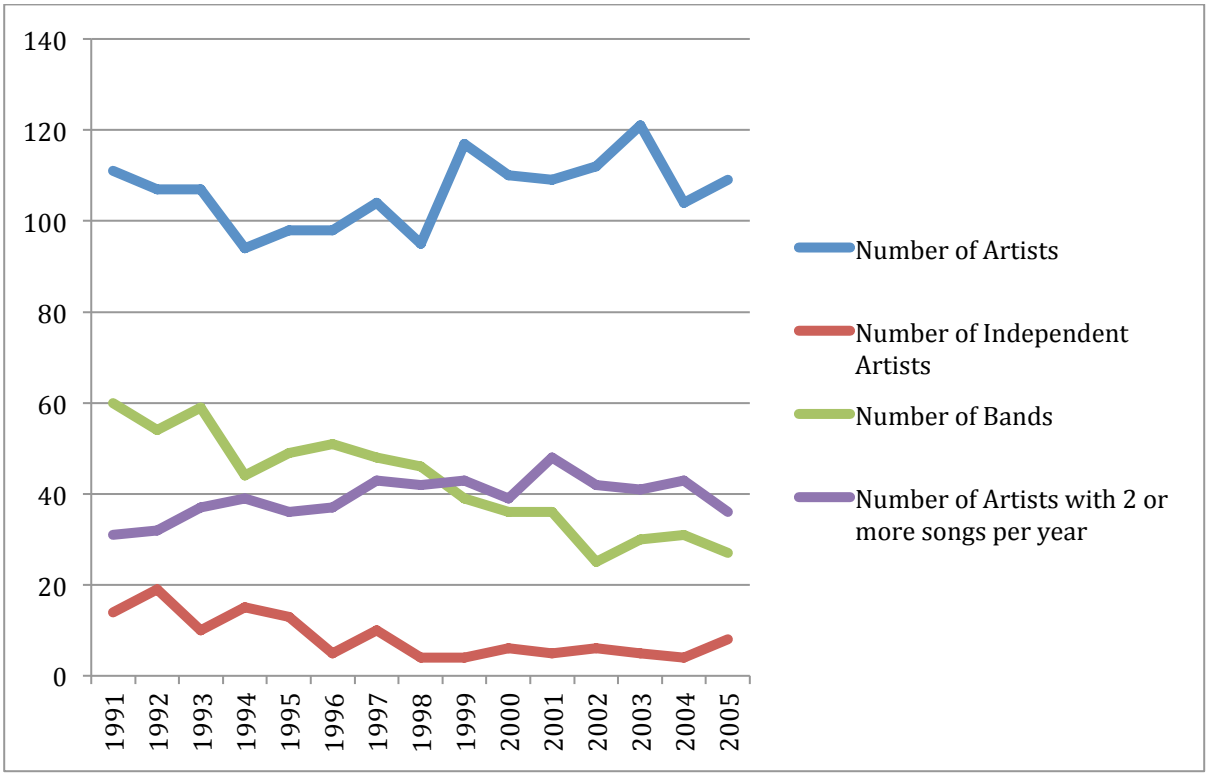
Table 5: Absolute Values Artists, HHI and Telecommunications Dummy

Year	Number of Artists	Number of Independent Artists	Number of Bands	Number of Artists with 2 or more songs per year	HHI	Tele-communi-cations Act Dummy
1991	111	14	60	31		0
1992	107	19	54	32		0
1993	107	10	59	37	81	0
1994	94	15	44	39	84	0
1995	98	13	49	36	98	0
1996	98	5	51	37	176	0
1997	104	10	48	43	324	0
1998	95	4	46	42	443	0
1999	117	4	39	43	1010	1
2000	110	6	36	39	1166	1
2001	109	5	36	48	1155	1
2002	112	6	25	42	1077	1
2003	121	5	30	41	1061	1
2004	104	4	31	43	1046	1
2005	109	8	27	36		1
Average	106.4	8.5	42.3	39.3	643.4	

Table 5 shows that the number of artists as well as the number of artists with more than two songs stayed relatively stable from 1991-2005. The number of independent artists and bands however seem to have experienced a decline over the years. These trends can be better seen in Figure 16: Development of Artists and Bands below. The HHI as expected and shown in Figure 1: Commercial Radio Revenue Concentration

shows a significant increase after the implementation of the 1996 Telecommunications Act.

Figure 16: Development of Artists and Bands



This graph shows a clear downward trend for both the number of independent artists and the number of bands represented in the Billboard Airplay Top 50. The number of artists overall fluctuates quite a bit over the years, not only due to the number of songs an artist has in the charts, but also due to collaborations. These collaborations, as mentioned in the Data Collection chapter, are usually represented by both artists. The number of artists with multiple songs however show a slight increase over the analysed timeframe. Figure 16 seems to give an indication that there has been a decrease in independent artists and bands, as well as more songs per artist in the Billboard Radio Charts.

Table 6: Correlations Dependent, Independent and Control Variables below, shows the correlations of the five variables used to test the three hypotheses. The dependent

variables are the Average Number of Songs per Artist, Share Independent Artists and Share Bands for H1, H2 and H3 respectively. The independent variable in all three hypotheses is the time-lagged dummy variable for the implementation of the Telecommunications Act, as well as the revenue based HHI for robustness checks. The Year is the control variable for all three hypotheses.

Table 6: Correlations Dependent, Independent and Control Variables

(N=12)	**Year**	**Average Number of Songs per Artist**	**Share Independent Artists**	**Share Bands**	**HHI**	**Telecommuni-cations Act**
Year	1					
Average Song per Artist	-0.5944	1				
Share Independent Artists	-0.7318	0.5595	1			
Share Bands	-0.9108	0.7294	0.5573	1		
HHI	0.9091	-0.7396	-0.7312	-0.9263	1	
Tele-communications Act	0.8690	-0.7874	-0.6514	-0.9387	0.89730	1

The telecommunications dummy variable is strongly correlated to the year. It is furthermore strongly negatively correlated to the share of independent artists and bands. The HHI is strongly positively correlated to the Year, and also strongly negatively correlated with the average number of songs per artist, the share of independent artists as well as the share of bands. The negative correlation to the three dependent variables gives first insights into the validity of the hypotheses. The decreased share of independent artists and bands is in line with hypotheses 2 and 3. The negative correlation with the average number of songs per artist however points towards the opposite result as has been hypothesised in H1. A decrease in the average number of songs per artist indicates

increased diversity. Fewer songs per artist mean that there are more artists sharing the 50 songs in the Billboard Radio Songs charts. The three hypotheses have to be empirically tested in form of a regression analysis to be accepted or rejected.

6.1. Hypothesis 1: The 1996 Telecommunications Act and Diversity

The diversity of the Billboard Top 50 Airplay will be measured based on the number of artists in the charts and more accurately the average number of songs per artists. The developments between 1991-2005 can be seen in Table 7: Changes in the Number of Artists and their Average Number of Songs.

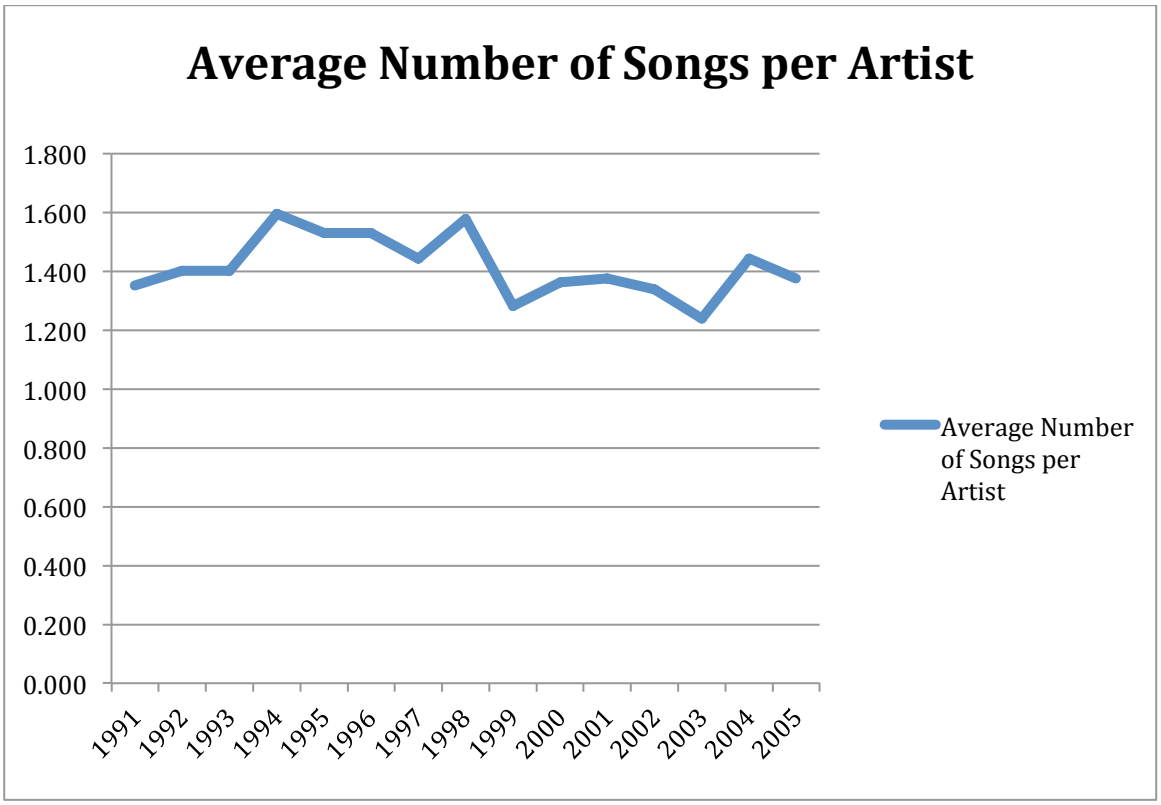
Table 7: Changes in the Number of Artists and their Average Number of Songs

Year	Number of Artists	Average Number of Songs per Artist
1991	111	1.351
1992	109	1.402
1993	107	1.402
1994	**94**	**1.596**
1995	98	1.531
1996	98	1.531
1997	104	1.442
1998	95	1.579
1999	117	1.282
2000	110	1.364
2001	109	1.376
2002	112	1.339
2003	**121**	**1.240**
2004	104	1.442
2005	109	1.376
Average	106.4	1.416

As can be seen in Table 7, the number of artists per year varies greatly, with a minimum of 94 artists in 1994 and a maximum of 121 in 2003. On average there are

105.75 artists occupying the 150 songs from the three gathered data points. The developments of the average of number of songs per artists can be seen in Figure 17 Since the number of songs stays constant, the minimum/maximum values in absolutes can be seen in the same years as the changes in the number artists represented in the charts. On average, each of the 106.4 artists has 1.416 songs in the Top 50.

Figure 17: Average Number of Songs per Artist



Hypothesis 1 is tested using Equation 2: Regression H1 with the dependent variable Average Songs per Artist. The results can be seen in Table 8.

Table 8: H1 Regression Results[24]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Telecommunications Act	-0.2794294**	0.0724889	-3.85	0.002
Year	0.0126711*	0.0146477	2.32	0.039
Constant	-37.31052	16.69457	-2.23	0.045

N	15
R-Square	0.6126
Adjusted R-Square	0.5481
F (2, 12)	9.49
Root MSE	0.07003

The results in Table 8 show that the 1996 Telecommunications Act did have a statistically significant effect on the diversity of the Billboard Top 50 Radio Charts. In order for the parameters to be statistically significant at a 5% confidence level, the p-values have to be below 0.05. This is the case both for the explanatory variable $TelcomAct_t$ and the control variable $Year_t$. The statistical significance is further confirmed by the T-statistic, for which both variables exceed the 2.145 threshold for statistical significance at a 5% confidence level. The R-square value explains the variance of the average number of songs per artists, which is 0.6126. The Adjusted R-square, is a better indicator for regressions with fewer observations per variable (Austin & Steyerberg, 2015, p. 635), has a value of 0.5481. This regression model therefore explains 55% of the variance of the results. The scatterplot and regression line with the Telecommunications Act dummy variable can be seen in Figure 18. Another version with the year variable on the x-axis can be found in Appendix 4.

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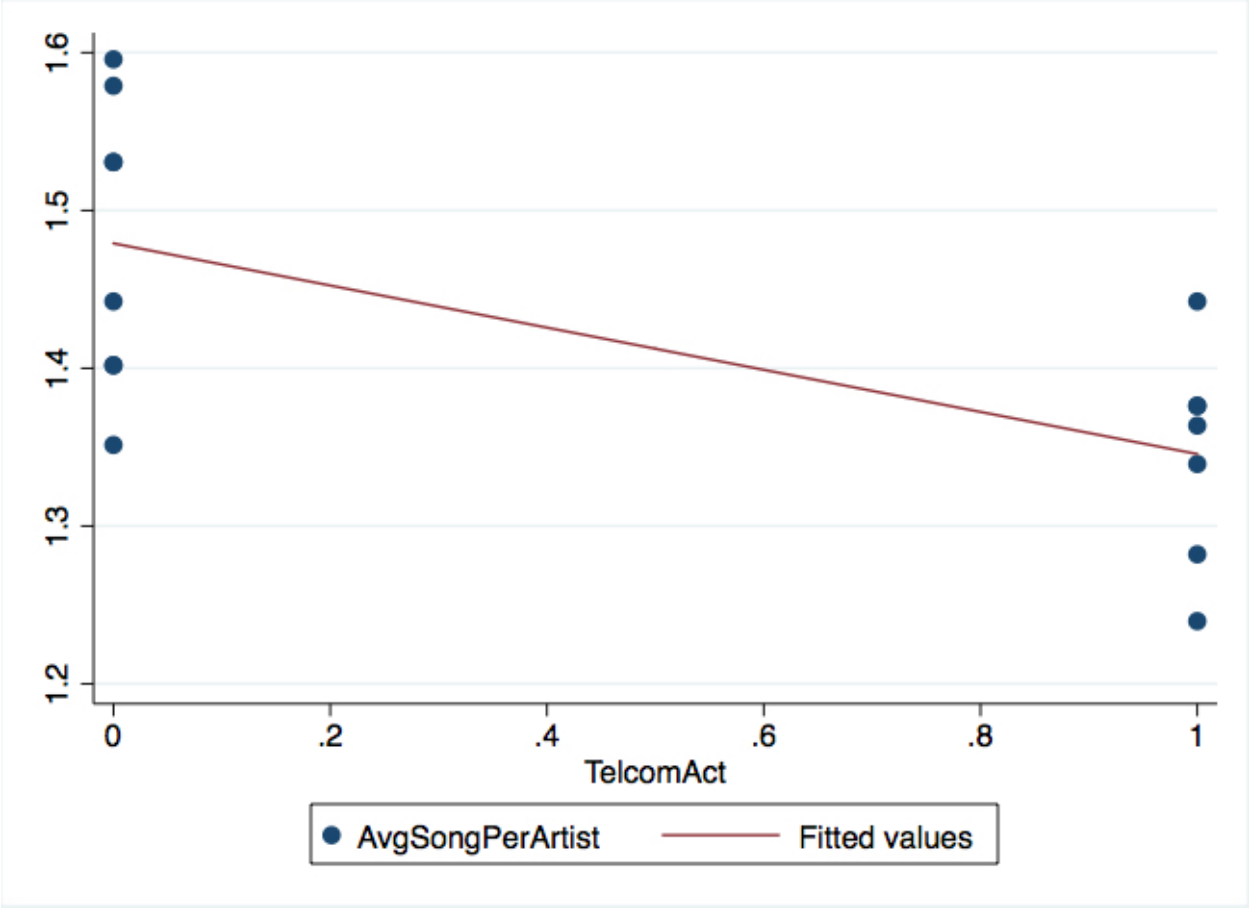
[24] * Denotes significance with 95% confidence interval (two tails)
** Denotes significance at 99% confidence interval (two tails)

Figure 18: Scatterplot and Regression H1



The coefficient of the variable $Year_t$ shows that the average number of songs per artist per year increases by 0.01 every year. This is however outweighed by the effect of the 1996 Telecommunications Act. The implementation led to a decrease of 0.28 average songs per artists. This is surprisingly the opposite effect that has been hypothesized in Hypothesis 1. H1 expected an effect of $\beta_1 > 0$. The effect is however lower than 0 and the criteria $\beta_1 \leq 0$ for the rejection of the hypothesis therefore has been met. Hypothesis 1 stating that the 1996 Telecommunications Act decreased diversity thus has been rejected.

The regression is further tested to fulfill the three underlying assumptions for OLS regressions. These assumptions are homoscedasticity, and independence and normality of errors. Homoscedasticity is tested with the Cook-Weisberg test. This test results in a chi2

value of 0.09 and a probability of homoscedasticity of 76.89. Using a 5% confidence level we can conclude that the data is homoscedastic. The test for the independence of errors is done by looking at the distribution of errors (see Appendix 5). The distribution does not suggest a non-linear patter, this is however difficult to verify due to the fact that the variable for the implementation of the Telecommunications Act is a dummy variable. By comparing the distribution of errors of the regression and a normal distribution it can be checked if the errors are normally distributed. This can be seen in Appendix 6. The plots suggest a not perfect normal distribution, but the deviations are minimal and we can assume that the OLS regression provided robust results.

In order to verify the robustness of the results, another regression, stated in Equation 3, is conducted. The dependent variable remains the same, as does the control variables Year_t. The independent variable TelcomAct_t is replaced by HHI_t in order to see if concentration has an effect on diversity based on the average songs per artist. The HHI based on revenue shares is used as a proxy for the Telecommunications Act. The results are displayed in Table 9.

Table 9: H1 Robustness Results

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0002772	0.0001294	-2.22	0.054
Year	0.0143044	0.0164473	0.87	0.407
Constant	-26.98212	32.79687	-0.82	0.432

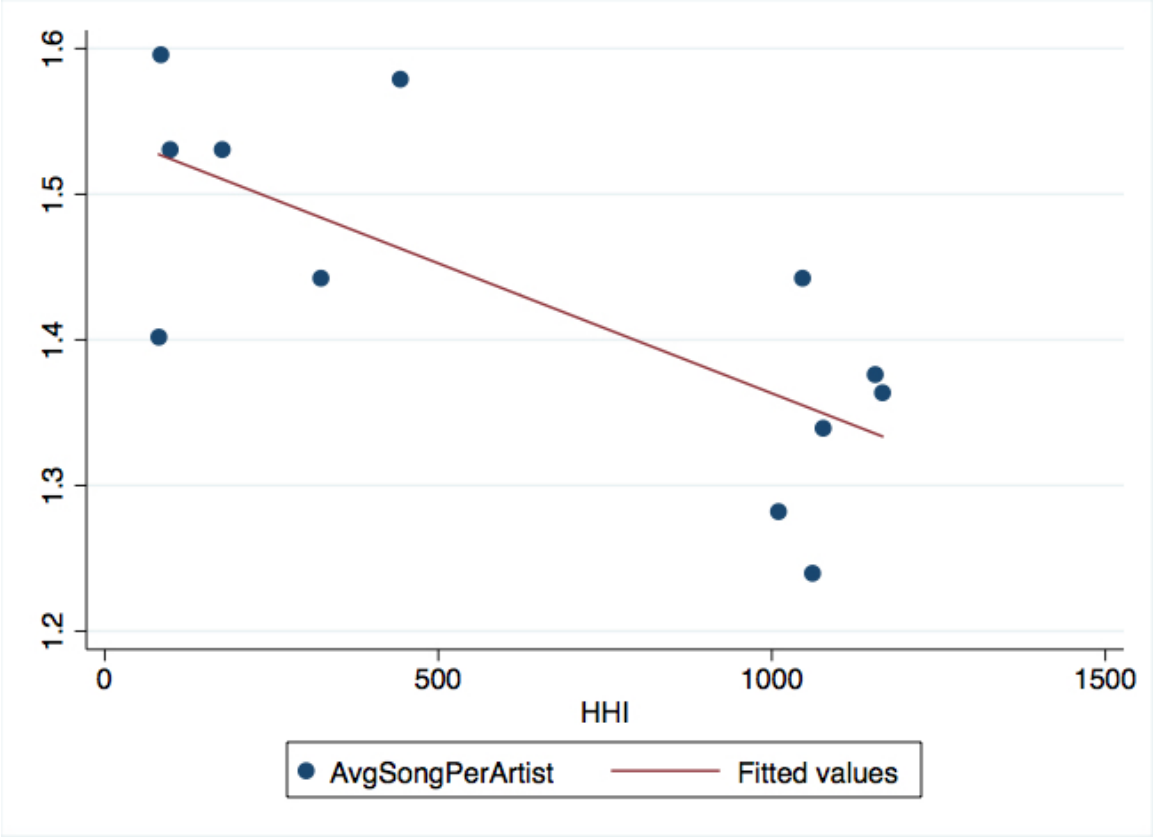
N	12
R-Square	0.5822
Adjusted R-Square	0.4893
F (2, 9)	6.27
Root MSE	0.08191

The individual independent variables all have a p-value larger than 0.05. All variables furthermore have T-statistics that do not pass the -2.201 or 2.201 threshold. The threshold for joint significance of the variables of 4.2565 however is exceeded at 6.27. This shows that the two variables are jointly significant in this regression, but not individually. This is due to the high correlation of the year and the HHI at 0.9091.

The regression is again tested for homoscedasticity, and the independence and normality of errors. The Cook-Weisberg test shows that the data is homoscedastic with a probability of 99.5%. The errors furthermore seem to be independent as can be seen in Appendix 7. The normality results for the residuals can be seen in Appendix 8 and are not perfectly normally distributed. The variances however are not large enough to suggest that another regression method would be more appropriate. We can therefore conclude that the OLS regression was an appropriate method.

The regression has an adjusted R-square of 0.4893, which explains about 49% of the variances. The corresponding scatterplot and regression line can be found in Figure 19.

Figure 19: Scatterplot and Regression H1 Robustness



The HHI and the year seem to play a role in the average number of songs per artist, due to the high correlation the exact effect however cannot be measured. Since the coefficients individually however are negative we can conclude that they have a positive effect on diversity measured by the average number of songs per artist. When not controlling for the yearly trends, revenue concentration measured by the HHI has a significant negative effect of -0.0001785 on the average number of songs per artists, as can be seen in Table 10. The negative coefficient shows that the number of songs per artist decreases with increased concentration. For every 1000 points the HHI increases, artists have on average 0.179 fewer songs in the Billboard Radio Songs Top 50 charts.

Table 10: H1 HHI only[25]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0001785**	0.0000514	-3.48	0.006
Constant	1.541793	0.0404708	38.10	0.000

N	12
R-Square	0.5471
Adjusted R-Square	0.5018
F (1, 10)	12.08
Root MSE	0.07003

The exact values for the effect of the HHI on radio diversity, when controlling for yearly trends, is difficult to determine, as they are not individually significantly different from 0. When testing the effect of yearly trends on the dependent variable individually, it shows that these trends do not have a significant effect, as can be seen in Appendix 9. It can however be rejected that the concentration has negative effect on diversity. The expected results were stated as $\beta_1 > 0$, which is not the case as $\beta_1 < 0$. The hypothesis of the effect of the implementation on diversity is therefore rejected.

Conducting a regression measuring the effects of the implementation of the 1996 Telecommunications Act results in a negative significant coefficient. Conducting another regression with the explanatory variable $TelcomAct_t$ being replaced by the concentration measure HHI_t tests the results' robustness. This results in a significant negative effect of the HHI on diversity, when not controlling for yearly trends. The yearly trends do not result in individually significant results, but are jointly significant with the HHI. Hypothesis 1 stated that the Telecommunications Act of 1996 led to decreased diversity

[25] ** Denotes significance at 99% confidence interval (two tails)

shown as $\beta_1 > 0$. The resulting coefficients however suggest that $\beta_1 < 0$ and Hypothesis 1 is therefore rejected.

6.2. Hypothesis 2: The 1996 Telecommunications Act and Independent Artists

The changes in the number of independent artists are based on the share these artists take in the Top 50. The share of independent artists takes the fluctuations in the overall number of artist in the Top 50 into account. The yearly developments for the number of independent artists and their share can be seen in Table 11 below.

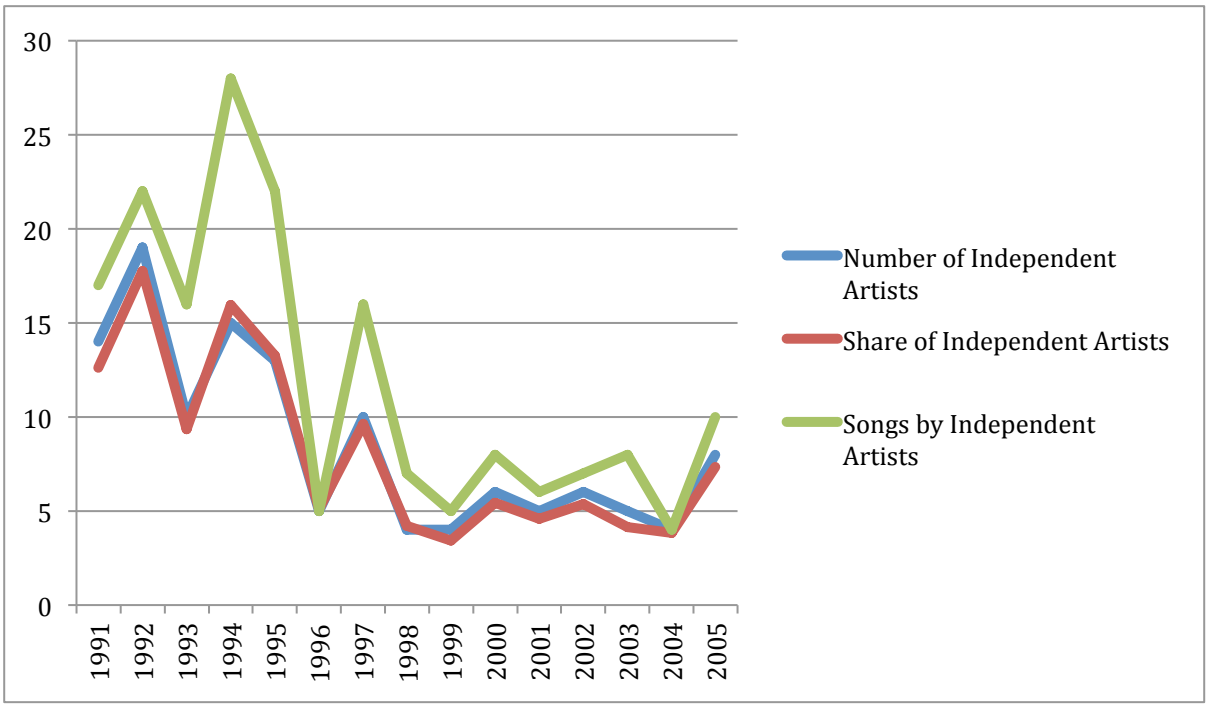
Table 11: Changes in Number of Independent Artists and their share on the radio

Year	Number of Independent Artists	Share of Independent Artists
1991	14	12.61%
1992	**19**	17.76%
1993	10	9.35%
1994	15	15.96%
1995	13	13.27%
1996	5	5.10%
1997	10	9.62%
1998	**4**	4.21%
1999	**4**	**3.42%**
2000	6	5.45%
2001	5	4.59%
2002	6	5.36%
2003	5	4.13%
2004	**4**	3.85%
2005	8	7.34%
Average	8.5	8.13%

The largest decrease of independent artists and their share in the charts was in 1996, followed by the largest increase of artists in 1997. Overall the largest number of independent artists can be found in 1994 and the lowest number in 1998, 1999 and 2004,

which are all after the 1996 Telecommunications Act. The developments shown in a graph can be seen in Figure 20: Development Independent Artists and Share. The share and number of artists follow pretty much the same path and are highly correlated at 0.9943. The number of songs by independent artists in the Top 50 is also highly correlated to the share and number of independent artists at 0.9871 and 0.9870 respectively. The number of songs is usually higher as some artists have multiple songs in the charts. The largest difference is in 1994, during which Ace of Base had 2 songs at all three data points examined. The extremely similar developments of the share and number of artists suggest that the overall number of artists in the charts closely affects them.

Figure 20: Development Independent Artists and Share



Hypothesis 2 is tested using Equation 4: Regression H2, with $ShareIndArt_t$ being the dependent variable. The independent variables are, as for Hypothesis 1, the Telecommunications Act dummy and $Year_t$. The results can be seen in Table 12.

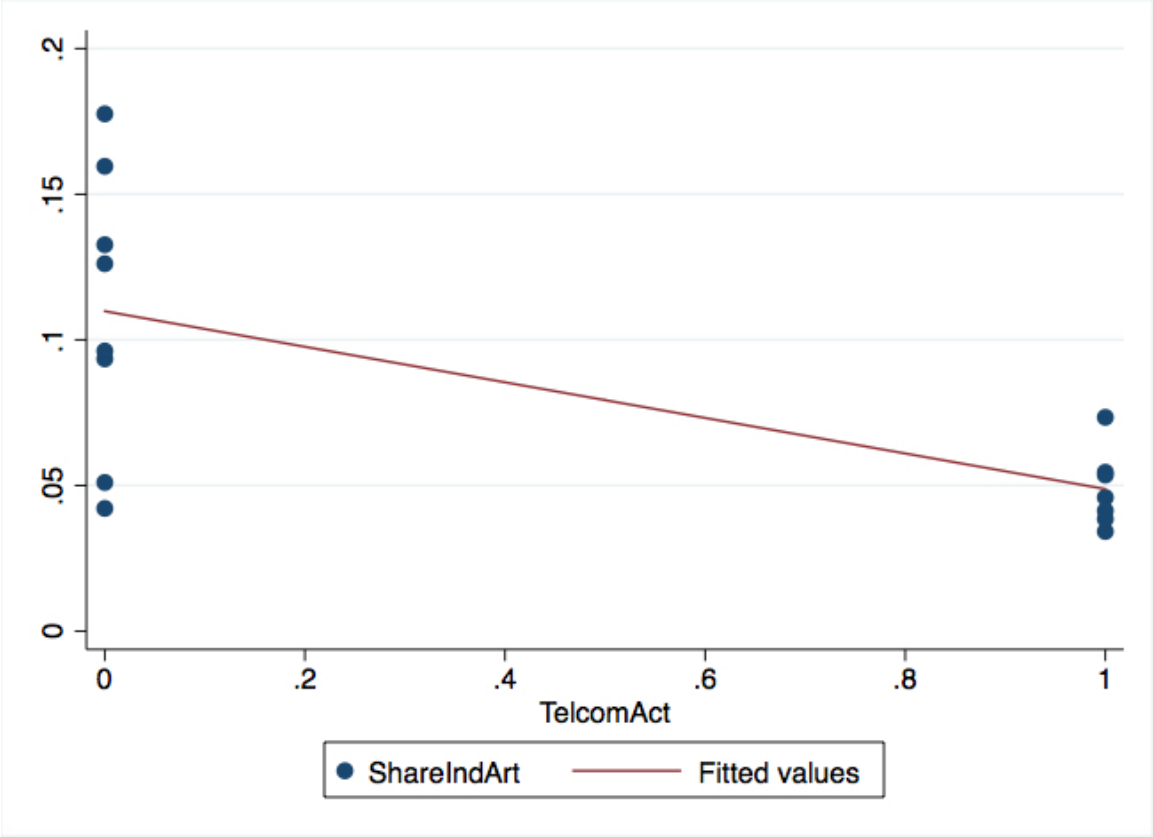
Table 12: H2 Regression Results

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Telecommunications Act	-0.0081575	0.0352437	-0.23	0.821
Year	-0.0070547	0.0040696	-1.73	0.109
Constant	14.180410	8.116806	1.75	0.106

N	15
R-Square	0.5558
Adjusted R-Square	0.4818
F (2, 12)	7.51
Root MSE	0.03405

The results for the Telecommunications Act and the year are not statistically significantly different from 0. The resulting p-values are all far above the required 0.05 to be considered significant with a 95% confidence interval. The results however are jointly significant as the F-value at 7.51 exceeds the required 3.8853 for joint significance. The Telecommunications Act dummy and the $Year_t$ have a high correlation of 0.8690, this can explain, why they are jointly significant but not individually. The regression explains 48.18% of variance as suggested by the adjusted R-square. The scatterplot and regression line can be seen in Figure 21. Another scatterplot and regression line, with $Year_t$ measured on the x-axis can be found in Appendix 10. The regression is for homoscedasticity in Appendix 11, which has not been rejected. It can therefore be argued that the standard errors are not biased. The independence (Appendix 12) and normality (Appendix 13) of errors is also tested and does not raise any concerns that an OLS regression is inappropriate.

Figure 21: Scatterplot and Regression H2



When considering $TelcomAct_t$ and $Year_t$ in individual regressions, Table 13 and Table 14 respectively, both show statistically significant negative results.

Table 13: H2 TelcomAct only[26]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Telecommunications Act	-0.0610677**	0.0189321	-3.23	0.007
Constant	0.1098327	0.0129331	8.49	0.000

N	15
R-Square	0.4446
Adjusted R-Square	0.4018
F (1, 13)	10.40
Root MSE	0.03658

[26] ** Denotes significance with 99% confidence interval (two tails)

Table 14: H2 Year only[27]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Year	-0.0078704**	0.0019593	-4.02	0.001
Constant	15.806470	3.914744	4.04	0.001

N	15
R-Square	0.5538
Adjusted R-Square	0.5159
F (1, 13)	16.14
Root MSE	0.03279

Both the implementation of the 1996 Telecommunications Act and yearly trends have a significant negative effects on the share of independent artists in the Billboard Radio Songs Top 50. The individual regressions suggest that the 1996 Act led to a decrease of 6.11% points in the share of independent artists, while yearly developments account for a yearly decrease of 0.79% points. The effects for both variables in Table 12 are negative and the results are jointly significantly different from 0. Hypothesis 2 states and expected a value of $\beta_1 < 0$, which is the case here. While the effect of the Telecommunications Act is not individually significant, it can be argued that since it is jointly significant, Hypothesis 2 cannot be rejected. This is further confirmed by looking at the effect of only the implementation of the Act, which shows negative significant results. The Telecommunications Act, together with yearly developments led to a lower share of independent artists in the Billboard Radio Songs Top 50. In order to verify the robustness of the results, another regression is conducted.

[27] ** Denotes significance with 99% confidence interval (two tails)

In the robustness test, the independent variable TelcomAct_t is replaced by HHI_t. The equation can be found as Equation 5. The HHI based on the revenue share is a proxy for the implementation of the Telecommunications Act, as changes in the HHI can be seen as direct results of the act. The results for the robustness test can be seen in Table 15: H2 Robustness Results below.

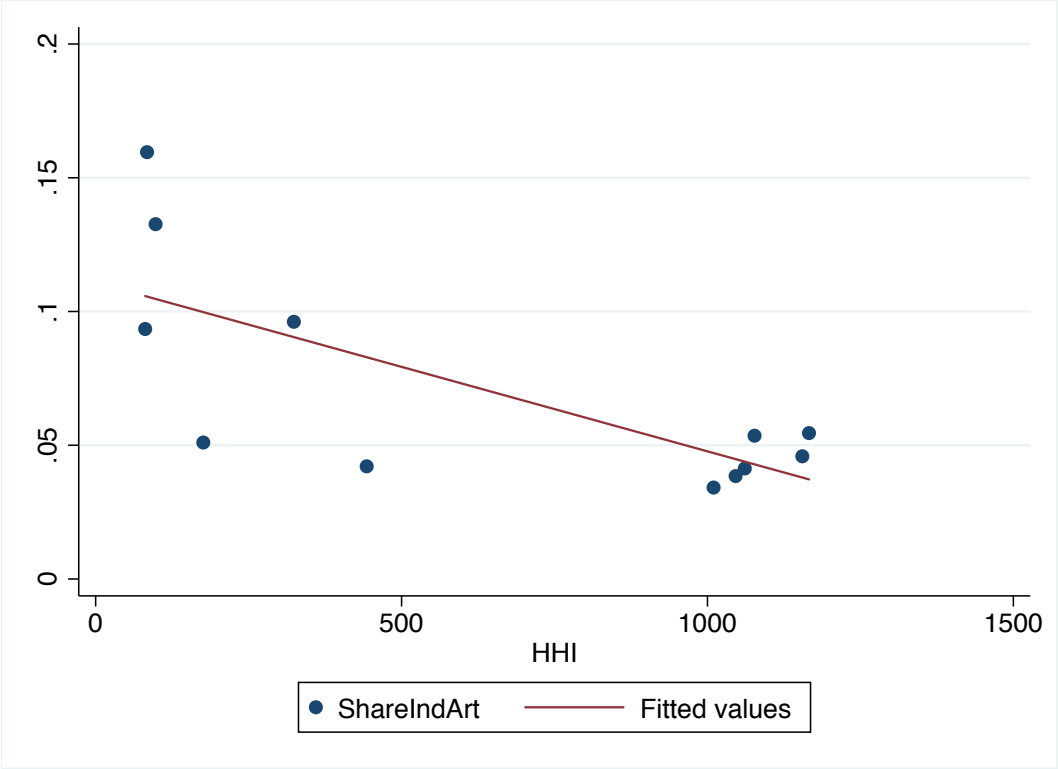
Table 15: H2 Robustness Results

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0000328	0.0000458	-0.72	0.492
Year	-0.0043948	0.0060362	-0.73	0.485
Constant	8.874447	12.03663	0.74	0.480

N	12
R-Square	0.5606
Adjusted R-Square	0.4629
F (2, 9)	5.74
Root MSE	0.03006

The individual variables do not have a significant effect on the share of independent artists in the Billboard Airplay Top 50. As previously stated, the two variables HHI_t and Year_t have a correlation of 0.9091 as can be seen in Table 6. This may lead to the resulting individual insignificance and the joint significance. The threshold for joint significance at a 5% confidence level with 2 and 9 degrees of freedom is 4.2564, which has been exceeded with the regression's F-value of 5.74. The regression explains 46.29% of the variance as determined by the adjusted R-square. The corresponding scatterplot and regression line can be found in Figure 22.

Figure 22: Scatterplot and Regression Robustness H2



The OLS regression is tested for the three underlying assumptions homoscedasticity, error independence and error normality. The Cook-Weisberg test shows a chi2 of 4.06 and a probability of 4.4%. This is below the 5% confidence level and the stated H0 that the variances are homoscedastic has to be rejected. Heteroscedasticity does not affect the resulting coefficients, but it might bias the standard errors. In order to control for this bias, another regression is conducted with a more robust method to calculate standard errors (Ellitott, 2013) in STATA. The results can be seen in Appendix 14. The results show that the T-statistics have increased but are statistically still insignificant. The bias of the standard errors therefore does not affect the outcomes. The test for the independence of errors is done by looking at the scatterplot of the residuals (see Appendix 15). Due to the limited number of observations, it is difficult to see a non-linear trend, but there does not seem to be one. The graph however shows

that there is a trend in the dispersion of the residuals that further confirms the earlier conclusion that the data is not homoscedastic. The errors are not perfectly normally distributed, but the variances are not severe enough to conclude that an OLS regression is inappropriate (Appendix 16). While the regression shows heteroscedasticity, a regression with more robust methods to measure standard errors showed some bias of the T-statistic. This bias however did not have an impact on the results, as the coefficients were still insignificant. The OLS regression is therefore an appropriate method.

The results for the variables HHI_t and $Year_t$ individually can be found in Table 16 and Table 17 respectively. The results in Table 17 are the same as Table 14 as the variable $Year_t$ is the only explanatory variable and the dependent variable $ShareBand_t$ remained the same. Both regressions have been tested for the three underlying OLS assumptions. The Cook-Weisberg test showed heteroscedasticity for the regression only featuring HHI_t suggesting a bias of the t-statistics. Another regression has been conducted with more robust methods for the standard errors, but did not lead to different conclusions. All other tests did not show to any violations of the assumptions.[28] The OLS regression results can therefore be accepted, as the OLS regression is an appropriate method.

[28] HHI: Homoscedasticity in Appendix 17, Robust Regression in Appendix 18, Independence in Appendix 19, Normality in Appendix 20
Year: Homoscedasticity in Appendix 21, Independence in Appendix 22, Normality in Appendix 23

Table 16: H2 Robustness HHI only[29]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0000632**	0.0000186	-3.39	0.007
Constant	0.1108838	0.0146797	7.55	0.000

N	12
R-Square	0.5347
Adjusted R-Square	0.4882
F (1, 10)	11.49
Root MSE	0.02935

Table 17: H2 Robustness Year only[30]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Year	-0.0078704**	0.0019593	-4.02	0.001
Constant	15.80647	3.914744	4.04	0.001

N	15
R-Square	0.5538
Adjusted R-Square	0.5195
F (1, 13)	16.14
Root MSE	0.03279

The results show, while not individually significant when using both variables in the same regression, if both variables are regressed individually on $ShareIndArt_t$ they both have negative significant effects. This can be explained by the high correlation of the HHI and $Year_t$. The negative coefficients for both variables in the joint and individual regressions suggest that both have a negative effect on the share of independent artists in the Billboard Radio Songs Top 50. This is further supported by the joint significance of

[29] ** Denotes significance with 99% confidence interval (two tailed)
[30] ** Denotes significance with 99% confidence interval (two tailed)

the two variables. It can be therefore concluded that $\beta_1 < 0$ and that Hypothesis 2 tested with the HHI cannot be rejected. This suggests that revenue concentration has a negative effect on the share of independent artists.

In conclusion, both the original regression and the robustness test resulted in negative joint significance. The exact values for this effect is however ambiguous as none of the independent variables is individually significant. It can be argued that the implementation of the 1996 Telecommunications Act, the market concentration measured by the HHI and a yearly trend result in a lower share of independent artists in the Billboard Radio Songs Top 50. H2 expected a result of $\beta_1 < 0$, which seems to be plausible from the conducted regressions. Hypothesis 2 can therefore not be rejected as the 1996 Telecommunications Act had a negative effect ($\beta_1 < 0$) on the share of independent artists and the rejection criteria of $\beta_1 \geq 0$ has not been met.

6.3. Hypothesis 3: The 1996 Telecommunications Act and Bands

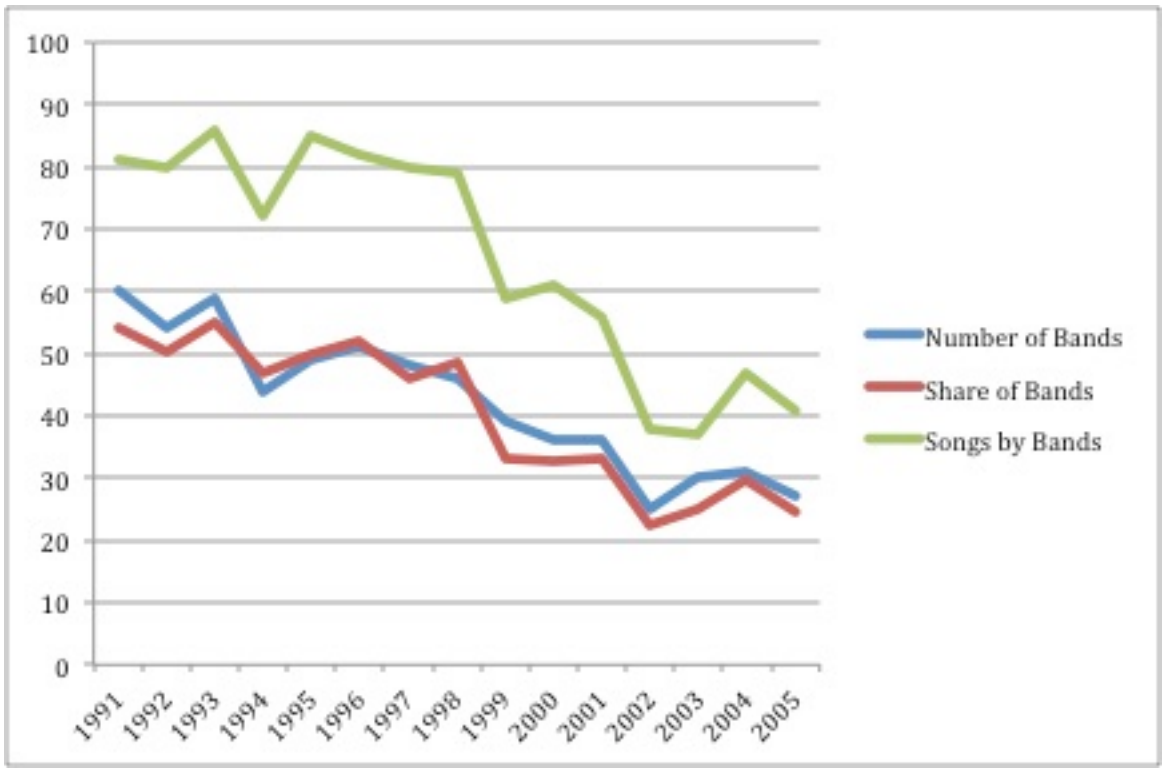
The effect of the 1996 Telecommunications Act on bands is tested by using the share of bands in the Billboard Radio Songs Top 50 as dependent variable. The developments of the number of bands and their share in the Top 50 can be seen in Table 18.

Table 18: Changes in Number of Bands and their share on the radio

Year	Number of Bands	Share of Bands
1991	**60**	54.05%
1992	54	50.47%
1993	59	**55.14%**
1994	44	46.81%
1995	49	50.00%
1996	51	52.04%
1997	48	46.15%
1998	46	48.42%
1999	39	33.33%
2000	36	32.73%
2001	36	33.03%
2002	**25**	**22.32%**
2003	30	24.79%
2004	31	29.81%
2005	27	24.77%
Average	42.3	40.26%

The table shows that there has been a steady decline in the number of bands and their share in the Billboard Radio Songs Top 50. In the years before the 1996 Telecommunications Act, the share of bands was above 50% in every year, besides 1994. This has not been achieved since then and has reached a low of 22.32% in 2002. This is also the year with the fewest bands represented in the charts. The highest number of bands was in 1991 and bands had their highest share in 1993 with 55.14% of artists in the Top 50 being bands. The trends can also be seen in Figure 23.

Figure 23: Development Number and Share of Bands and Songs



The statistical effects of the Telecommunications Act of 1996 can be seen in Table 19: H3 Regression Results. The regressions are run using Equation 6 with $ShareBands_t$ as the dependent variable, $TelcomAct_t$ as explanatory variable and $Year_t$ as control variable.

Table 19: H3 Regression Results[31][32]

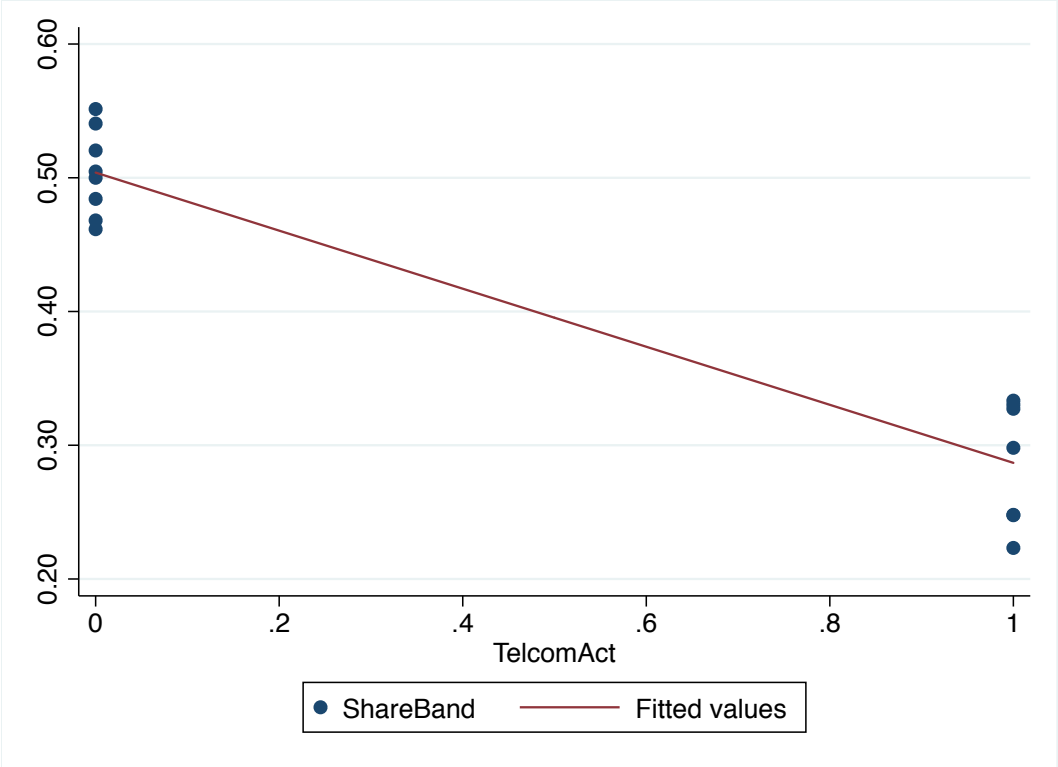
Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Telecommunications Act	-0.1384763**	0.0335096	-4.13	0.001
Year	-0.0104734*	0.0038694	-2.71	0.019
Constant	21.39305	7.71743	2.77	0.17

N	15
R-Square	0.9359
Adjusted R-Square	0.9252
F (2, 12)	87.55
Root MSE	0.03237

The results suggest that the implementation of the 1996 Telecommunications Act had a significant negative effect on the share of bands in the Billboard Radio Songs Top 50. The results are significant at a 1% confidence level. The implementation of the Telecommunications Act led to a decreased of 13.85% points in the share of bands. The regression has an adjusted R-Square value of 0.9252, which indicates that the regression explains 92.5% of the variance. The scatterplot and regression line can be seen in Figure 24. Another scatterplot and regression line, with the x-axis indicated by the year can be found in Appendix 25.

[31] * Denotes significance with 95% confidence interval (two tailed)
[32] ** Denotes significance with 99% confidence interval (two tailed)

Figure 24: Scatterplot and Regression H3



The yearly trend is also significant at a 5% level and resulted in a 1% decrease in the share of bands annually. The significance of the results is shown by the T-Statistics exceeding the threshold of 2.145 and the by the p-value, which is in both cases below 0.05. Hypothesis 3 states that there has been a decrease in the share of bands denoted as $\beta_1 < 0$. This has been proven with an effect of -0.1384763. The condition for rejecting the hypothesis ($\beta_1 \geq 0$) has not been met and Hypothesis 3 can therefore not be rejected. The decrease in the number of songs by bands has been separately tested and the results can be seen in Appendix 24. The results suggest that the share of bands explains the decrease in number of songs by bands and the Telecommunications Act does not have a significant effect. The regression used for Table 19 is now tested for robustness.

The regression is tested for homoscedasticity, and independence and normality of errors. These are the underlying assumptions that have to be fulfilled to guarantee an

OLS regression is appropriate. The Cook-Weisberg test for heteroscedasticity provides a chi2 of 0.57 and a probability of 45.05% (Appendix 26). The probability is not enough to reject the null hypothesis of constant variance and we can therefore say that it is homoscedastic. The independence of errors is, as in the previous hypotheses, difficult to evaluate as all plots in Appendix 27 are scattered at the 0 and 1 value. The errors are not perfectly normally distributed, but the deviations are not large enough to dismiss and OLS regression as appropriate method (Appendix 28). It can therefore be concluded that the regression fulfills the three underlying assumptions.

The robustness test for the results is stated in Equation 7, which still uses $ShareBands_t$ as dependent variable and $Year_t$ as control variable. The explanatory variable $TelcomAct_t$ however has been replaced with the revenue based HHI_t. The Herfindahl-Hirschman Index is with 0.9730 closely related to the dummy variable used to represent the implementation of the Telecommunications Act. The HHI could furthermore only increase its level to this extend due to the Act. The results for the robustness test can be seen in Table 20.

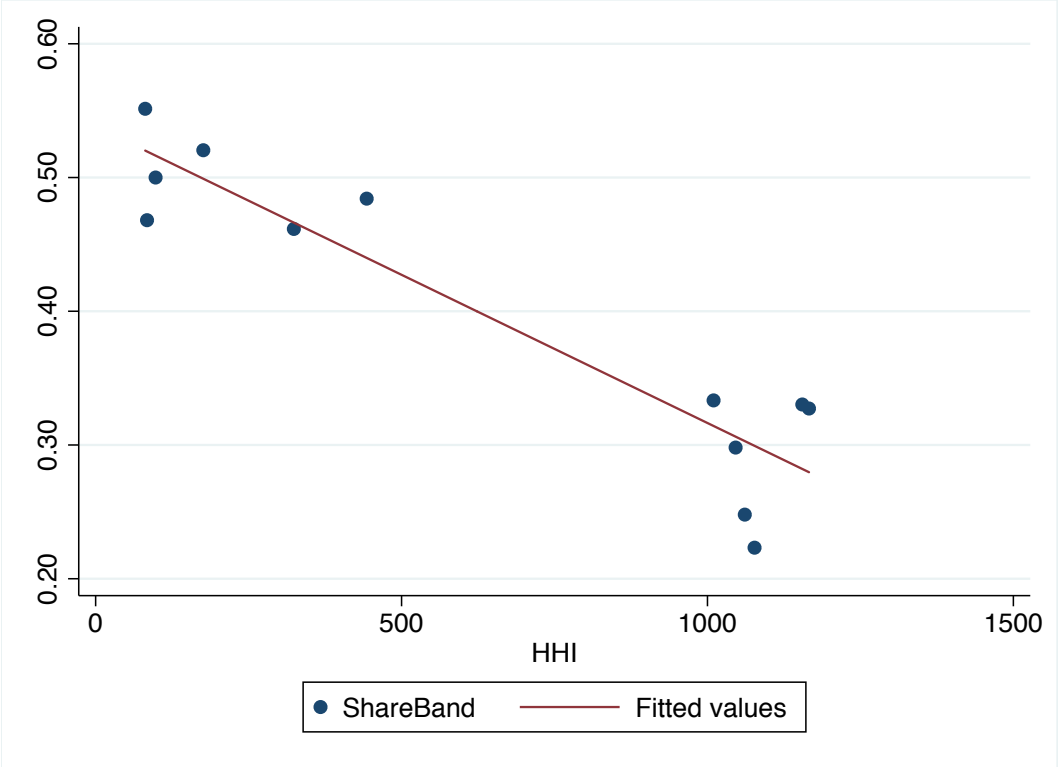
Table 20: H3 Robustness Results

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0001355	0.0000649	-2.09	0.066
Year	-0.0124756	0.0085481	-1.46	0.178
Constant	25.41511	17.04548	1.49	0.170

N	12
R-Square	0.8852
Adjusted R-Square	0.8596
F (2, 9)	34.69
Root MSE	0.04257

The robustness results differ from the original regression results, as the HHI and the yearly trend do not show statistical significance. Neither variable has a p-value below 0.005 or a T-statistic exceeding the required threshold. The adjusted R-square suggests that the regression explains 85.96% or the variances. This can be seen in the scatterplot and regression line in Figure 25. The regression is tested for the three underlying assumptions of OLS regressions, homoscedasticity (Appendix 29), and independence (Appendix 30) and normality of errors (Appendix 31). None of the tests raise any concerns that the OLS regression does not represent a valid model.

Figure 25: Scatterplot and Regression Robustness H3



The variables show a large joint significance represented by the F-value at 34.69. This indicates that the revenue concentration and the yearly trend in unison have a significant effect on the share of bands in the Billboard Radio Songs Top 50. In order to get a better idea of these effects, both variables are used in individual regressions as sole

independent variable. The results can be seen in Table 21 and Table 22. Both regressions have been tested for the fulfillment of the OLS assumptions. None of the tests raised any concerns with the validity of the regression method. The tests for the HHI for homoscedasticity, and independence and normality of errors can be found in Appendix 32, Appendix 33 and Appendix 34 respectively. For the regression with the explanatory variable $Year_t$ the results can be found in Appendix 35, Appendix 36 and Appendix 37 for homoscedasticity, and the independence and normality of the errors respectively.

Table 21: H3 Robustness HHI only[33]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
HHI	-0.0002216**	0.0000285	-7.77	0.000
Constant	0.5380846	0.0224658	23.95	0.000

N	12
R-Square	0.8580
Adjusted R-Square	0.8438
F (1, 10)	60.42
Root MSE	0.04491

[33] ** Denotes significance with 99% confidence interval (two-tailed)

Table 22: H3 Robustness Year only[34]

Independent Variable	Coefficient	Standard Error	T-Statistic	p-value
Year	-0.024321**	0.0028934	-8.41	0.000
Constant	48.99599	5,781071	8.48	0.000

N	12
R-Square	0.8446
Adjusted R-Square	0.8326
F (1, 13)	70.65
Root MSE	0.04842

The individual regressions of HHI_t and $Year_t$ show that both have a significant negative effect on the share of bands. An increased of the HHI by 1000 points leads to a decrease of 22.16% points and the yearly trend leads to a 2.43% drop annually. Both results are significant at a 1% confidence interval. The results of the robustness test indicate a negative effect on the share of bands based on yearly trends and revenue concentration in the radio industry. Both coefficients, joint and individual, show that $\beta_1 < 0$, which is in line with the findings of the effects of the 1996 Telecommunications Act and the expectations of Hypothesis 3.

The results of the regression analysis and the robustness test suggest that the share of bands in the Billboard Radio Songs Top 50 has decreased due to the implementation of the Telecommunications Act of 1996. More specifically, the implementation of the Act led to a 13.85% point drop in the share of bands. There also seems to be a small negative yearly trend that affected the share of bands. The robustness test confirms the findings that the increased concentration resulting from the Telecommunications Act and yearly

[34] ** Denotes significance with 99% confidence interval (two-tailed)

trend led to a lower share of bands in the Top 50. The regression for Hypothesis 3 results in $\beta_1 < 0$, which is in line with the hypothesised effect. The rejection criteria $\beta_1 \geq 0$ has not been met and the hypothesis can therefore not be rejected.

7. Discussion of Results

In this section of the research paper, the results from the previous analysis chapter are discussed and possible reasons are explored. The chapter further includes a discussion of the limitations of the research and recommendations for future research.

The analysis chapter tested three hypotheses for their validity. The first hypothesis expects decreased concentration in the Billboard Radio Songs Top 50 due to the implementation of the 1996 Telecommunications Act. The second hypothesis is that the Act leads to a lower share of independent artists in the charts. The third hypothesis hypothesises a decrease in the share of bands in the Top 50 resulting from the implementation of the Telecommunications Act. The three hypotheses were tested and validated with robustness tests and an analysis of the appropriateness of the methods.

The research faces some limitations regarding the availability of data. The only way to correctly measure the concentration of ownership, listener ratings and revenue is with the correct data. There is very limited public information available regarding the ownership of radio stations and their revenues. The only publicly available data is from other papers (DiCola, 2006) (DiCola & Thomson, 2002) (Chipty, 2007). These and other papers considering concentration in the radio industry acquired their data from the Media Access Pro database, which is sold by BIA Financial Networks. Since the FCC does not collect or publish extensive data on ownership, the BIA database is frequently used. This database however is not available to the researcher due to its costs, cited at $7000 by DiCola in 2006. The BIA website further does not provide any current pricing information and questions regarding access remained unanswered. Therefore the revenue

share HHI data is only available for the years 1993-2004. This limits the scope of the research on the effects of the 1996 Telecommunications Act, especially regarding concentration before the implementation.

It would have been beneficial to include a similar data collection and analysis for different genres. This could be done to better measure the effects in those genres, as their overall preference also changed over the years. This could have an effect on some of the research. The increased popularity of a genre that is dominated by solo artists could have skewed the results towards the decrease of bands. Genres such as rap or country are more likely to have solo artists than genres like rock. The data for the overall Billboard Radio Songs Top 50 might therefore be affected by the rise of these genres. This could have been controlled for by assigning the various artists to a genre or by gathering separate data for genres. The collection of various genre data was initially planned but could not be conducted due to time constraints. The assignment of genres to various artists or songs is further difficult as artists might be present in multiple genres or feature an artist from another genre. Research into preferences in genres and their representation should be conducted to test and further expand on the results.

The regressions not featuring the HHI, but using the implementation dummy could have been expanded beyond the 1991-2005 timeframe, which however was not feasible within the given time allotted for this thesis. The data collection for the number of songs per artists, independent artists and bands was done manually and required at least 2 hours per year. An extended time period for completing the research would have also allowed for the collection of more data points per year. The Billboard Radio Songs Top 50 charts are published every week and more data samples can provide more representative results.

Whether the inclusion of further observations beyond 2005 would have been beneficial is unclear. 2005 is used as limit since it was before the existence of music platforms such as Spotify, SoundCloud and YouTube. An expansion of this limit could be relevant if the importance of the radio as tool for music promotion has not suffered considerably due to new technology.

Hypothesis 1, expecting a decrease in diversity of the most popular songs, has been rejected. The regression offers statistically significant results for the implementation of the Act, but the effect is increased diversity in terms of average number of songs per artists. The expectation was that with the implementation of the 1996 Act, record labels would have more influence over radio playlists, which lets them further promote their most successful artists. This would have resulted in decreased diversity of artists. The results however suggest that diversity increased and that each artist now has 0.28 fewer songs on average on the radio. The results do however not suggest that the influence of the record labels must have decreased due to the implementation of the Act. It is possible that the record labels use their improved negotiation position to not promote their most popular artists more intensively, but instead increase the promotion of all their artists. Record deals with labels usually last one year before they are being reviewed or revised (Passman, 2014, p. 116). It is possible that renewed contracts result in higher payments by the label to the artist. This makes it more lucrative for the labels to focus on their largest artists that guarantee revenue and on new artists that can provide revenue in the short-run. This could also be an explanation for one-hit-wonders that are used as cash cows for the labels. These are however only assumptions and are not tested in this paper. Further research on this could include an analysis of label strategies in terms of artist

promotion. Another reason might be that there are more artists that make the jump from the local to the national stage. Another possible explanation for increased diversity based on the average number of songs per artist could be changes in listener preferences regarding certain genres. Increased listenership and preferences for some genres might affect the number of artists and therefore the average number of songs. Artists in genres like rap and hip-hop traditionally use featured artists for their songs. J. Cole is the only rap or hip-hop artist since 1993[35] that released an album achieving platinum status without any features (True Magazine). This might be an explanation for increased diversity in the Billboard Radio Songs Top 50 based on the average number of songs per artist. While the implementation of the 1996 Telecommunications Act had a positive effect on the diversity of the most popular music on the radio, it should be further explored what role labels and genre preferences played in the process.

Hypothesis 2 expects a decrease in the share of independent artists in the Billboard Radio Songs Top 50, which was not rejected. The regression results show that the implementation of the 1996 Telecommunications Act and yearly trends have a significant negative effect on the share of independent artists. The development therefore cannot be solely attributed to the Act, but other factors, which led to a yearly decline, have to be considered. The decline might not be due to the increased negotiation position of major labels, as opposed to independent labels, with radio stations, but due to other factors. One reason could be that there have been changes in the preference of genres and that these genres tend to have fewer independent artists. It should be analysed in future research, if

[35] Wu Tang Clan – Enter the Wu Tang (1993), Vanilla Ice – To The Extreme (1990) Beastie Boys-Pauls's Boutique (1989) and LL Cool J – Bigger and Deffer (1987) were the only other hip-hop/rap artists with Platinum Albums.

a change in the genre composition of the Billboard Radio Songs Top 50 has an impact on the share of independent artists. Another possible reason could be the market composition of the record label industry. There might have been mergers or acquisitions that decreased the number of independent labels. The changes in the record label industry however lie outside the scope of this paper. There could have also been a change in the strategies pursued by the major labels. The labels might have anticipated larger control over the music that is played on the radio or felt increasing pressure from independent labels and therefore increased the number of artists they signed. Record labels sign artists to contracts that binds the artists to the label, the record label however is not obligated to actually create a record for the artist (Passman, 2014, p. 112). The major labels could have increased the number of artists they are signing for little costs and never release or produce any records of them. This takes away the artist base for independent labels and makes them financially vulnerable. This however is difficult to verify, as businesses usually do not share their business strategies with the public. There could however be further research into the number of artists signed by major labels and the number of releases they have, if this information is available to future researchers. The implementation of the 1996 Telecommunications Act had a negative effect on the share of independent artists in the Billboard Radio Songs Top 50, which was significant together with yearly trends and is therefore not rejected. The exact extend of the effect should be further research with more extensive data and information on the operational strategies of major record labels.

Hypothesis 3 states that the implementation of the 1996 Telecommunications Act has a negative effect on the share of bands in the Radio Songs charts. Hypothesis 3 is not

rejected as the implementation together with a yearly trend leads to a jointly significant negative development in the share of bands. The negative effect is difficult to attribute to the implementation of the Telecommunications Act alone, as it does not make a difference for a radio station whether it is playing a song by a solo artist or a band. It could however be explained by the increased negotiation position of labels with radio stations. Contracts with bands are more risky for the labels as bands can have internal disputes that are not existent with solo artists. There are situations were band members start solo careers or a band breaks up due to conflicts and is dissolved. This poses an increased risk for the labels and requires them to negotiate more extensive contracts with bands to mitigate those risks (Passman, 2014, p. 375). Bands furthermore represent higher costs, such as travel, marketing and other variable costs that have to be paid for all members. This could have led to a shift in labels' strategies to prefer solo artists to bands. This would explain the decrease in the share of bands. There might have also been changes in the genre preferences of listeners that affected the results. Some genres might be dominated by solo artists, such as rap or country, and their increased listenership leads to a decline in the number of bands. This again should be further researched taking genre specific changes as well as changes in the composition of the Billboard Radio Songs Top 50 into account. The changes in record label strategies regarding bands should also be considered in further research, as it was outside the scope of this paper. It can however be said that the share of bands decreased due to the Telecommunications Act and yearly trends, the exact reasons that led to this decline however have to be further researched.

The results support the Hypotheses 2 and 3, but stand in clear contradiction to Hypothesis 1, which states the opposite effect that has been measured. There are some

limitations to the research that would be worth to be further examined by future research. An important aspect of future research should be an analysis regarding the genres represented in the Billboard Radio Songs Top 50. There could have been significant changes in listener preferences of certain genres and these genres might vary greatly in terms of the label status and composition of the musical acts. There should also be further research into behavioural changes of labels. This is especially relevant for the signing strategies of the major labels. Furthermore there should be a research with more than three data samples per year to make the results more accurate. It would be furthermore interesting to see if the emergence of music platforms such has Spotify, SoundCloud or YouTube had an effect on the radio playlists, as these can be used to gain popularity before appearing on the radio. Overall two of the three developments are as previously expected. There is however some uncertainty as the radio industry and their playlists is not a closed system and is strongly affected by the labels, and listeners' and musicians preferences.

8. Conclusion

In conclusion, this thesis researches the effects of the implementation of the 1996 Telecommunications Act on the United States radio industry, especially the effects on the market structure and diversity in radio programming. Chapter 2 provides an overview of the regulation of the radio industry before the 1996 Telecommunications Act. The United States first regulated radio broadcasting in 1924. The aim of the first regulations was to ensure that radio broadcasters serve in the public interest, convenience and necessity, which has been the mandate of the FCC to this day (Huntemann, 1999, p. 394). One aspect of the public interest is to provide diverse broadcasting. In 1996, the FCC experienced its first major overhaul since its establishment. The implementation of the 1996 Telecommunications Act brought far-reaching changes to the radio industry. Previously established national ownership caps were removed and local ownership caps were increased significantly. Before 1996 the national ownership limit was 20 AM and 20 FM stations and the local limit was 2 AM and 2 FM stations. This is further explored in Chapters 3 and 4. Due to the increased number of radio broadcasters and pressure to increase their profitability, the ownership caps have been removed nationally and increased locally. The station owners could now take advantage of economies of scale by increasing their station holdings. The research examines the effects on the market structure and changes in diversity. Three hypotheses that examine the effects on diversity in broadcasting are stated in Chapter 1.2.

The effects on the market structure of the radio industry have been extensively researched on a national, local and format level. The findings are reviewed in Chapter 4.

The implementation of the 1996 Telecommunications Act led to immediate mergers and acquisitions of radio stations. The market structure based on ownership changed drastically due to the removed ownership caps, but did not lead to an oligopoly. When measuring listenership ratings and advertising revenues however, one can observe an oligopoly. The 5 largest station groups reach over 50% of listeners in the United States and earn over 53% of the industry's revenue. On a local level, the changes in concentration are even more severe. The listenership concentration in 232 of 297 markets is considered to be highly concentrated. The same development can be seen in local revenue concentration. There are 281 of 297 markets that are considered highly concentrated markets. Considering format diversity in the radio industry after the implementation of the 1996 Telecommunications Act one can also observe increased concentration. The focus of radio stations on certain formats provides them with economic advantages to reduce costs. This lead to the formation of oligopolies in 28 of the 30 self-reported radio formats. In these formats, the 4 largest owners reach over 50% of the listeners nationally. On a local level the number of formats available increased, but increased format diversity does not equal programming diversity as can be seen in Chapter 4.3.

Programming diversity is analysed using the three hypotheses stated in the introduction. Diversity is measured based on the average number of songs per artist, the share of independent artists and the share of bands. The necessary data is gathered from the Billboard Radio Songs Top 50 between 1991-2005. The analysis shows that diversity decreased in terms of independent artists and bands represented in the Top 50, but shows an increase of diversity based on the average number of songs per artist. The analysis

however shows some limitations, especially regarding the analysed data. There are yearly trends, which jointly account for the developments in diversity that have to be further researched. The developments have to be further researched based on possible preference changes and strategy changes in the operations of record labels. These cofounding factors and the resulting limitations are further explained in Chapter 7.

The stated research question examines the effects of the 1996 Telecommunications Act on the market structure and programming diversity in the United States radio industry. The research shows that the Act had substantial effects on the market structure in the radio industry leading to the formation of oligopolies by most measures considered in this research. The effects on programming diversity are mostly negative as suggested by hypotheses 2 and 3, but Hypothesis 1 shows an increase in diversity. The radio industry however is not a closed system and developments and strategies of the record label industry and their effect have to be further researched. The analysis of the radio industry shows that the regulation of broadcasting media requires extensive considerations. Broadcasting media like the radio, Internet or television are not only affected by their own market structure, but there are other important actors that have provide the content. This is especially important seeing recent developments in the regulation of the Internet and the loss of net neutrality (Neidig, 2017). The concentration of power by the access providers or broadcasters might not have a direct negative effect on the consumer. There are however other actors that provide and control the content on these media. For the radio industry it is the music industry, which has control over the majority of music produced. The communication providers, such as radio stations, and the regulatory agencies are required to act in the public interest. The content providers

such as record labels however to not adhere to the same standards and are mainly concerned with the increase of shareholder value. This leads to increased importance of business interests over the public interest. Regulations therefore should not only address the consequences on the communication providers but also if the content providers can use those changes to further increase their business interests over the public interest.

"The only part about music that I dislike is the business that is attached to it. Now, if music is free, then there is no business, there is just music"
-Joss Stone, Singer

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10. Appendices

Appendix 1: Interview Camel_Knight[36]

Thank you Camel_Knight for answering my questions. I understand you have contractual agreements and signed a non-disclosure and I will therefore only refer to you as Camel_Knight. If you feel uncomfortable answering any questions, please let me know. I will include a transcript in the appendix of my thesis and will use some information. If you would like to have a copy of my thesis once it is completed, I would gladly share it with you.

As I previously mentioned, I am currently writing my Master's Thesis on the effects of the 1996 Telecommunications Act. My name is Philipp Huester and I am studying at Leiden University in the Netherlands. If you want to respond via email, please send it to Philipp.Huester@gmx.de

Question 1: You stated that you were a DJ for a station owned by Clear Channel. During what time did you work for the station?

Answer: 2000-2008

Question 2: You have stated you worked in a prime market, does that refer to one of the markets in Market Group #1 of the Nielsen (formerly Arbitron) markets: New York City, Los Angeles, Chicago, San Francisco, Dallas-Ft. Worth, Philadelphia, Houston-Galveston, Washington DC, Detroit, Boston, Atlanta, Miami-Ft. Lauderdale-Hollywood.

[36] The interview content is unedited; there have been some edits to the format.

Answer: Yes and a #2 market, still a major metropolitan city though.

Question 3: From your comments I assume you worked as a DJ after 1996. What do you think of the 1996 Communications Act and its effects on Radio?

Answer: I think it's a sham that was disguised as a way to make telcoms free and equal across the board. In reality this allowed big corporate radio to branch out from the top 5 markets and buy out all the small market radio stations across the nation as we saw/see with Clear Channel. Its yet Another way for the government to be overtly involved in the peoples lives infringing on their rights. In my new profession, i have traveled the globe. The real equal playing field would be to allow radio waves and their content to operate like the internet where anyone with the know how can start their own station (like a blog or a YouTube channel) and let them operate how they wish. The internet is more available than the radio waves. I mean can you access the radio on your phone (yes some/most stations stream but let's say not really) why doesn't the FCC regulate the language used on the internet and only allow off-color content during safe harbor? It's because that's absolutely insane to regulate what people say and do and how they operate in a communications setting. I could go on forever, but basically big corporate radio got together and monopolized the market with the policy under an "equal broadcasting" masquerade.

Question 4: You have stated that your station was a Contemporary Hit Radio (CHR) station. Did you feel there was enough diversity in terms of the artists or was it the same few artists over and over again?

Answer: There is enough diversity in artists. Yes you do here the popular ones substantially more, but typically the big artists have more than one hit song in the top 40 or top 100 at a given time. The issue I have is the genre or sound. There are phases and several of the big hit songs have the exact same vibe, sound, beat, bed, rhythm. Like when a blockbuster movie comes out and is a hit, say a space movie, then 5 other space movies will come out within the next two years. Same thing but in stead of two years it's two months.

Question 5: Was your Programming Director only responsible for your station? If not, were the other stations in the same market?

Answer: No. He was responsible for another stationed owned by CC and some small ones. Often times, as the assistant program D. I would do the smaller stations.

Question 6: Where the playlists mainly created on a station level or by few Programming Directors across the country and then distributed to smaller local stations?

Answer: So you get your song "rating" from corporate CC, with the understanding (in your contract and through meetings) that you will play the top songs every hour and the silver songs every two hours and bronze every 3 hours, so on and so forth, but we planned it out ourselves how they would play.

Question 7: How much control did your Programming Director have over the music played on your station? Was a list of songs to choose from provided by Clear Channel?

Answer: See above, plus as long as it was in the top 40 we were good. Same for the country station and the rock. They had to be a previous major hit or in the top 40.

Question 8: Radio stations usually use consumer-testing pools to find the songs that sell best. How was the selection of these songs influenced by payola and later independent promoters?

Answer: I didn't see allot of that, but I guess the work around is labels and artists managers would send you tons of items to give away to listeners. things like CD's, digital downloads, concert tickets, backstage passes, cars, vacations (of course extras for the jocks) and they would associate it with the artist so of course if you are giving away a "Beyonce Prize package" on your station, your going to play her music a lot more than others and more people are going to listen to try and win, giving her airtime and the station more customers and of course live remotes to help sell the Beyonce package which ties in with a local dealership or night club now that's more advertisement for the station and now the on air talent are getting paid $100-$300/hr for that live remote. Lots of money involved for everyone.

Question 9: Did you have a say in programming decisions?

Answer: The jocks don't typically, no.

Question 10: Did you have the feeling that artists from major labels were preferred over independent artists?

Answer: Not really, but the major labels definitely advertised more and gave away more free things for us to give out.

Question 11: How much local content did the playlists include and how valued was localism in playing songs?

Answer: Hahaha. No value for locals at all. I even tried to pitch a "battle of the bands" type contest for local bands. CC shot it down. I played some locals from time to time, but honestly the listeners are not in to it. They want that song they know and love. I do remember Colby callet (this may go to a previous question) was forced on us. No one knew her and they just kept telling us to play her more and more then eventually she became a hit.

Thank you again for answering my questions.

Sorry it took a while, I've been traveling. Also sorry for grammar and spelling. This is on my phone. Good luck. I hope you do well. Let me know if you need anything else

Appendix 2

Format and Format's Popularity Rank in Parentheses	Total # of Listeners Accounted for by this Format	Total % of Listeners Accounted for by These Two Companies	Name of the Station Groups that Share this Format Duopoly and the % of Listeners Accounted for by Each Company	
Oldies (5) (See Table A7 in Appendix A)	17,644,200	50.56%	Infinity Broadcasting	26.59%
			Clear Channel Communications	23.97%
Urban (7) (See Table A8 in Appendix A)	15,972,700	54.45%	Clear Channel Communications	34.93%
			Radio One Inc.	19.52%
Alternative (12) (See Table A9 in Appendix A)	10,466,800	56.73%	Infinity Broadcasting	31.88%
			Clear Channel Communications	24.85%
Spanish/Mexican (15) (See Table A10 in Appendix A)	8,339,300	64.35%	Univision Communications Inc	48.66%
			Spanish Broadcasting System	15.69%
Soft Adult Contemporary(17) (See Table A11 in Appendix A)	8,039,100	52.45%	Clear Channel Communications	39.39%
			Infinity Broadcasting	13.06%
Smooth Jazz (20) (See Table A12 in Appendix A)	5,921,600	57.32%	Clear Channel Communications	46.56%
			Infinity Broadcasting	10.76%
Lite Rock (40) (See Table A13 in Appendix A)	2,083,200	60.90%	Infinity Broadcasting	41.67%
			Entercom	19.23%

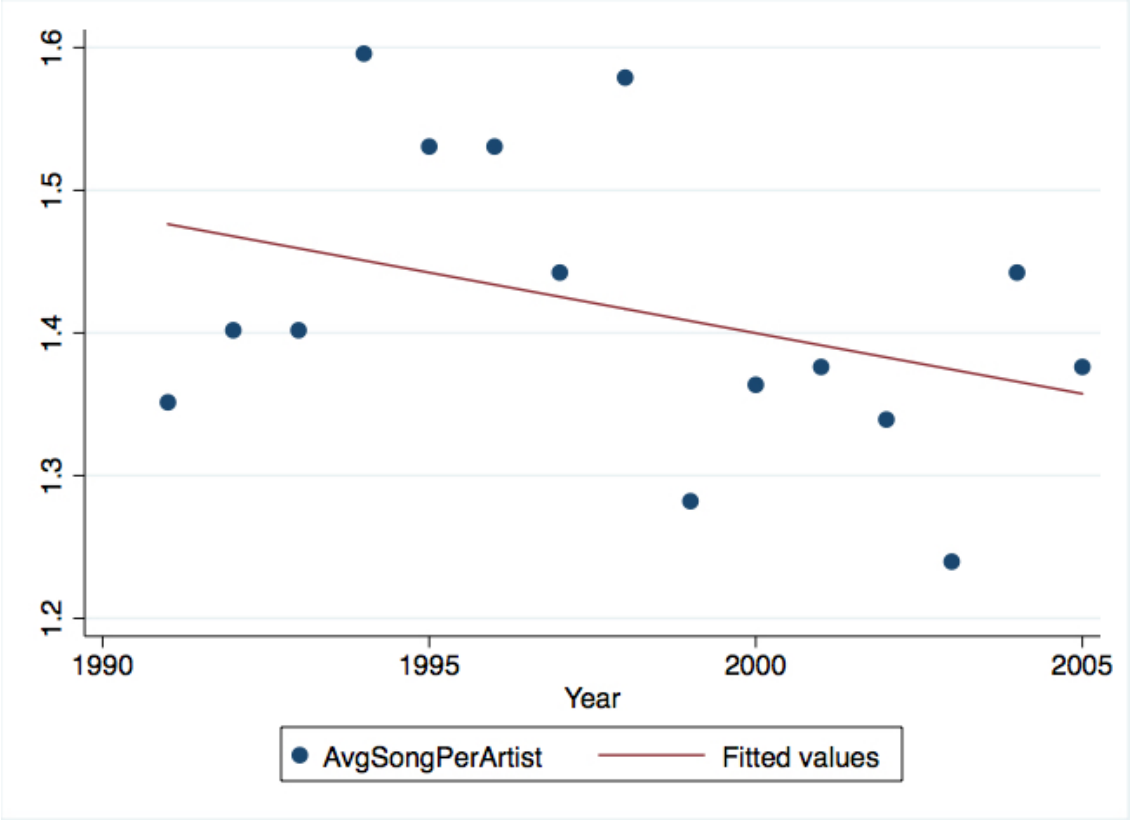
Appendix 3

```
. regress HHI TelcomAct
```

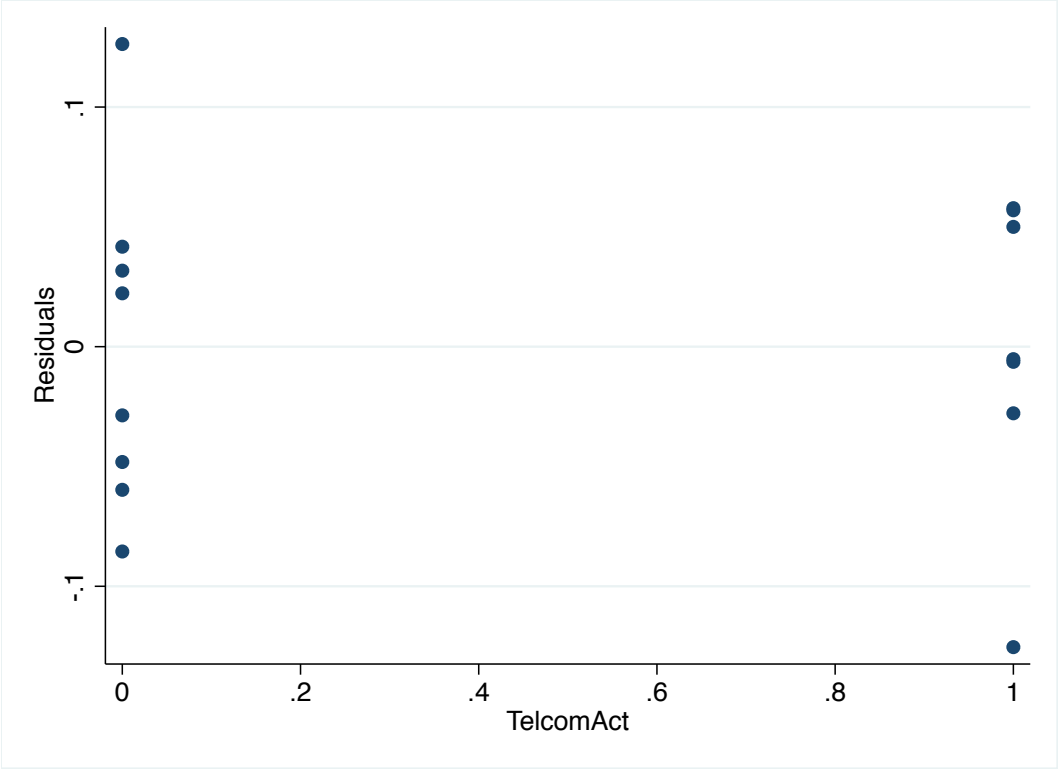
Source	SS	df	MS	Number of obs	=	12
				F(1, 10)	=	177.59
Model	2348790.08	1	2348790.08	Prob > F	=	0.0000
Residual	132258.833	10	13225.8833	R-squared	=	0.9467
				Adj R-squared	=	0.9414
Total	2481048.92	11	225549.902	Root MSE	=	115

HHI	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
TelcomAct	884.8333	66.3975	13.33	0.000	736.8905	1032.776
_cons	201	46.95012	4.28	0.002	96.38861	305.6114

Appendix 4


1.6
1.5
1.4
1.3
1.2
1990
1995
2000
2005
Year
AvgSongPerArtist
Fitted values

Appendix 5



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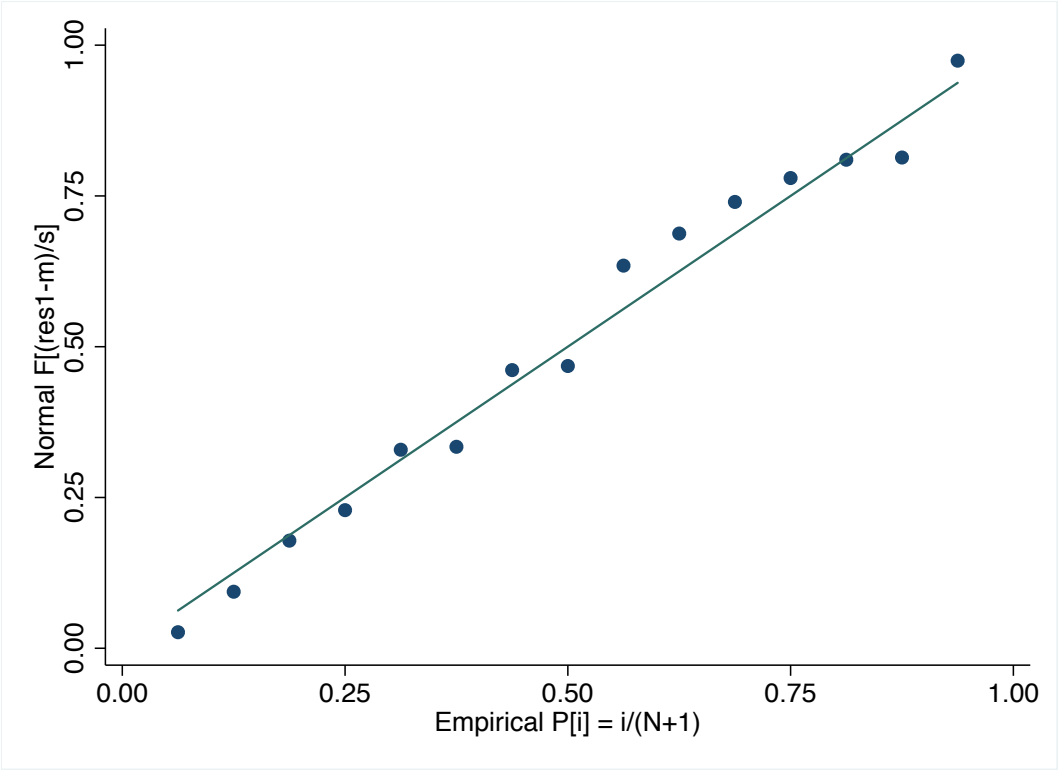

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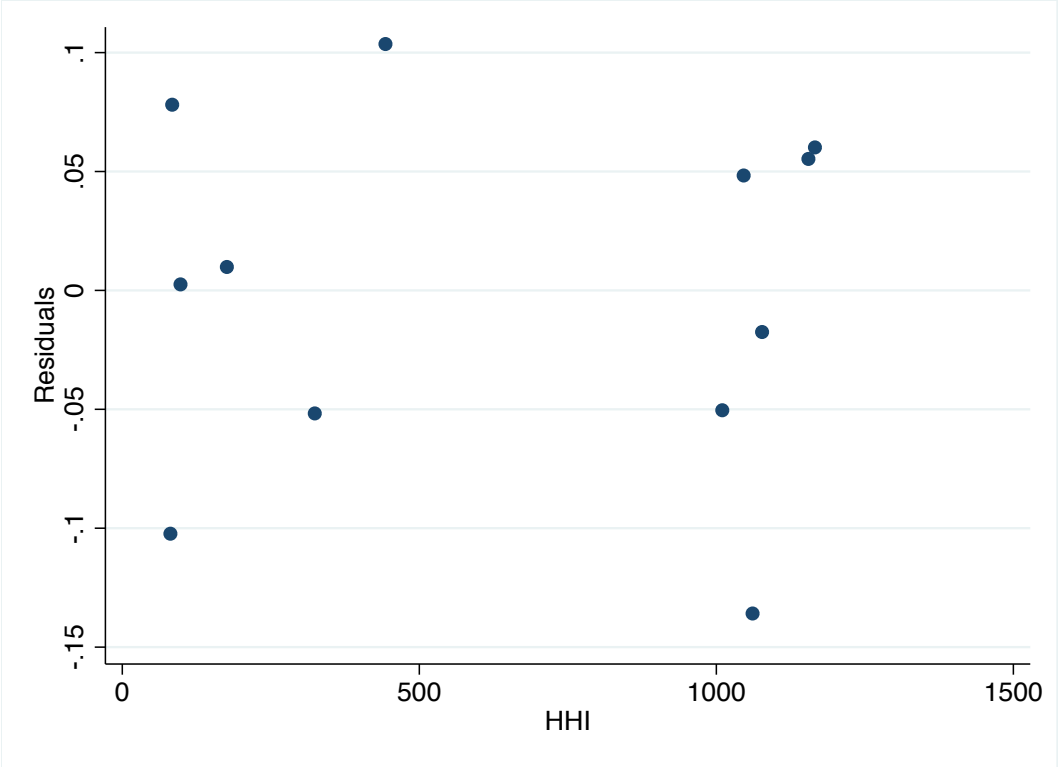

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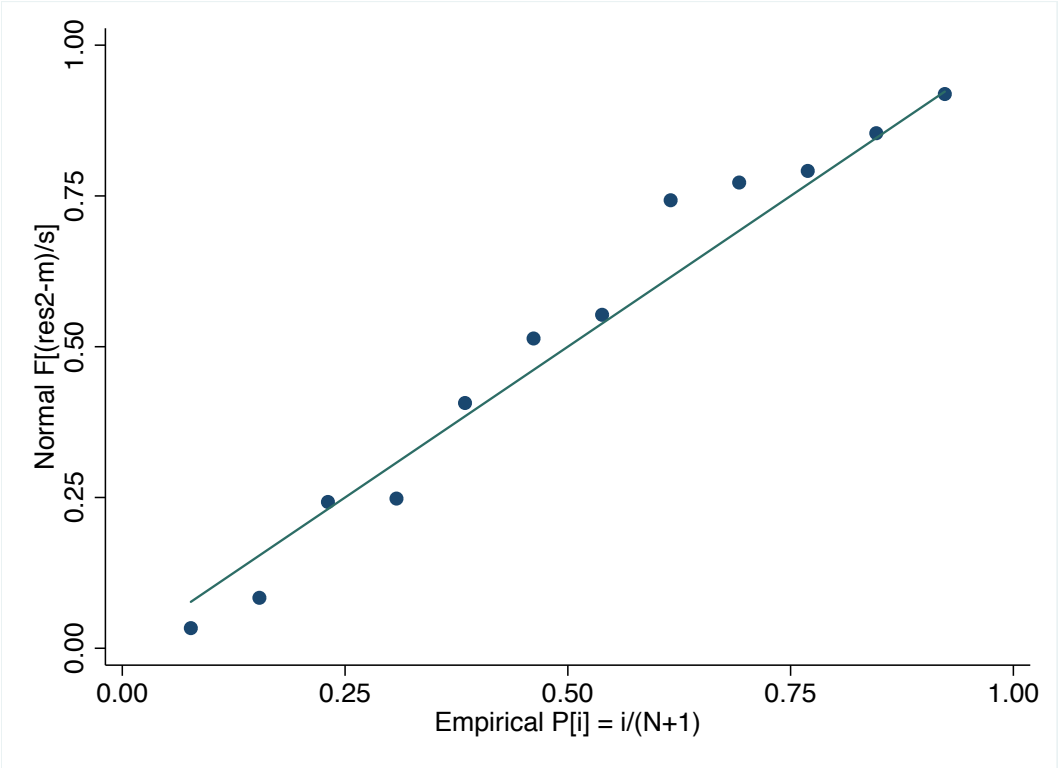


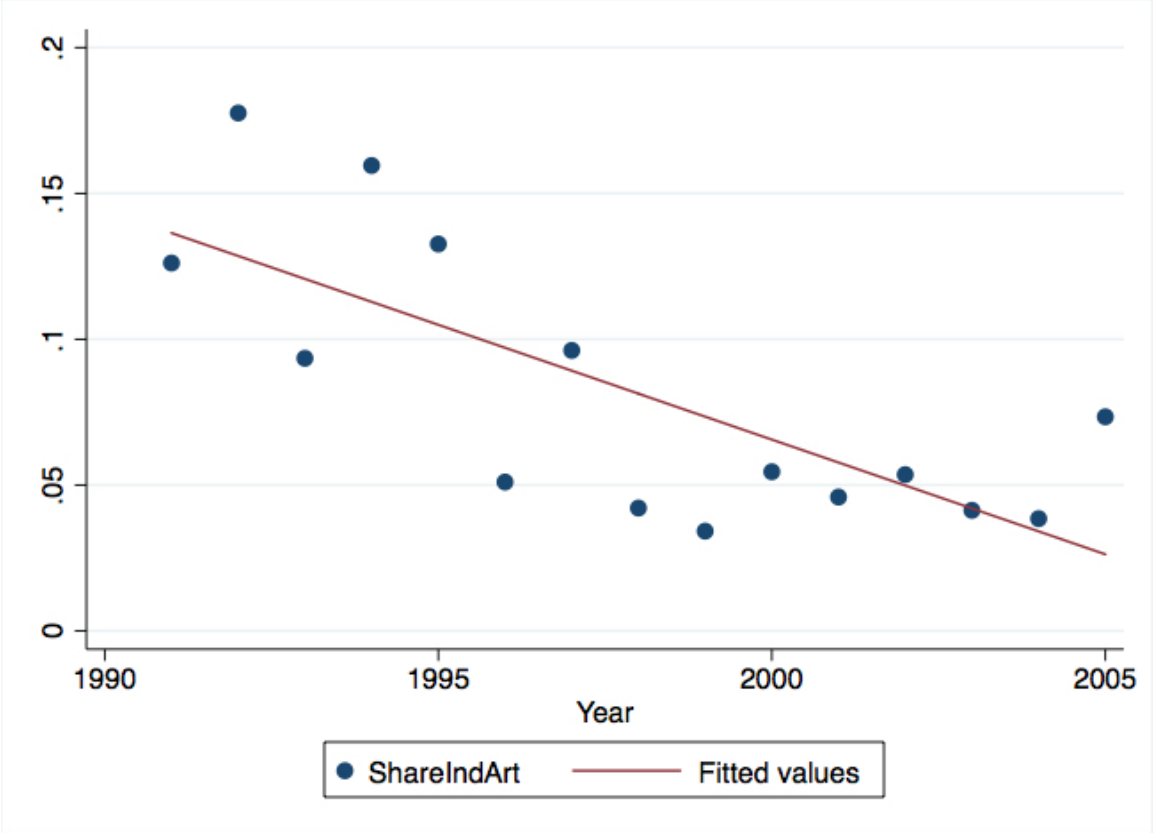
Appendix 9

```
. regress AvgSongPerArtist Year
```

Source	SS	df	MS	Number of obs	=	15
				F(1, 13)	=	1.99
Model	.020200088	1	.020200088	Prob > F	=	0.1815
Residual	.131722646	13	.010132511	R-squared	=	0.1330
				Adj R-squared	=	0.0663
Total	.151922734	14	.010851624	Root MSE	=	.10066

AvgSongPer~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Year	-.0084937	.0060156	-1.41	0.181	-.0214896	.0045022
_cons	18.38728	12.01921	1.53	0.150	-7.578654	44.35321

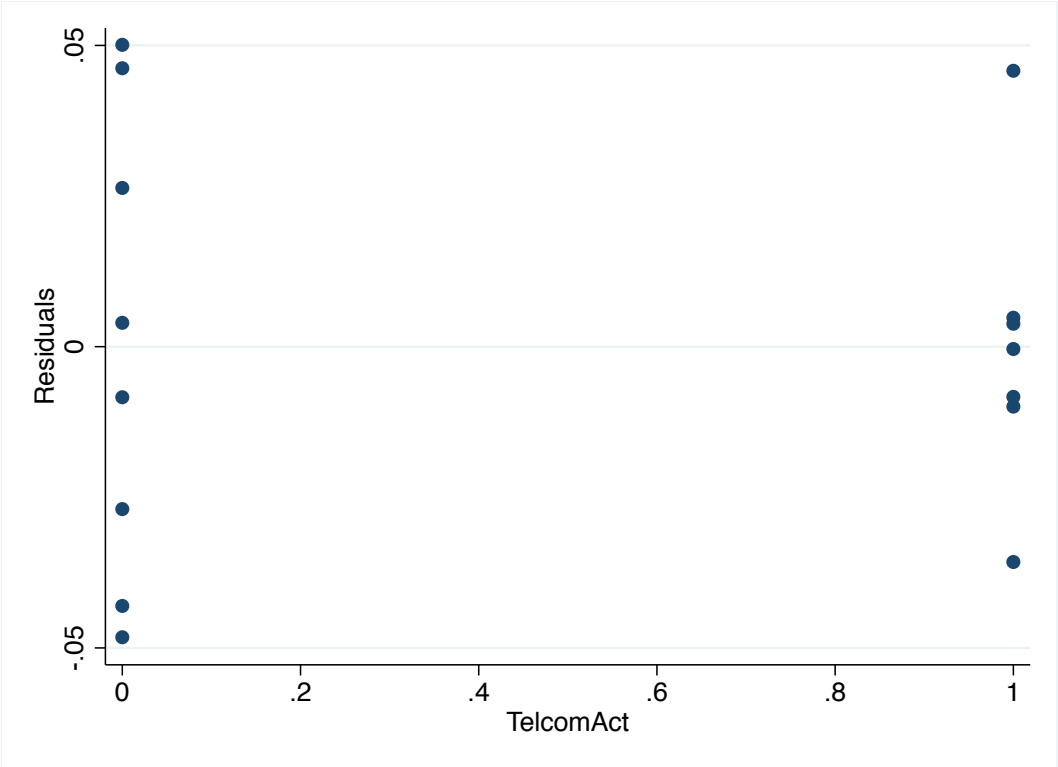
Appendix 10



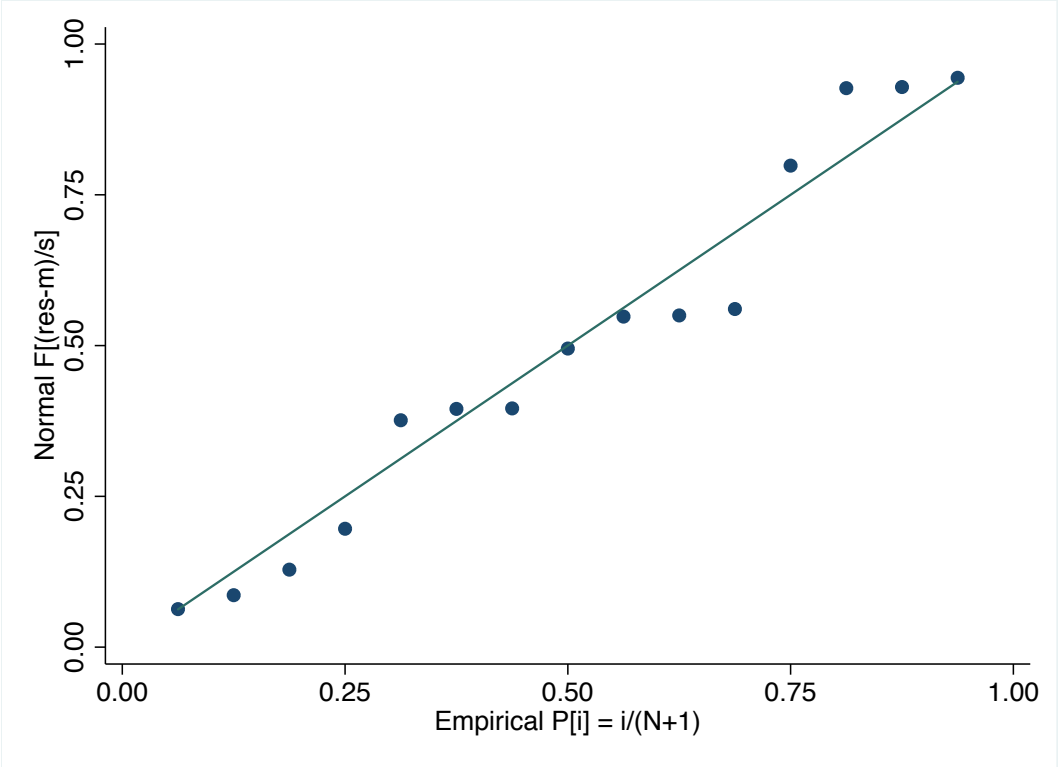
Appendix 11

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareIndArt

         chi2(1)      =     0.75
         Prob > chi2  =   0.3857
```

Appendix 12



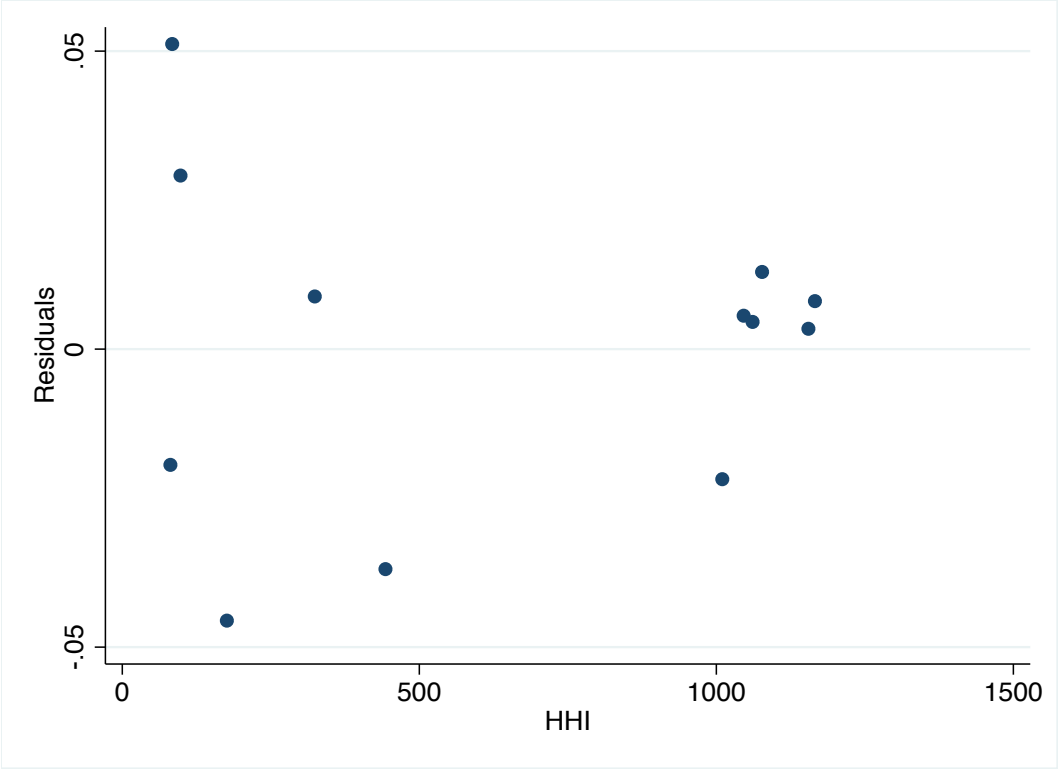
Appendix 13



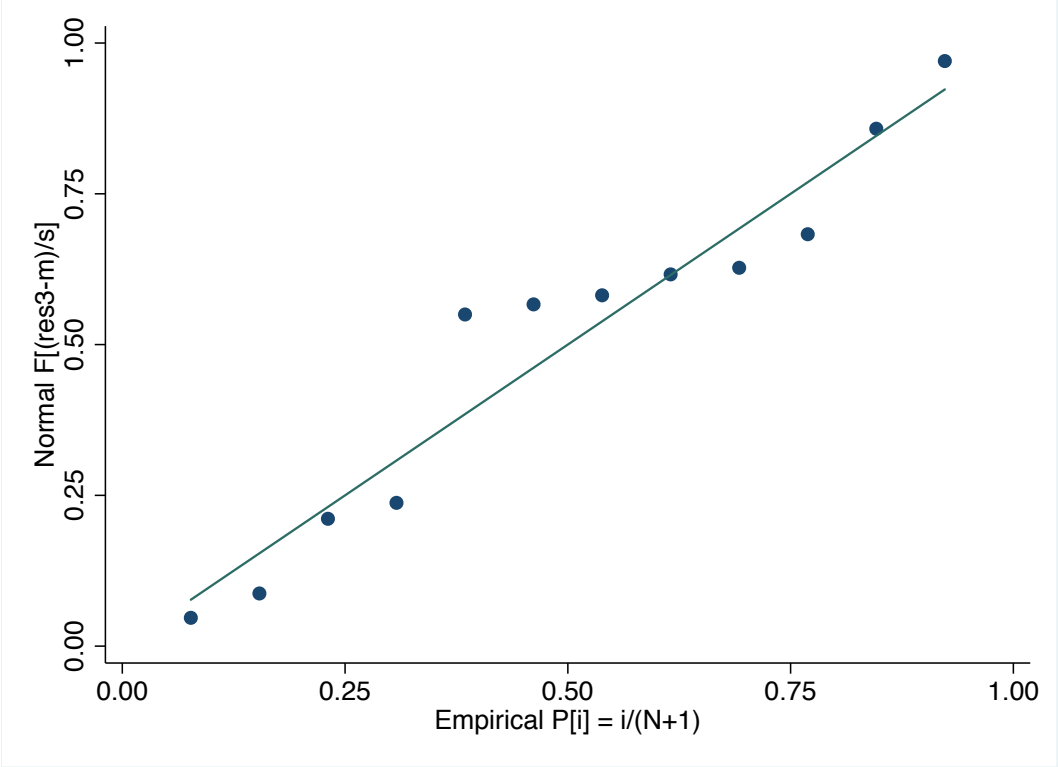
Appendix 14

```
. regress ShareIndArt HHI Year ,robust

Linear regression                               Number of obs     =         12
                                                F(2, 9)           =       5.84
                                                Prob > F          =     0.0237
                                                R-squared         =     0.5606
                                                Root MSE          =     .03006

------------------------------------------------------------------------------
             |               Robust
ShareIndArt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         HHI |  -.0000328    .000034    -0.97   0.359    -.0001097    .0000441
        Year |  -.0043948   .0038686    -1.14   0.285    -.0131462    .0043565
       _cons |   8.874447   7.713908     1.15   0.280    -8.575626    26.32452
------------------------------------------------------------------------------
```

Appendix 15



Appendix 16



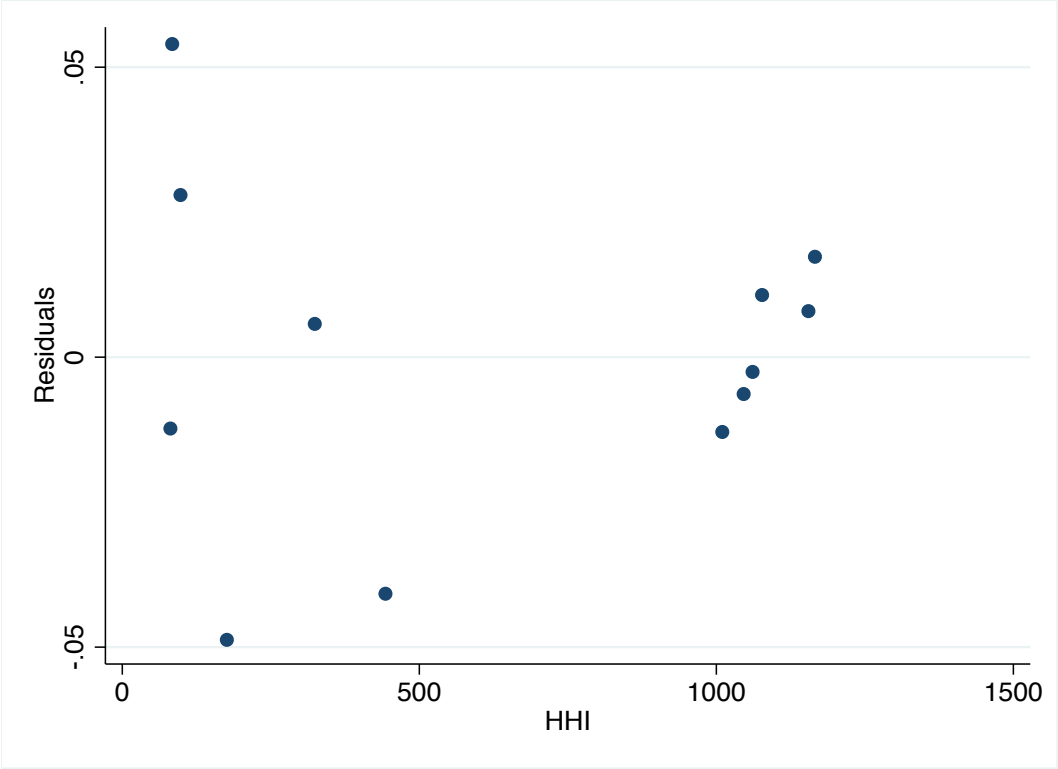
Appendix 17

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareIndArt

         chi2(1)      =     4.21
         Prob > chi2  =   0.0403
```

Appendix 18

```
. regress ShareIndArt HHI, robust

Linear regression                               Number of obs     =         12
                                                F(1, 10)          =      10.59
                                                Prob > F          =     0.0087
                                                R-squared         =     0.5347
                                                Root MSE          =     .02935

------------------------------------------------------------------------------
             |               Robust
ShareIndArt |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         HHI |  -.0000632   .0000194    -3.25   0.009    -.0001064   -.0000199
       _cons |   .1108838   .0199443     5.56   0.000     .0664451    .1553225
------------------------------------------------------------------------------
```

Appendix 19



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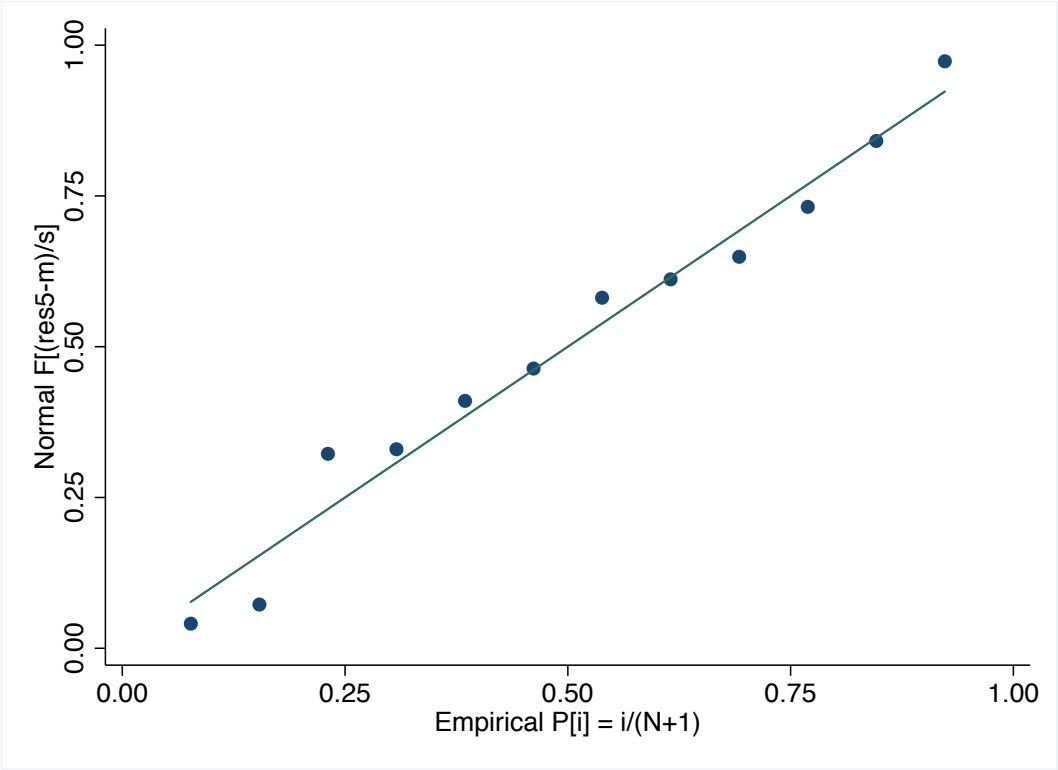
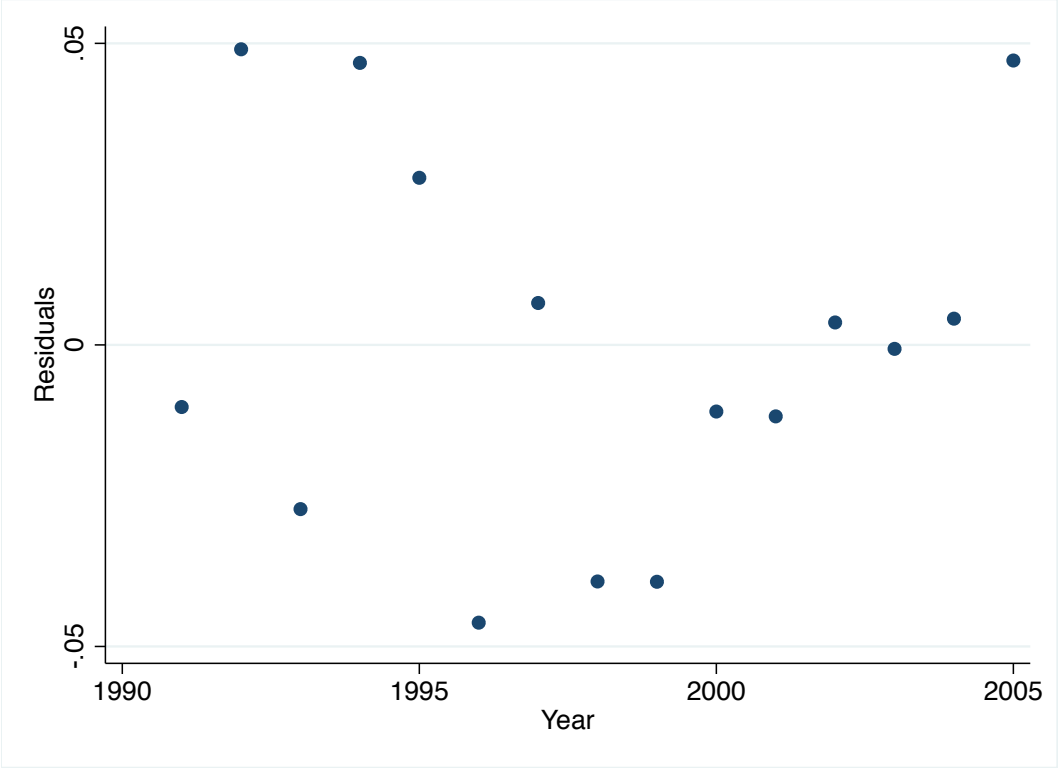


Appendix 21

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareIndArt

         chi2(1)      =     0.54
         Prob > chi2  =   0.4608
```

Appendix 22



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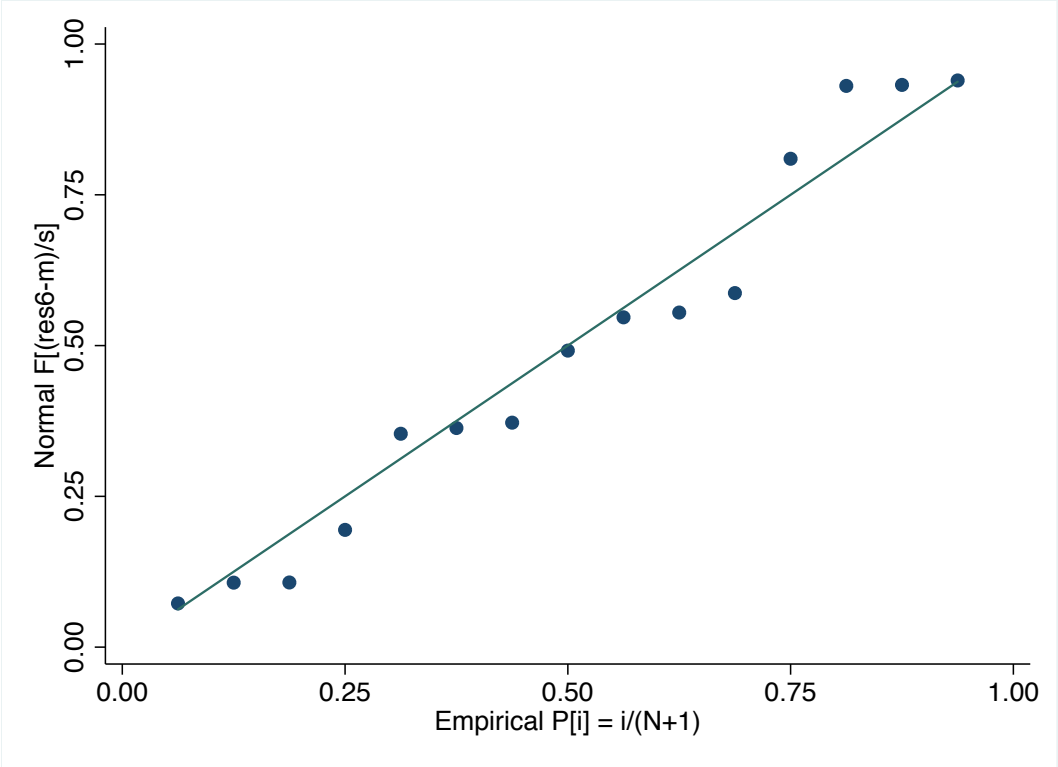


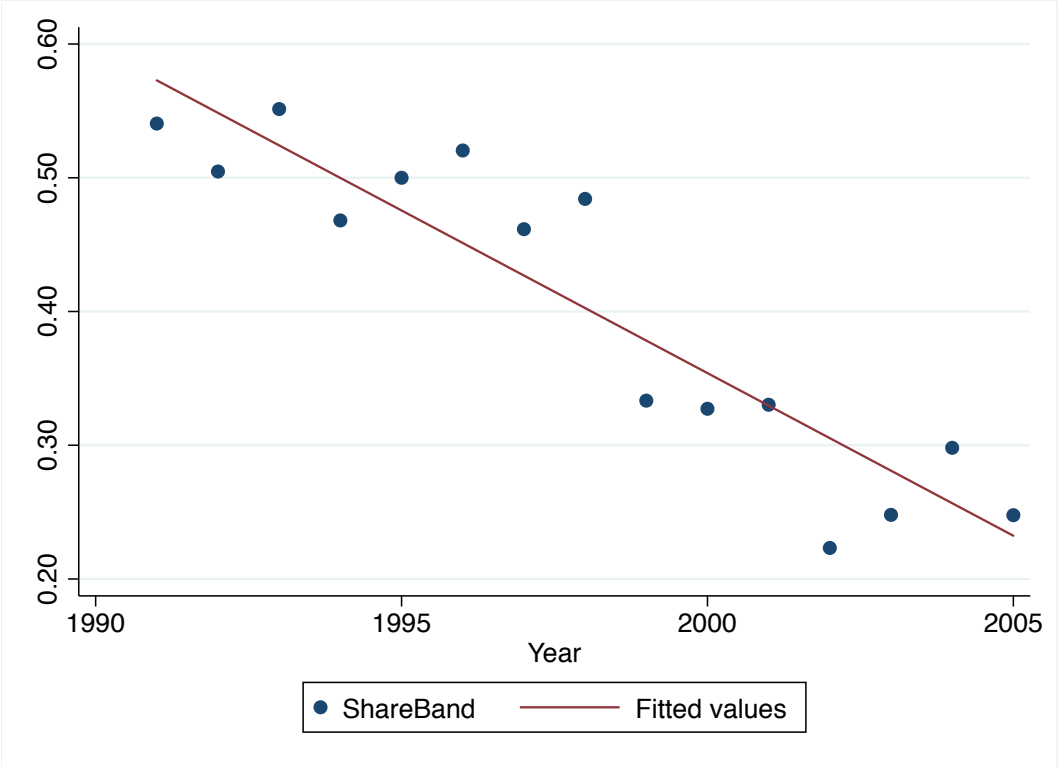
Appendix 24

```
. regress SongBand ShareBand TelcomAct Year
```

Source	SS	df	MS	Number of obs	=	15
				F(3, 11)	=	84.56
Model	4429.51836	3	1476.50612	Prob > F	=	0.0000
Residual	192.081636	11	17.4619669	R-squared	=	0.9584
				Adj R-squared	=	0.9471
Total	4621.6	14	330.114286	Root MSE	=	4.1788

SongBand	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ShareBand	177.0927	37.26222	4.75	0.001	95.07913	259.1063
TelcomAct	3.844574	6.733066	0.57	0.579	-10.9748	18.66395
Year	.3190485	.6338463	0.50	0.625	-1.076038	1.714135
_cons	-644.9466	1275.853	-0.51	0.623	-3453.08	2163.187

Appendix 25

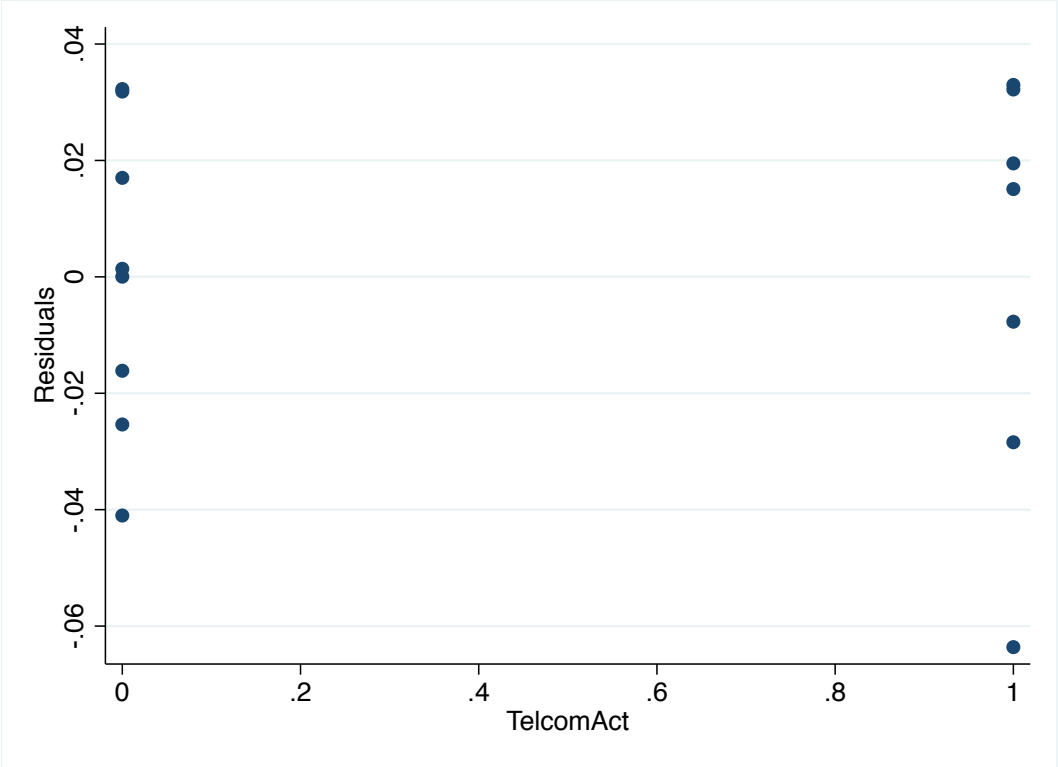


Appendix 26

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareBand

         chi2(1)      =     0.57
         Prob > chi2  =   0.4505
```

Appendix 27



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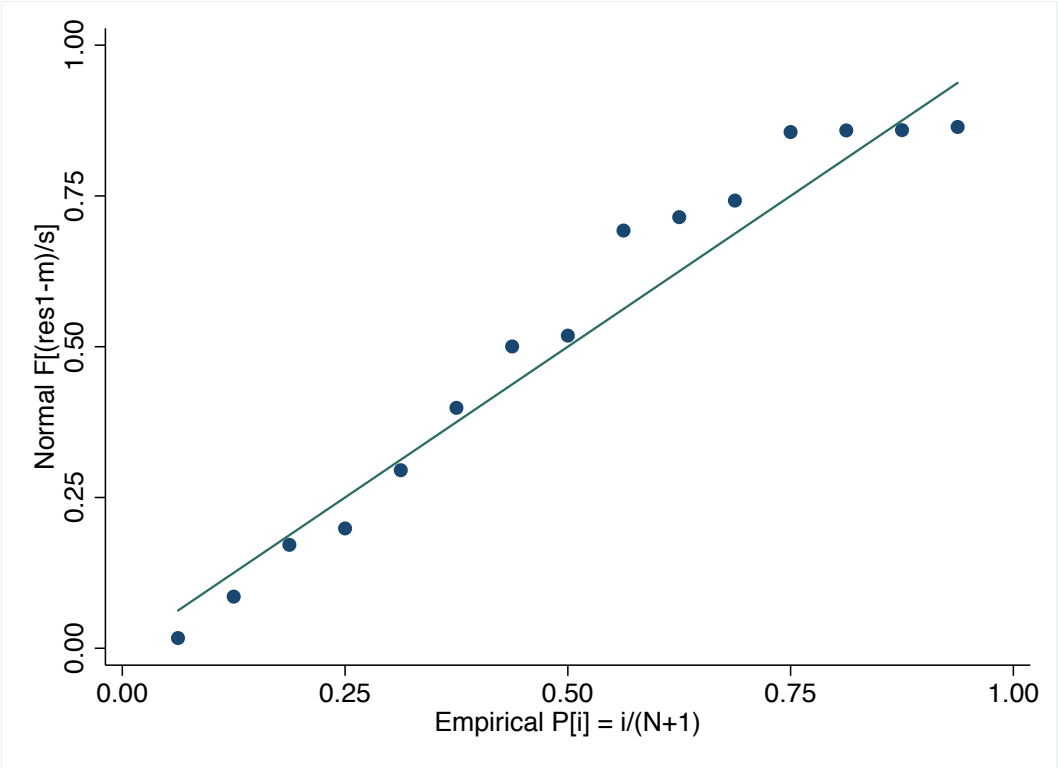
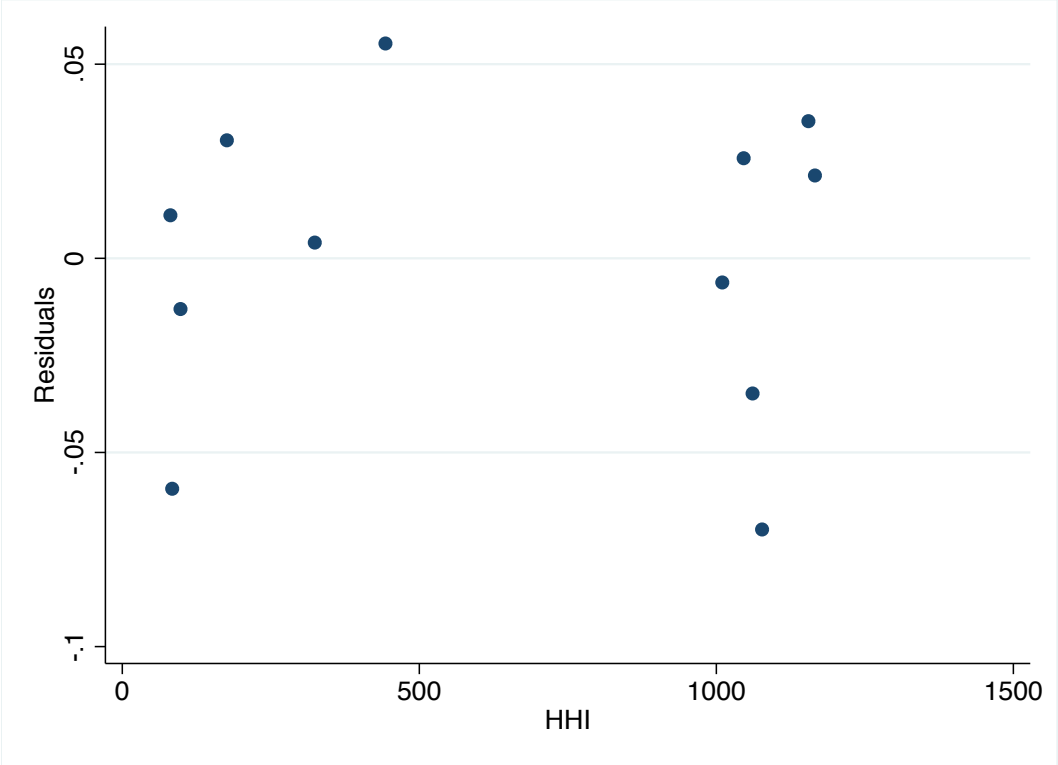


Appendix 29

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareBand

         chi2(1)      =     0.08
         Prob > chi2  =   0.7770
```

Appendix 30



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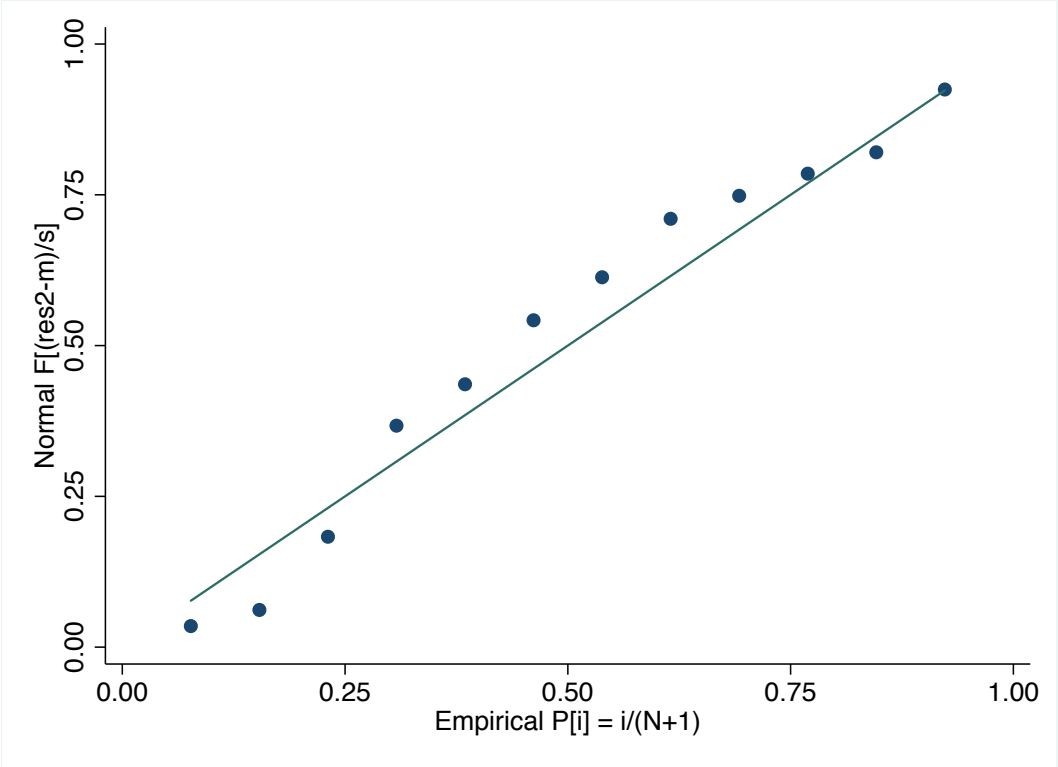
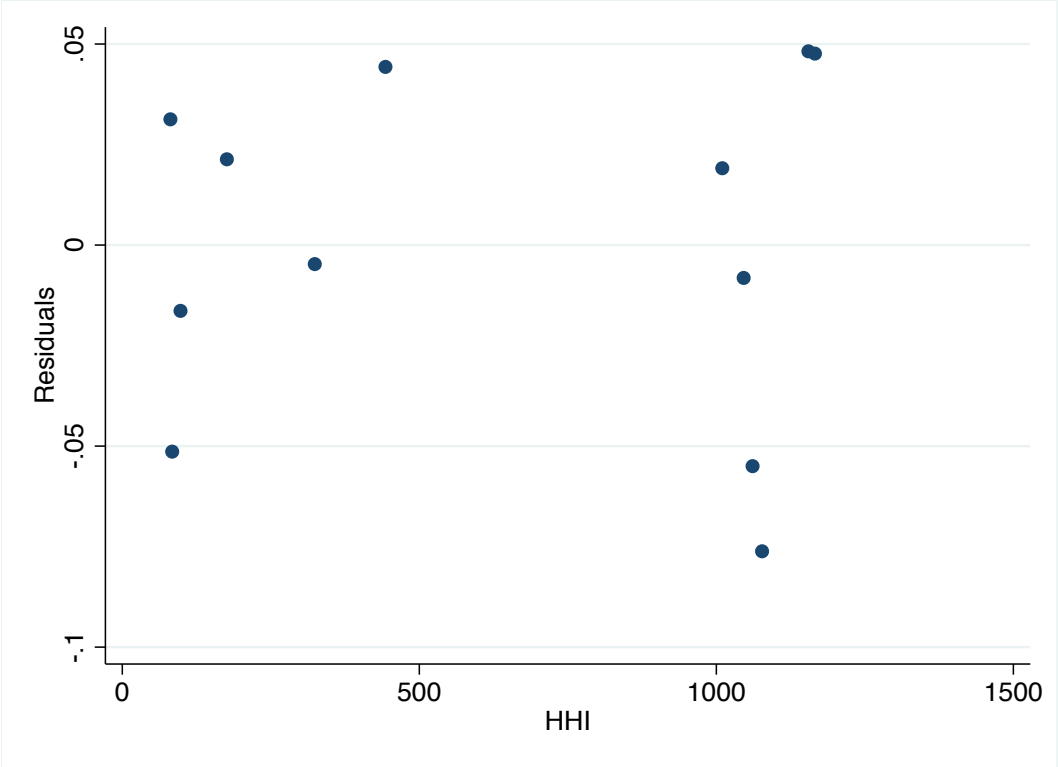


Appendix 32

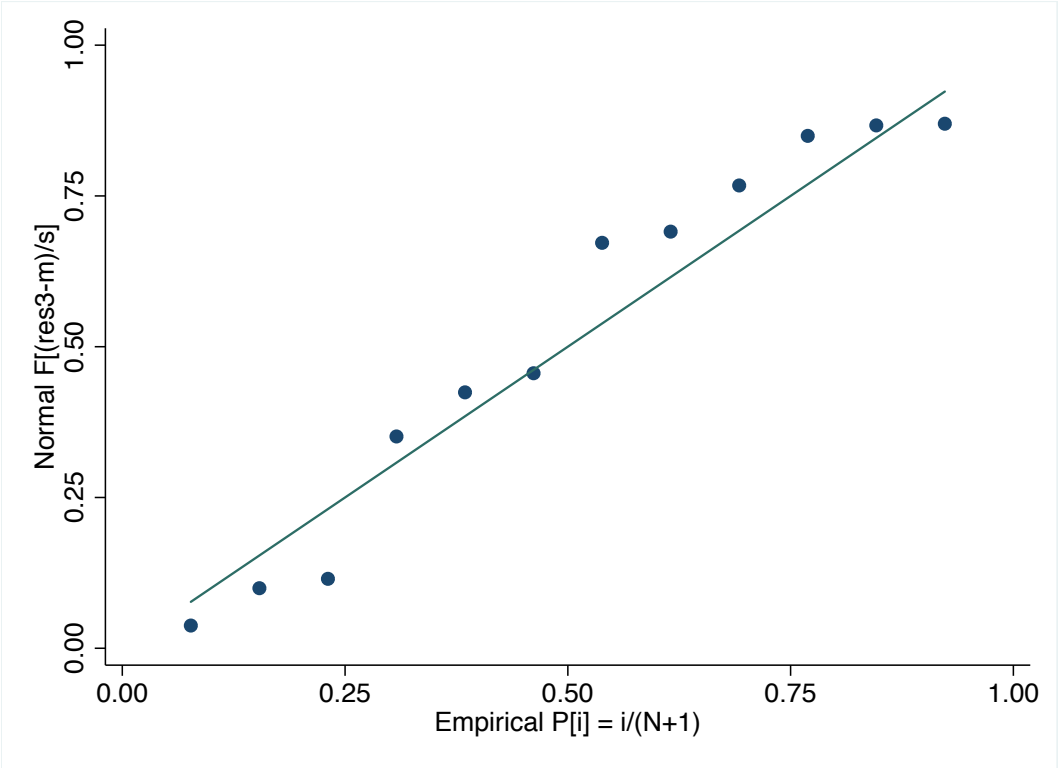
```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareBand

         chi2(1)      =     0.89
         Prob > chi2  =   0.3465
```

Appendix 33



Appendix 34

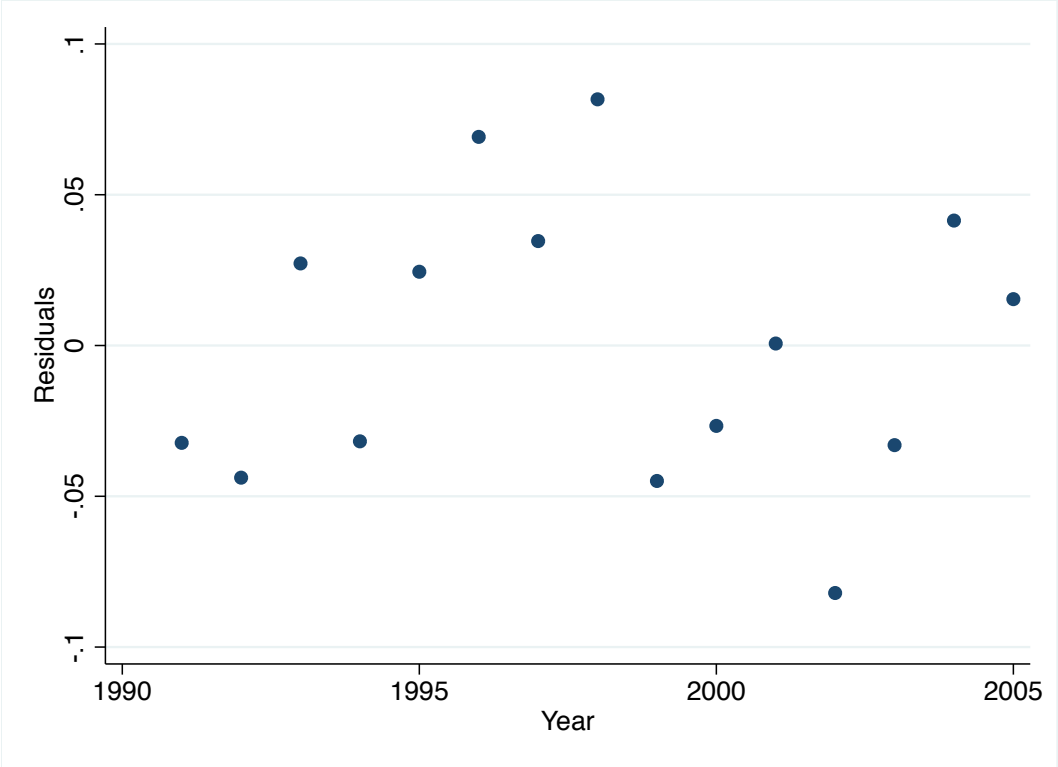


Appendix 35

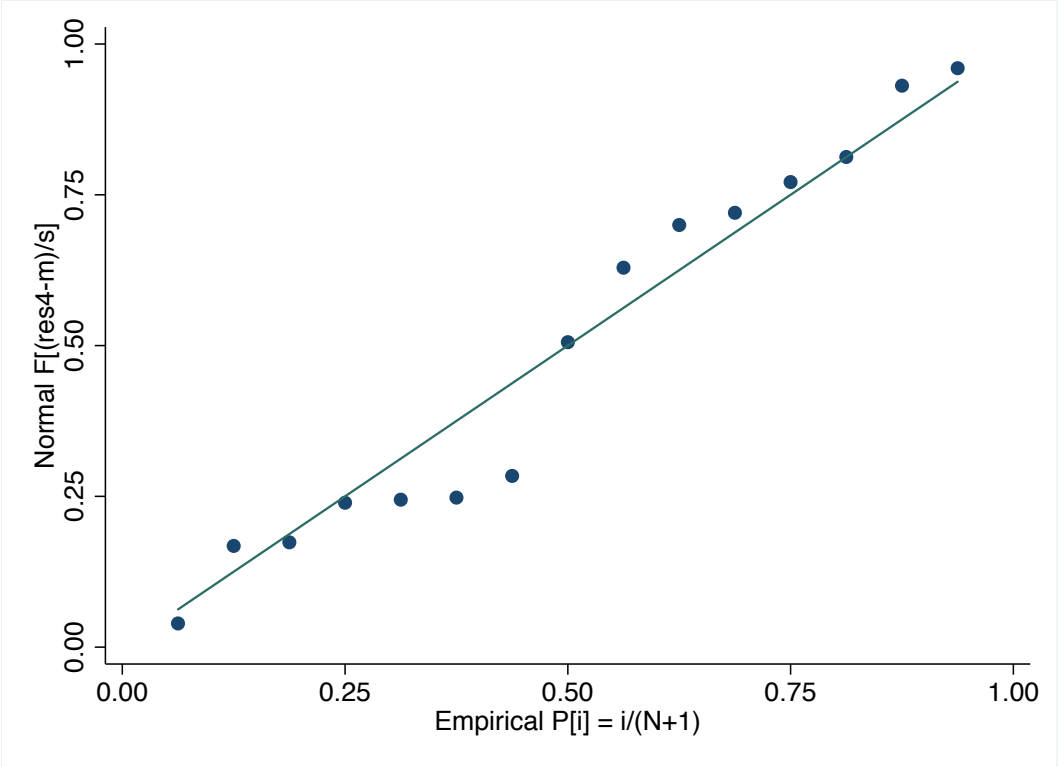
```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ShareBand

         chi2(1)      =     0.03
         Prob > chi2  =   0.8570
```

Appendix 36



Appendix 37


Normal F[(res4-m)/s]
0.00
0.25
0.50
0.75
1.00
Empirical P[i] = i/(N+1)
0.00
0.25
0.50
0.75
1.00