



Utrecht University

***Searching for Schumpeter: Historic topic modeling analysis of the Economist Magazine from 1960 to 2010.***

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**Abstract**

Even though the academic economic discourse seems to be far removed from the more popular economic discussion their influence should not be underestimated. The popular weekly magazine The Economist reports to its influential readership about the political and economic events around the world. The way in which they cover these events are influenced by the academic discourse. The digestion of these theories into the more mainstream economic discourse are the subject of this research. In the last quarter of the twenty-first century the economic discourse shifted from the hegemony of one economic theorist to another. Government regulated economic policies made way for the more laissez-faire market. This transition was founded in the theories of Schumpeters business cycle.

Through the use of topic modeling the output of the Economist magazine will be analysed to find out whether or not this shift in economic discourse effected the output of the Economist magazine. Starting in the year 1960 the analysis covers fifty years of the output by the Economist magazine. Through the topic distribution as established through topic modeling these changes within the report of the Economist become visible.

### *Introduction*

Starting in 2009 the world-renown weekly magazine, *The Economist*’ devoted the name of one of their business columns to that of the economist Joseph Schumpeter. The column concerns itself with topics that are associated with Schumpeter, particularly the concepts of innovative disruption and creative destruction.<sup>1</sup> The column is young in comparison to the long-standing history of the magazine that dates back to 1843. The magazine has since its foundation been able to reflect on and even shape the discourse on political economy and economic thought amongst a highly influential readership.<sup>2</sup> Thus bestowing the honour of a dedicated weekly column has some major significance. It solidifies Schumpeter’s name and theories amongst a large well-informed readership.

Schumpeter’s fame and influence within the mainstream economic discourse is, however, post mortem. His economic insights and theories are now part of the established economic discourse, but this has not always been the case. Schumpeter’s theories infiltrated the main economic discourse in the latter half of the twentieth century whilst Schumpeter spent most of his life in the first half of the century.<sup>3</sup> His book ‘*Capitalism, Socialism and Democracy*’ became the third most cited book in the social sciences written before 1950, following only *Das Kapital* and the *Wealth of Nations*.<sup>4</sup>

Schumpeter’s concepts of innovative disruption and creative destruction are characteristics of the business cycles he envisioned. These business cycles although fluid all share three periodic characteristics. These three key periods are unique to Schumpeter’s business cycle firstly that of

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<sup>1</sup> ‘Schumpeter: Taking Flight’, *The Economist*. September 19, 2009, p84.

<sup>2</sup> Zevin, Alexander. *Liberalism at Large, The World According to the Economist*. London: Verso, 2019, 2-5.

<sup>3</sup> Giersch, Herbert. 1984. “The Age of Schumpeter.” *The American Economic Review* 74, no 2:103-109, 103.

<sup>4</sup> Green, Elliot, ‘*What are the most-cited publications in the social sciences (according to Google Scholar)*’ May 12, 2016, <https://blogs.lse.ac.uk/impactofsocialsciences/2016/05/12/what-are-the-most-cited-publications-in-the-social-sciences-according-to-google-scholar/>.

disruptive innovation, followed by a swarming effect followed by a process of normalisation.<sup>5</sup>

Although characteristics of this business cycle have been accepted within the modern discourse and even solidified by the Economist through naming their column after Schumpeter this didn't occur until 2009. Whether or not these business cycles have been described within the output of the Economist prior to 2009 remains unclear. The aim of this research is to scrutinise the output of the economist in the latter half of the twentieth and early twenty-first century to find out whether or not the business cycles as described by Schumpeter are visible in the output of the Economist. The three distinct parts of Schumpeter's business cycle will be searched through the use of topic modeling.

According to Joseph Schumpeter's own words 'We are dealing with a process whose every element takes considerable time in revealing its true features and ultimate effects, we must judge its performance over time, as it unfolds through decades or centuries.'<sup>6</sup>

The luxury of analysing economic history is the possibility to judge longer periods of time aided by the comfort of hindsight. Another luxury mostly found in modern history writing is the sheer volume of sources that have been made readily available, especially thanks to the large-scale digitisation of historic newspapers and magazines. This luxury, however, does not come without its challenges. The digitisation of enormous bulks of sources such as the entire 167 years of the Economist output poses the problem of having too much information. This is all the more the case when the goal is to work with large quantities of texts and compare these over time. According to Tze-I Yang, Andrew Torget and Rada Mihalcea one of the tools that could solve this problem is the tool of topic modeling. They used topic modeling to tackle a large bulk of historical newspapers. Software that runs analysis through large bodies of text. This technique runs analysis through large bodies of text by assigning words in the text to different baskets which can be interpreted as topics. Yang et al, for example, explore how topic modeling is able to identify the most important and

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<sup>5</sup> Schumpeter, Joseph Alois, *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. New Brunswick: Transaction Publisher, 1934, 597.

<sup>6</sup> Schumpeter, Joseph Alois. *Capitalism, Socialism and Democracy*. London: Allen & Unwin, 1981, 83.

potentially interesting topics over a period of time in historical newspapers.<sup>7</sup> Thus far surprisingly little historical scholarship is based on topic modeling given the amount of historical data that is readily available for any researcher willing to take it on. Due to the status of the Economist as a reliable well-informed magazine that caters to a bourgeois readership<sup>8</sup> the magazine lends itself as a reflection of mainstream economic discourse. It seems therefore to be the perfect place to conduct the search of signs of the business cycle as described by Schumpeter. The influence of Schumpeter's concept of the business cycle is what is at stake. The Economist magazine proclaims that Schumpeter was one of the greatest economist who influenced the modern economic discourse.<sup>9</sup> The question is thus how it has influenced the output of the Economist magazine. Did the magazine's coverage of the business cycle correspond to Schumpeter's theory? So far this link has remained unscrutinised. The correlation between the coverage of the business cycles in the Economist and that of Schumpeter's business cycles reveals the influence of Schumpeter on the Economist output. Especially in the period dubbed as Schumpeter's economy from the 1980's up until the early 2000s should, according to the Economist own conviction show a correlation as unseen prior to this period.

The relevance of which is two-folded, on the one hand, the research illustrates how the shift within the economic discourse influenced the output of the Economist, And on the other hand, the research shows what topic modeling can uncover and how it can be applied to the many large sources available such as the entire backlog of the Economist Magazine. The influence of Schumpeter on the Economist magazine has thus far only been recognised in 2009 by the naming of the column. Any influence of Schumpeter prior to it has been unrecognised by the magazine itself.

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<sup>7</sup> Yang, Tze-I, Torget, Andrew, Mihalcea, Rada. 2011. "Topic modeling on historical newspapers.", *Proceedings of the 5th ACL-HLT Workshop on Language Technology for Cultural Heritage, Social Sciences, and Humanities*, 96-104, 96-98.

<sup>8</sup> Zevin, *Liberalism at Large*, 5.

<sup>9</sup> 'Schumpeter: Taking Flight', *The Economist*, p84.

The way in which this influence is now researched namely through topic modeling has been unprecedented. Hence a new road is taken to explore the unscrutinised influence of Joseph Schumpeter on popular economic discourse in the Economist.

What was simply unique to Schumpeter alone is the idea that innovation lies at the heart of economic progress. If his theories are correct this holds merit all throughout history. But what is being scrutinised is how this became apparent in the output of the Economist. This research spans a period of 50 years starting in 1960. The first chapter will analyse the first two decades in order to establish a pattern in the way topic modeling assigns topics within the Economist. The two following chapters will analyse topic distribution in the subsequent decades in order to find any divergence within the patterns. These patterns and their divergence indicate the coverage of subjects the magazine covered. Scrutinising the links between Schumpeter's business cycle and the output of the Economist.

### ***1.1 Joseph Schumpeter and his theories***

The writings of Schumpeter covered many different facets of economic theory but his most famous idea was the conceptualisation of evolutionary economics, especially the idea of creative destruction. Another major component of the theories he created was the role and influence of the entrepreneur within evolutionary economics. According to him, entrepreneurs act as the driving force of the economy. Through his economic lens, the entrepreneur is the inventor of disruptive innovation and thus responsible for innovation. It is because of this that Schumpeter's name has become synonymous with the emersion of new markets based on technological developments. The idea of creative destruction is one that could perhaps be taken for granted in modern economics. It is something that would seem to be intrinsic to the capitalist society. However, the idea of creative destruction or at least the recognition of the process is of more recent date than its actual conceptualisation. The process of creative destruction in its very essence defies the holy equilibrium of Adam Smith that was central in the early days of capitalist and liberal thinking. The idea of

creative destruction was formalised by Joseph Schumpeter in his book *Capitalism, Socialism, and Democracy*. In it he referred to it as the following:

If I may use that biological term—that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.<sup>10</sup>

He calls it an essential fact about capitalism. But here it seems he was getting ahead of his time. This is why some would proclaim him a prophet of economics.<sup>11</sup> His book, published in the midst of the Second World War in 1942, was referring to a process that defied the economic discourse of the time. To him, creative destruction was something that was essential to the concept of capitalism. After the Second World War, the economy changed and slowly technological innovation became a driving force of the economy. The process of creative destruction became slowly more prevalent until it was considered part of basic economics. Its inclusion within the popular discourse cemented Schumpeter's name in history. In 1984 German economist Herbert Giersch wrote in the *American Economic Review* that the age of Schumpeter had arrived. A full list of qualifications was listed but what stood out most is the 'spectacular growth of self-employment and job creation in new firms for new products in Europe and the United States'.<sup>12</sup> The elements of creative destruction and innovative disruption were characteristics of what Schumpeter understood to be business cycles.

Giersch agreed that the spectacular growth fit into Schumpeter's business cycle. The business cycle such as Schumpeter intended consisted of a multitude of periods with large variables depending on each unique circumstance. According to Schumpeter each business cycle consisted of

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<sup>10</sup> Schumpeter, *Capitalism, Socialism and Democracy*, 83.

<sup>11</sup> McCraw, Thomas. *Prophet of Innovation: Joseph Schumpeter and Creative Destruction*. Cambridge, Harvard University Press, 2009, 10.

<sup>12</sup> Giersch, Herbert, *The Age of Schumpeter*, 103.

both a boom and a recession. Though these periods could fluctuate in time and appearance one of the key characteristics of the boom is that the cause is linked to what he refers to as the swarming effect.<sup>13</sup> According to Schumpeter, entrepreneurs are the driving force of the economy. Through their disruptive technologies, they are able to create new enterprises. The group of entrepreneurs that are responsible for this is small since only a few hold the qualities needed for such enterprises.<sup>14</sup> It is rather the less capable entrepreneurs who follow the original innovation in swarms. These swarms referred to as the swarming effect are responsible for the boom within the business cycle. A process of normalisation follows which Schumpeter refers to as absorption of liquidation. This process of liquidation is what is considered to be the essence of a recession.<sup>15</sup> The business cycle consists of three periods, it started with the initial invention, followed by the swarm which in turn was followed by a period of liquidation or normalisation. The swarming effect causes a boom whereas the liquidation causes a recession. This business cycle comes from an evolutionary point of reference. Schumpeter describes the status quo of capitalism to be evolutionary. He considers that this is what Karl Marx described perfectly a century preceding his own works.<sup>16</sup> He attributed this due to the fact that the capitalistic system exists only within a human society that is in itself in a constant state of evolution or change.

The Business cycle has a few characteristics, one of such is that of creative destruction. The concept of creative destruction holds that whenever a disruption occurs due to a newer form of technology or any other process from which the consumer and producer benefits it destroys the old system and from it derives a new and better system from which society benefits. This benefit, however, may not seem like a benefit due to the initial destruction that is necessary for the improved structure to be implemented. One example of such an event is how Uber has been able to

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<sup>13</sup> Schumpeter, *The Theory of Economic Development*, 602.

<sup>14</sup> *Ibid*, 597.

<sup>15</sup> *Ibid*, 602.

<sup>16</sup> Schumpeter, *Capitalism, Socialism and Democracy*, 83.

take over the position of the taxi industry. In the creation of many new jobs and new technology, many taxi drivers went bankrupt.<sup>17</sup> This is perhaps one of the most clear-cut examples and it arrives more than half a century after *Capitalism, Socialism, and Democracy* was published. Often times the process of creative destruction takes longer and is harder to recognize, especially in the midst of the process. Changes like these become clearer in hindsight. Examples of creative destruction have taken place all throughout modern history however, the cases have steadily increased within contemporary times.

A specific component of creative destruction is that after the invention of the new technology follows a period of corporate digestion. This means that after the initial invention a period follows in which the new invention is transformed and adjusted in order to be applied within an economic context. This is what Schumpeter refers to as the swarming effect.<sup>18</sup> Within the business cycle, this effect is what causes the initial boom within the economy. According to Schumpeter, this is followed by a recession due to the normalisation of the new industry and technology.

The post-second world war economy of Western Europe and the United States can be characterised as a Keynesian economic state. Keynesian economic policies can be categorised by state expenditure in order to boost the economy. It is important to note that according to the theory of Keynes the driving force of the economy is the consumer.<sup>19</sup> This stands contrary to Schumpeter's conviction being that it is actually the entrepreneur that acts as the driving force of the economy. In the 1980s, three decades after Schumpeter passed away the Keynesian economic theory started to regress in popularity. His theories no longer corresponded with the economic developments of the time. Instead, now Schumpeter's theories found their place within the economic discourse. His

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<sup>17</sup> Schneider, Henrique. *Creative Destruction and the Sharing Economy : Uber As Disruptive Innovation*. Cheltenham: Edward Elgar Publishing, 2017, 121.

<sup>18</sup> Schumpeter. *The Theory of Economic Development*, 601.

<sup>19</sup> Giersch, Herbert, *The Age of Schumpeter*, 104.

two main concepts of innovation and entrepreneurship in particular fitted the economic reality of the time.

According to Karol Slidzik of the faculty of management in Gdansk: ‘One of Schumpeter’s most lasting contributions was his insistence that entrepreneurship is at once a unique factor of production and the rare social input that makes economic history evolve.’<sup>20</sup> It is these aspects of Schumpeter that will be searched for in the analysis. The notion that entrepreneurship and innovation are the driving force of the economy. How does this relate to the development of conversations within the discourse of the economist?

### *1.2 The Economist Magazine*

The Economist as a magazine caters to bourgeois readers of mostly the transatlantic western world.

<sup>21</sup> Although not exclusively read by the bourgeois, the magazine boasts of its influential clientele.

They refer to their readers as policymakers and decision-makers.

The Economist has over the centuries remained an economic liberal magazine that promotes the ideas of what are considered economically liberal practices.<sup>22</sup> By analysing the magazine throughout different years it can thus reveal insights in the economic discourses and how it developed over time. In modern times it has consistently released weekly all throughout the year.<sup>23</sup> The magazine concerns itself with international politics and international business. Hence its consumers often belong to groups or professions that require knowledge on such things. The magazine is further filled with articles on trends, advertisements, and advice. The magazine also refrains from publishing writer’s names in order to create a consistent voice. Due to the magazine’s

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<sup>20</sup> Slidzik, Karol. 2013. “Schumpeter’s View on Innovation and Entrepreneurship.” *Management Trends in Theory and Practice* (University of Zilina & Institute of Management): 89-94. 2.

<sup>21</sup> Zevin, *Liberalism at Large*, 13.

<sup>22</sup> Ibid, 14.

<sup>23</sup> Ibid, 13.

consistency in its output and the format of its output it has the potential to function as a tool through which to examine economic theory.

The Economist magazine proclaims Schumpeter as one of the greatest economists of all time even honouring him with a column named after him. According to Alexander Zevin who wrote a monograph on the history of the magazine and their coverage of liberalism, the Economist has almost always displayed the dominant stream of liberal thought.<sup>24</sup> Therefore, their output has been highly influenced by the dominant ideas on the economy. But if Schumpeter's theories were the prominent theories of the later twentieth century does this correspond with their output? It wasn't until 2009 that they named the column after him. There are few mentions of Schumpeter's name to be found prior to the column. However, the correspondence of the output could still correlate with Schumpeter's theories. If for instance characterisations of the business cycle becomes clear in the coverage of the magazine the link between the Economist and Schumpeter can be found prior to the column. It will prove that the Economist was influenced by Schumpeterian economics before they were even aware of it. If their coverage of the business cycle corresponds to that of Schumpeter's it will be proof of Schumpeter's infiltration into the mainstream economic discourse.

### ***1.3 Methodology: Working with Topic Modeling***

This research is based on a topic modeling analysis of the *Economist* magazine. The archived documents of the *Economist* have been accessed through the Gale Digital Scholar Library.<sup>25</sup> Topic modeling will be used in order to distinguish the variety of topics discussed within the Economist. These topics will be compared and analyzed in chronological comparison, focusing on topics covering examples of the theory of Joseph Schumpeter. The corpus is analyzed per year jumping 5 years at a time starting in 1960 and ending in the year 2010.

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<sup>24</sup> Ibid, 631.

<sup>25</sup> Gale Digital Library, <https://go-gale-com.proxy.library.uu.nl/ps/dispBasicSearch.do?userGroupName=utrecht&prodId=DSLAB>.

The software used for the topic modeling is MALLET. The MALLET topic modeling software searches for words that are used in a similar pattern in the text.<sup>26</sup> Topic modeling programs such as MALLET do not have knowledge of the meaning of individual words. Rather they select words from a large pile of documents and order the words in an iterative process on the basis of probable association with other words in that text. They then gather these words in separate baskets that are referred to as topics or themes.<sup>27</sup> Topic modeling links words found in large bodies of text and links them to a topic.<sup>28</sup> Topic modeling is a probabilistic technique and will not consistently assign every word to the same topic if the analysis is run twice. Although the results will not profoundly diverge it is important to note that this quantitative research method varies slightly in each analysis. The software that will be used for topic modeling has been made available through the Gale Digital Scholar Lab. The Gale Digital Scholar Lab offers great transparency in the way it implements topic modeling and provides clear instructions to those willing to implement them. Thus the Gale Digital Scholar Lab will suffice for the research. The backlog of the Economist consists of a yearly average of between 7000 and 10000 documents, however, the software of the Gale Digital Scholar Lab has a limit of 10000 files per collection. This means that in some of the years that are analysed the collection will miss a few articles belonging to the bulk of that year's documents. This does not have to diminish the findings of research since the documents remain representative.

This research can, in addition to the prime objective of finding Schumpeter's theory, also be viewed as a demonstration of the possibilities that topic modeling has to offer. Topic modeling remains a selective process. Selections are made on the different moments of the research, for

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<sup>26</sup> McCallum, Andrew Kachites. 2002 "MALLET: A Machine Learning for Language Toolkit." <http://mallet.cs.umass.edu>.

<sup>27</sup> Mohr, John, Bogdanov, Petko. 2013. "Introduction—Topic models: What they are and why they matter". *Poetics* 41 (6): 545-569, 547-550.

<sup>28</sup> Graham, Shawn; Weingart, Scott & Milligan, Ian. 2012. "Getting Started With Topic Modeling and MALLET", *The Programming Historian*, <https://programminghistorian.org/en/lessons/topic-modeling-and-mallet>.

instance in deciding how many words are being searched per analysis. Or how many topics are searched. Each decision will affect the outcome of the research. Topic modeling as a tool helps classify large documents and topics within these documents.<sup>29</sup> Table 4.2 is an example of the overview one analysis provides. This example is the result of one analysis in one year. It shows the ten topics searched for and list ten associating words within the topic starting with the most frequently used on the top.

Table 4.2

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8	Topic 9	Topic 10
London	London	America n	Year	Years	Oil	Year	London	Government	Limited
Experience	Page	Government	Companies	People	New	Cent	Bank	EEC	Bank
University	Business	South	Share	Book	Industry	Price	New	Party	Incorporated
Research	International	Political	Million	New	Companies	Prices	Business	British	Inc
Department	World	President	Capital	Life	British	Percent	Tel	Labour	International
Applications	Service	United	Profits	Public	Years	Inflation	York	Britain	Banque
Work	New	New	Company	Work	Production	Rate	International	Unions	Securities
Economist	Travel	Military	Market	Time	World	Billion	Ltd	New	S.A
Economics	Fly	War	Shares	Does	Company	Countries	Hong	Union	Corperation
Salary	Time	Foreign	Profit	Man	North	Oil	Street	Committee	Company

Due to its selective nature topic modeling is not free of potential problems. According to John Mohr and Petko Bogdanov, specialised in computer science and computational social science, it requires

<sup>29</sup> Syed Shaheen, “*Topic Discovery from Textual Data: Machine Learning and Natural Language Processing for Knowledge Discovery in the Fisheries Domain.*”, PhD diss (Utrecht University, 2009), 2.

knowledge on the subject at hand. It requires an understanding of the data that is being analyzed that surpasses superficial knowledge of that subject. It requires a hermeneutical approach, a map that is needed to embark on the sea of information that is provided.<sup>30</sup> According to Ted Underwood, an English professor specialised in text mining, these topics could perhaps better be referred to as discourses.<sup>31</sup> In the case of this specific study that doesn't necessarily pose a challenge, on the contrary, it actually benefits the analysis. Because the specific gaze of this study focuses on topics or discourse that involve examples of the ideas of Joseph Schumpeter. However, for purpose of consistency, the discourses will mostly be referred to as topics. A study by Goldstone and Underwood attempted to apply topic modeling to research the history of scholarship. They used topic modeling in an attempt to display conceptual ideas and how they progressed over time. For their research, they selected an enormous bulk of literature. The literature consisted of the whole catalogue of historic text they could download from JSTOR.<sup>32</sup> Within this whole catalogue they attempted to search for multiple overarching conceptual frameworks. They were unable to make any insightful conclusion that corresponded with the theory of their research. One of the problems of their study was the volume of the literary work they analyzed. Their research was too ambitious to conceive any useful results. The research thus seems like a beta version of the potential of topic modeling within historic text analysis. They fail to go beyond the demonstration of its application. They are easier to associate than the concepts such as structuralism and post-modernism such as Goldstone and Underwood have done.<sup>33</sup>

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<sup>30</sup> Mohr, Bogdanov, 'Topic models: What they are and why they matter.', 547.

<sup>31</sup> Underwood, Ted "Topic modeling made just simple enough." *The Stone and the Shell*., <https://tedunderwood.com/2012/04/07/topic-modeling-made-just-simple-enough/>.

<sup>32</sup> Goldstone, Andrew, Underwood, Ted. 2014 "The Quiet Transformations of Literary Studies: What Thirteen Thousand Scholars Could Tell Us." *New Literary History* 45 (3): 359-384. Project Muse, 360-362.

<sup>33</sup> Goldstone, Underwood, "What Can Topic Models of PMLA Teach Us About the History of Literary Scholarship?", 362.

Although the catalogue of the *Economist* is still large this doesn't have to be a problem itself. According to Shaheen Sayed who wrote his PHD dissertation on topic modelling, topic modeling functions better on larger data sets. The topics tend to be more coherent when applied to larger data sets.<sup>34</sup> Topic modeling makes possible what would be impossible with manual labour. Even an automated system that counts the frequency of words would lack the sophistication required to understand the context of the words. In the search for signs of Schumpeter's theory in a text such as the *Economist*, it is able to display the significance of words within the context they are used. Proof of the proliferation of the swarming effect in economic discourse can only become visible in chronological comparisons analysed by topic modeling. Basking words within their topics and simultaneously showing the frequency of the topics and words allow for a clear and visible analysis of the writings of the Economist. As will be displayed in the research this becomes visualised through topic modeling. Instead of having to go through all of the titles of the articles topic modeling searches the entire text. Therefore, one text isn't exclusively linked to one topic. This allows for a broader search into topics and how they develop. Because of the consistency of the *Economist* magazine, the large bulk of text do not pose a problem such as it did in Goldstone and Underwood's research. With only one magazine and only one theory, it will avoid the problems they encountered.

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<sup>34</sup> Syed, *Topic Discovery from Textual Data*, 45.

## *Chapter Two: From Keynes to Schumpeter*

At the time of their publication the ideas Schumpeter had been unable to establish themselves within the mainstream economic discourse.<sup>35</sup> It wasn't until the end of the twentieth century that his theories gained popularity amongst economists. This chapter will focus on the first two decades that have been analysed through topic modeling. The output of the Economist magazine in these decades is unlikely to reflect Schumpeter's business cycle explicitly. These decades do not belong to a period in which Schumpeter's theories were widespread amongst economists let alone popular economic magazines.

The analysis of the first decades functions predominantly as a tool to establish patterns within the Economist magazine and to examine the consistency within these patterns. Surely any signs for Schumpeter's theories will be examined, however, this will not be the main focus of the chapter. Rather the main focus is on what patterns of topics, topic modeling reveals in the 1960s and 70s and whether or not are they consistent. Besides the search for consistency within the topics, the chapter will also focus on the Economist magazine as a representation of the state of affairs. The period from 1960 until the late 1970s is from the perspective of economic theory headed by the ideas of Keynes. Do the findings of topic modeling confirm this Keynesian sentiment?

### **2.1 Consistency of the Economist magazine**

There are a total of two analyses run each year. The first analysis is set in search of ten topics. The second analysis is set in search of twenty topics. The results of each analysis can be found in the annex. The annex will show only the most significant topics of the second search. One of the first tasks when applying topic modeling is that of the labeling of the topics. Sometimes this labeling is fairly straightforward. For instance, one topic in the year 1960 is made up out of words such as experience, London, Applicants, University, Research, Salary, Qualifications, Invited and

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<sup>35</sup> Heertje, Arnold, *Schumpeter's Vision, Capitalism and democracy after 40 years*. Preager New York Publishers, 1981, 81.

Economics. Upon further inspection through the sampling of the topic by random documents, the samples reveal vacancies for high-end jobs and documents discussing the appointment of significant positions. Thus this topic will be labeled career and education. The topic of career and education seems to be consistent throughout all of the years that are analyzed. As seen in table 2.1 in of 1965 it can be found in topic 1. Within the first analysis of 1970 as seen in table 3.1 it can be found in topic 10 and in the year 1975, it is listed as topic 1. This consistency highlights that each year a similar amount of attention is spent on the topic of education and career. A logical topic to be found for a magazine such as *The Economist* whose readers regard their careers as important. Other topics also remain consistent throughout the years. Topics in Table 1.1 such as topics 2,4,5,6 and 7 all concern themselves with specific corporate terms. Although the topics will undoubtedly be unique from one another they all concern themselves with terms found in the banking world. These topics also remain consistent throughout the years and make out the majority of topics. Topic 3 in table 1.1 discusses international politics which words such as Party, Government, African, French all words that implicate its international content. This topic will also be found throughout the other years, however, it seems that during the election year of 1970 another topic on foreign politics emerges as seen in table 3.1 topic 1.

The remaining topic in table 1.1 is the topic with the words: New, Industry, Plant, Equipment, Aircraft, Production, Steel, British, and finally world. This topic can be labeled as a topic that covers industries such as energy, building, and aircraft. This topic is of particular interest. It seems to compress different industries such as the aircraft industry, the energy industry and the building industry. This topic is apparent in the following years as well. Though some words tend to vary per year the topic consistently seems to cover themes such as energy, building, and aircraft. Found as topic 3 in table 2.1, topic 5 in table 3.1, and topic 6 in table 4.1. This topic is most significant because it is thus far the only topic that clearly represents developing industries.

Industries that are subjected to Schumpeter's business cycle. The remaining topics will unlikely be able to show any signs of the business cycle.

In the second analysis of each year, these topics seem to be split into different topics. Because the second analysis is set in search of twenty topics they are no longer necessitated to be condensed into one topic. Due to them sharing the overarching theme of new industries they are assigned the same topic within the first search set at ten topics.

This shows the influence of the selection of topics that are searched. When searching for only ten topics topic modeling is forced to condense topics together that could be their own topic in a broader search. Therefore a second broader analysis is run on each year. The second analysis is expected to vary more per year due to the lower threshold to become a topic. It is predominately the topic of career and education that splinter amongst topics in the second search. Topics such as energy, television, or aircraft become their own topic.

## **2.2 The representation of Keynes.**

Topic modeling has uncovered patterns and consistency amongst the topics within the 1960s and '70s. But do these topics also reflect the Keynesian economic policies of the time?

Within the topics that have been labeled as banking topics, there is little to be found about the representation of its time outside of the vocabulary used by the banking industry. The topic of education and career likewise seem to refrain from shedding any light on current events. The topics that cover international affairs and politics are in contrast to that of education and banking representative of the times they were published. They discuss ongoing international affairs and policies. It is for instance a sign of the significance of the United States Presidential election in the year of 1970 that it belonged to one of the most discussed topics. The topics on international affairs and politics also shed light on the events of the cold war. With words found such as Soviet, Russian, American in topic 3 off table 3.1 or Vietnam as found in topic 2 of table 2.1. Unsurprisingly these

topics correspond with the ongoing international affairs during their publication. Though insightful on international affairs these topics do not represent specific economic policies or economic discourse.

The constantly found topic on new business on the other hand is far more telling of economic practices at the time. In Table 1.1 of 1960, the order of words is New, Industry, Plant, Equipment, Aircraft, Production, Steel, British, and finally the world. All these words seem to point at the emergence of new markets and new technology occurring around the world. It is within this topic that Schumpeter's concepts of creative destruction and disruptive innovation will become applicable. This, however, is not yet the case.

When considering its time in history these words correspond with the large upcoming steel industry and the expansion of the airline industry. As is displayed in table 2.2 words all belonging to topic 5 in table 2.1 now have broken off into three different topics. Topic 1 concerns itself with the airline industry topic 2 with the gas and oil industry and topic 3 with the car manufacturing industry. Topic 4 in table 2.2 has Japan as the most frequented word of the topic. When put into proper historic placement this becomes interesting for two reasons. First being that there is no mention in any topics on Japan in the year of 1960 and secondly that Japan in 1965 is about to enter a large economic boom becoming one of the great economies of the world.<sup>36</sup>

In its evolution, through the analysis it becomes more clear why Topic 9 in table 1.1 can be taken as the topic of new technologies and new markets. This is because five years later in the year 1965 the top ten words discussed within the same topic changed slightly. Oil is replaced by the word Aircraft and the word Tons is replaced by the word World what is visible here is the discussion of

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<sup>36</sup> Johnson, Chalmers. *MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925-1975*. Stanford University Press, Stanford, California, 1982, 6.

the new technologies that coincide with the year 1965. The year 1965 saw new technologies entering the stage of aircraft that changed the entire business model for airlines.<sup>37</sup>

The 1960s are characterised by the growth and the development of the building industry and of the emergence of the middle class.<sup>38</sup> Especially the industry of steel and building can be characterised as part of the Keynesian economic model. The steel and building industry were government-regulated enterprises. This falls in line with Keynesian economic policies in which the focus was not on individual entrepreneurs and technological advances but on government-regulated economics.<sup>39</sup> This is largely reflected in the topics found in the years 1960 and 1965. As is evident from both the two analyses the most important industries of new business are those of aircraft production and that of steel and oil. Steel at the time can be considered as the very fundamentals of building the new post-war economy.<sup>40</sup> This is not affiliated with Schumpeter in fact the steel industry at the time was that modelled after the ideas of his competitor Keynes.<sup>41</sup> Namely, that large parts of the steel industry were mostly government subsidised.

### 2.3 Traces of Schumpeter

When searched for some signs of the Schumpeterian business cycle can be found in the decades analysed thus far. Specifically, within the consistent topic covering new markets and technology, some traces can be found. It is within this topic that developments, as found within the Schumpeterian business cycle, are expected to become clear. Already there are traces of the business cycle. The airline industry, for instance, new technologies within the aircraft industry

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<sup>37</sup> Morrison, Steven A, and Clifford Winston. *The Evolution of the Airline Industry*. Washington, D.C: Brookings Institution, 1995, 7.

<sup>38</sup> Heertje, *Schumpeter's Vision, Capitalism and democracy after 40 years*, 24.

<sup>39</sup> Sharpe, Leon, *America in Decline*. Armonk: Taylor & Francis Group, 2012, 34.

<sup>40</sup> D'Costa, Anthony, *The Global Restructuring of the Steel Industry : Innovatons, Institutions, and Industrial Change*. Routledge, London, 1999, 13.

<sup>41</sup> *Ibid*, 21.

appear at the beginning of the decade in table 1.2. The word aircraft appears within the second analysis as seen in table 1.2, it makes out to be on the top of the topic that can be labeled 'transportation'. By 1965, the word is already found in the first analysis which signifies its increase in use. By 1970 it is only found within table 3.2 in the second analysis but still in the topic covering transportation. But by 1975 the words changed to Travel and Fly, it is now accompanied by words such as London, Page, Business, and service. Though this topic seems to correspond with travel, the context has changed from the discussion about the airline industry to that of business and travel. It signifies a development within the business cycle. The context in which aircraft are discussed has shifted from the transportation to that of leisure and business travel. By 1975 the words fly and travel is found in commercials for airlines rather than a discussion of transportation in think pieces. This indicated that by 1975 the swarming effect has taken place in which companies have adopted the new technologies and have created a larger industry through its adaptation. However, these cycles are difficult to find and are prone to bias. It is highly unlikely Schumpeter's ideas influenced the writings of the Economist magazine in these decades. The mentioning of these business cycles in this chapter does not reflect Schumpeter's influence on the magazine. It does, however, point out that these business cycles are not exclusive to the subsequent decades but can be found all throughout modern history.

#### ***2.4 Conclusion of chapter two***

The predominant goal of this chapter has been to create an overview of topics that can be found in the Economist to establish a pattern and test how the patterns evolve over time. The contingency of the topics has been proven to be fairly steady. In the analysis of the four years discussed in the chapter, there is proof of a clear structure found in the topic dispersion created through topic modeling. These topics themselves reveal hints and point to the historical context in which the

magazine and its topics find themselves.

Topic modeling has consistently recognised the same topics over different bodies of text. Now that topic modeling can show this insight, it is possible to analyze the progression of this specific discourse over the years. Thus far any significant proof of the influence of Schumpeter's business cycle on the Economist seems to be lacking. After all the 1960s and 70s were still predominantly Keynesian economic times. However, it has become evident that topic modeling has consistently found one topic that concerns itself with new technology and new markets. In the analysis, there have been new markets revolving around the airline industry, car industry, or the steel industry. It shows that this very topic concerns itself with the new markets and new business arriving from new inventions such as that of the airline. It is the development within this particular discourse that can prove to hold signs of Schumpeter's theories in the following years to come. The 1960s and 1970s were not the start of Schumpeter's rise to incorporation within the popular economic discourse. This chapter on the decades of the 60s and 70s functions more as a starting point in order to see the difference between the latter decades of the twentieth century.

### *Chapter Three: The Economy of innovation*

Whilst the 1960 and 1970s were characterised by Keynesian economic policies, the following decades seem to disband from those policies. The economic trend of the 1980s and subsequent 90s were less confined to the predominant economic discourse of the aftermath of the second world war. The discourse heavily leaned upon Keynesian economics and government substituted industries. In the political landscape of the 1980s, the West seemed to triumph over the East, capitalism seemed to prevail over communism. Schumpeter's theory would argue that it was the innovation within the capitalist system that not only contributed but defined the success of capitalism in the 1980s.<sup>42</sup> In hindsight, it is clear that the decades were full of disruptive technologies. The emergence of the computer followed by the internet and even cell phones were all introduced to the public during the 80s and the '90s. This technology revolutionised the workplace and the very things they worked on. Publications by the NASDAQ even refer to the 1980s as the decade of disruptive innovation.<sup>43</sup> New technologies would change the markets in which businesses operated and they would change the operation itself. This notion fits in with the vision of the Schumpeterian business cycle. Instead of assuming that the driving force between competition in firms was defined by price competition he viewed it as being technologically driven. <sup>44</sup> It is in the decade of the 1980s, several decades after Schumpeter passed away that it becomes clear why this was such an important aspect of his evolutionary economics.

As seen in the previous decades, new technologies and new industries did receive consideration that was visible within the output of the Economist. When searched for, characteristics of the Schumpeterian business cycle can be found. However, these business cycles

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<sup>42</sup> Schumpeter, *Capitalism, Socialism and Democracy*, 376.

<sup>43</sup> Moynihan, Lydia, 'Decades of Disruption', jul 28, 2016, <https://www.nasdaq.com/articles/decades-disruption-1980s-2016-07-28>

<sup>44</sup> Schumpeter, *Capitalism, Socialism and Democracy*, 82- 83

were not rampantly discussed. If Schumpeter indeed influenced the discourse of the Economist this should become visible through applying Topic Modeling to these decades. If true, the distribution of topics should differ from the previous decades. In this chapter again the decades will be analysed through topic modeling. As seen in the previous chapter, topic modeling has established some form of consistency in its topics. Therefore the research question of this chapter focuses on how the topics diverge from the topics in previous decades and what does this divergence reveals about economic trends and the way they are reported? And in turn, do these economic trends correspond with Schumpeter's theories of the economy? These topics will be sampled in order to clarify the topics and attempt to find traces of Schumpeter within the articles themselves. In particular, the topics on new business and innovation as seen in the previous year will be examined for changes. Any patterns specifically of the swarming effects should become visible during the period

### **3.1 Divergence within the output by the Economist Magazine**

At first sight, the analysis of the years 1980 reflects the expected sentiments of the decade. For instance, at least one topic in both analyses is closely linked to the events of the cold war. In table 4.1, Topic 7 words such as Soviet, American, Iran, Military lead back to articles on the cold war. Topic 1 discusses American politics, more specifically the presidential election with words such as Party, Carter, Reagan, and Election the topic is easily distinguished. Again there are consistencies with the previous analysis. Again this is to be expected from a magazine that adheres to an established format. It is, however in a second analysis in which the search was set for 20 topics that the results provide more insights into the decade that is to come. Of the total of 20 topics, three are listed in Table 5.2. Topic 1 seems similar to the topics on energy, as seen in the first analysis in Table 5.1. In Topic 8, however, there are two new words that have arrived from the second analysis. Topic 2 in Table 5.2 discusses media such as television and films with words referring to it as

television, advertisement, cars, news, and film. In topic 3 of Table 5.2 the very last word in the list already hints at one of these large technological disruptions, the computer.

In hindsight, the year 1980 can be seen as the eve of a revolution. The technological revolution will change the economy for good. In the first analysis of 1985 as seen in table 6.1 one of the first topics to stand out is topic 1. Where computer was found five years prior only in the second analysis on the very bottom of the topic it now finds itself in a separate own topic. In this topic computer is accompanied by words such as new and business, What is interesting about the search in 1985 is that now for the first time in all analysis there is the mention of the name of a company, namely IBM. However, the most significant changes have occurred in topic 1 in table 5.1. In five years' time, this entire topic came to exist. A topic that discusses technology and computers. It hints at the swarming effect that has occurred since 1980.

There is a clear sign of divergence to be found within the topic of new industries and business. In a few years the entirety of this topic has changed. Whether or not the topic has been replaced by another topic or whether the topic itself has changed is difficult to say. Either way, the change in topic distribution is significant in how the Economist discusses these new emerging technologies and industries. In this case specifically the topic following the Computer. However, this topic is not to be found in the later years. At least not within the first search set for ten topics. Only within the second search does the topic reappear. This entails that the tremendous divergence within the output of the Economist that can only be attributed to the computer.

### **3.2 The Business Cycle of the Computer portrayed by The Economist**

The word computer is first found in table 5.2 table 1980. The word computer is found within the second search of the year indicated that it's only found when searched for twenty topics. This indicates that the initial invention phase has already taken place.

By 1985 the word Computer has become visible in topic 1 within the first search as seen in table 6.1. Not only is it found here but it would seem that the entirety of topic 1 discusses computer-related topics. This shows that the swarming effect has taken place. The technology has been adapted by other entrepreneurs. By the year 1995, the word computer has vanished from the first search. Thereby showing the decrease in usage of the word. The three parts of Schumpeter's business cycle have already become clear, the invention, the swarming followed by the recession. The invention in this case seen as the recognition of the word in the magazine and the recession as the decline in usage of the word.

In 1985 The Economist Magazine has dedicated a previously unseen proportion of their output to the new technology computer. It shows that they shifted their focus to the discussion of this disruptive innovation. However, five years later the word computer has disappeared from all analysis run. This is due to the process of normalisation that the computer went through. This process of normalisation corresponds with the liquidation process according to Schumpeter's business cycle. The use of computers had not stagnated but the momentum had. These business cycles should coincide with a boom during the swarming phase and a recession during the liquidation phase. Although the increase in discussion and decrease mirror this pattern they don't account for whether or not a boom or recession took place. All they indicate is that the amount of attention spent by the magazine on these technologies corresponded to Schumpeter's cycle. This in itself shows that whether knowingly or not the magazine was mirroring the business cycle in their output.

### **Internet / Software and Data**

Other inventions that followed the computer would gain significance within the discussion of the magazine. Inventions only made available due to the increase of usage of the computer. This is clearly visible in table 6.2 topic 2. Words such as network, software, and data. Just as the swarming

effect claims there are new technologies that follow from the initial technological invention. Specifically adapted to use in the workplace to improve production. Network, software, and data are examples of these technologies meant to improve production. A Multitude of business cycles can occur at a similar time often these cycles build upon one another.<sup>45</sup> The main difference between the representation within the magazine between these new technologies and the computer is that these technologies remain only visible within the second analysis set for twenty topics. Although their discussion is apparent throughout the output of the magazine its frequency in usage never reaches the level such as computer within the year 1985.

### **3.3 Schumpeter's characteristics within the writings of The Economist Magazine**

The recognising of the business cycle is not the only way to search for traces of Schumpeter in the writings of the Economist. Upon further inspection and sampling of the topics, traces of Schumpeter's ideas become clear within the writings of the Economist.

For instance in Topic 3 of Table 5.2 when the word technology is further inspected it turns out the word has taken a different meaning as to what it was used for in the previous decades. For example one of the articles the word leads to is titled 'The Mega Battle for microchip market Share'. The article explains how the innovation of microchips will create a gigantic market in itself. It also goes on to explain that the chip will be used in different industries: 'These are the chips that are going to do most to transform office routines and industrial processes'<sup>46</sup> At the publication time, the chips are only seen under the circumstances of office work not yet in personal uses as will be at the turn of the millennium. This fits into the notion of Schumpeter's vision of technology being the most important competition amongst firms. The firms that have a technological edge over

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<sup>45</sup> Schumpeter, 'Capitalism, Socialism and Democracy', 80.

<sup>46</sup> 'The mega-battle for microchip market shares' *The Economist*, November 8, 1980, p93

the others will perform better. This article implicates that firms were well aware of this fact in the year 1980.

Another word that stood out was IBM as found in Topic 1 of table 6.1 given the topic in which it is found and the irregularity of companies listed in topics. IBM as a company has a long history, however, it doesn't come to its full fruition until the technological revolution of the 1980s. Upon sampling IBM within the topics, it becomes clear that oddly enough most of the articles in the 1985 Economist that mention IBM do not do so as an advertisement. Instead many articles actually discuss the market that IBM operates in. One such article discusses how IBM is able to prepare its managers for adaption. In the Article 'Innovative Unemployment' the magazine discusses how managers at different firms are losing their positions due to innovative technologies. The firing of managers is an expensive cost for larger firms since most managers require hefty buyouts. According to the article, however, IBM prepares its managers for this innovative change by consistently training them. Thus managers at IBM tend to stay longer than at other companies.<sup>47</sup>

The article, perhaps unbeknownst to itself discusses essential aspects of Schumpeter's theory. The article acknowledges the immense destruction that innovation has. It is a testament to the revolution that is happening in firms in the midst of the 80s. The article also shows that firms that are best able to adapt to these changes have an edge over those that are unable to adapt. IBM is the one firm that clearly is able to do so.

Entrepreneurs are given their head in separate 'outplan' unites funded by the company' ' Venture managers do not have to account for the money until they have got a product. The PC (personal computer) came this way, as do 90% of IBM's new product lines.<sup>48</sup>

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<sup>47</sup> "Innovative unemployment." *The Economist*, April 6th. 1985, p. 69

<sup>48</sup> Ibid, 69

Here again, it seems that IBM is following Schumpeter's tactics. Through nursing the entrepreneurial spirit they have been able to strengthen their company as a whole and in turn, changed the world economy. Schumpeter's theory of economic development views the entrepreneurial inventor as the driving force of evolutionary change.<sup>49</sup> According to this article by the Economist, IBM is a company that fits the description of Schumpeter's driving force. It becomes clear that IBM is listed within the topic that discusses this whole new economic sector. They appear to be one of the important forces adding to the swarming effect. They attribute to the innovation and adapt it for the markets.

The article 'create and survive' found through topic 2 in table 7.2 discusses the disruption and innovation of the previous decade. It is a testament to the awareness of the innovative decades. 'Consultants who grew fat in the 1980s teaching them how to identify, analyse and react even faster than their rivals'<sup>50</sup> Written at the end of the decade that revolutionised an economy, the article discusses the important lessons learned from it. How one should react to the innovations. It serves as a warning for firms in the upcoming 90s. Not to miss the next revolution when it happens. What matters in terms of great economic effects is not the date of the basic innovation but what matters is the diffusion of this innovation described by Schumpeter as the Swarming effect.<sup>51</sup> It is within this phase that according to Schumpeter the economic boom occurs. This boom according to the business cycle is followed by a recession. The Economist magazine has already seen this process take place only a few years earlier between 1980 and 1985 with the computer.

The analysis for the year 1995 is again in line with the topics as seen earlier. Besides the topic on new business and innovation, the topics are uncomplicated to label. It is only within topic 10 in

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<sup>49</sup> Schumpeter, Joseph Alois. *Business cycles: a theoretical, historical, and statistical analysis of the capitalist process*. Connecticut: Martino Publishing, 1939, 41

<sup>50</sup> "Create and survive." *The Economist*, December 1st 1990, p. 107.

<sup>51</sup> Dobbs, Ian, M. B Hill, Micheal Waterson. 1987. "Industrial Structure and the Employment Consequences of Technical Change." *Oxford Economic Papers*, New Series, 39, no. 3: 552-567, 552

Table 8.1 that again something interesting is happening. A new word has emerged in the topic of new business and new innovation. In 1995 a similar pattern emerges to that of 1980, the pattern of a brief mention of the word computer that eventually became its own topic. This time the word is Internet, the Internet just as the computer before became one of the greatest examples of a technological revolution that changed the economy forever. It serves as an introduction to what the next millennium will hold.

### **3.4 Concluding chapter Three**

The decades of the 1980s and 90s were the decades in which Schumpeter ascended to the main-stage of Economic discourse. This chapter focused on whether this was apparent in the content of the Economist magazine. Topic modeling showed that the discussion of certain new technologies followed Schumpeter's business cycle. Articles that can be found through the use of topic modeling show the usage of terms that are correlated to Schumpeter's theories. These articles clearly show reflections of the business cycle as per Schumpeter's vision. The decades of the 1980s and 1990s have illustrated one of the key signs of Schumpeter's revolutionary economic theory. Topic modeling has unveiled the interest in disruptive technologies over time. It has shown how the swarming effect takes place in which both the rise and decline within the disruptive technology occurs. The Business cycle as per Schumpeter's notion is applied in the output of the Economist magazine. The sudden increase in topic distribution as found by 1985 indicate that the magazine disbanded their traditionally stable output in order to accommodate the great disruption of the Computer.

### ***Chapter Four: Schumpeter entering the new Millennium***

One of the largest more recent phenomena within world economics is the grandeur of the rise of the internet. It changed the world forever. In the previous chapter in 1995, the word internet was already found. It was, however, according to topic modeling not yet discussed in tremendous frequency in the magazine that year. When compared to the previous chapter it could be expected that similar patterns should emerge to the topic concerning the internet as has happened with computer. After all this new decade is still be characterised as one of economic growth. During the early 2000s new firms were responsible for job growth. Especially startups that specifically pursued disruptive technologies.<sup>52</sup> Technologies first introduced in the 1980s such as the computer had changed the corporate landscape and the world economy for good. The economy of the new millennium is largely built upon the technological innovation of the previous decades. This chapter will again focus on the distribution of topics and how they change over time. Do these changes still correspond with Schumpeter's theory?

#### ***4.1 The Business Cycle Continues***

As expected the first, as well as the second analysis of the year 2000, reveal that the internet has a prominent place amongst the topics found in *The Economist*. The pattern that occurs here is indeed similar to the pattern that became visible between 1980 and 1985 with the word computer. Again in 1995, Internet was a word that made its way into the topic, however, it was low on the list. Meaning that the word wasn't used as frequently as others within the topic. In the year 2000, it has risen all the way to the top of the topic as seen in table 9.1. Again it would seem that the swarming effect

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<sup>52</sup> Christensen, Clayton, Thomas Craig, and Stuart Hart. 2001. "The Great Disruption." *Foreign Affairs* 80, no. 2: 80-95, 89.

such as according to Schumpeter's business cycle is applicable. The period following the initial invention of disruptive innovation. Before it is able to manifest itself in the optimal business setting it requires a period in which it is subject to innovation suited for business values.<sup>53</sup> Just as was the case with the computer now also the internet has received an influx in usage within the magazine in the year 2000.

In the topic distribution of 2005 Topic 4 is the topic that once again concerns itself with new technology and its implications. However, the words seem to differ from those five years prior. Both the word computer as well as the internet are no longer to be found. Nonetheless, the topic remains to concern itself with technological developments. The first word being 'New' and the second being 'Technology'. The main newcomer to the list is software. This disappearance of the word internet is part of the same process as the word computer was earlier. Again the internet has gone through a process of normalisation or liquidation as per Schumpeter's theory. Therefore the words are less frequently used in the year 2005. The Economist is again mirroring the business cycle within their output.<sup>54</sup>

#### ***4.2 Schumpeter in the new Millennium***

Upon further examination of the topics and the sampling of the words, articles seem to remain in line with the sentiment of the previous decades. One such article found in topic 6 in table 9.1 discusses the business potential that the internet holds. 'Click on the website of idtown.com. and you see the next industrial revolution at work.' This is how the article refers to the internet and its possibilities.<sup>55</sup> It's a sign that the writers and editors of the Economist were well aware of the disruption or evolution which was in place by the turn of the millennium. However, not all articles

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<sup>53</sup> Fagerberg, Jan. 2003. "Schumpeter and the Revival of Evolutionary Economics: An Appraisal of the Literature." *Journal of Evolutionary Economics*, 125-159, 126-128.

<sup>54</sup> Schumpeter, *Capitalism, Socialism and Democracy*, 84.

<sup>55</sup> 'All yours', *The Economist*, April 1 2000, p65.

discussing the internet are about economic growth and the endless positive opportunities that the internet provided. In one of the articles found in Topic 6, the writers of the Economist discuss ‘the new internet incubators’ Incubators being companies that offer office spaces and management training. The article mentions the fall of 60% entering the market of internet incubators. They attempt to profit from the new market filled with start-ups searching for their services however most fail to succeed. The article attributed their failure to some of the general backlashes of Internet mania. But also much of it to their own fault.<sup>56</sup> The article illustrates that many companies attempted to adapt or grow with the evolution taking place but that there is no guarantee for success. Just as with any other business simply seeing the change and acting upon it does not guarantee any success for the company. These articles in the Economist can function as examples of case studies. However, Topic Modeling, in turn, can show the larger process unfolds Since both Table 9.1 and Table 9.2 have a topic completely dedicated to the Internet the overall notion of topic modeling shows that despite the losses of some companies the significance of the Internet is undeniable. Starting in 2005 the significance of the word software arises, it shows a shift in the importance of words belonging to the topic of computers. When sampling articles affiliated with the words software it becomes apparent that many documents are advertisements. Advertisements such as ‘ ABN AMRO runs SAP.’ An advertisement ran by the international software company SAP.<sup>57</sup> In perhaps a more complicated example the World Press Group advertised how they helped CANON advertise their new software.<sup>58</sup>

Further samples provide insights into the importance of the new internet age by 2005. For instance articles such as ‘Answering the Call’ which discusses the Indian call centres and their staff

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<sup>56</sup> Hummers Napster bummer’ *The Economist*, August 12th , 2000, p69.

<sup>57</sup> ‘ABN AMRO runs SAP’, *The Economist*, February 5th, 2005, p5.

<sup>58</sup> ‘WPG helped Canon reach the key Business Decision Makers right across Europe’, *The Economist* , October 29th 2005, p76.

problems.<sup>59</sup> Or the article ‘Power at Last’ discussing how department stores are moving online.<sup>60</sup> Further samples of topic 2 in table 9.2 showcase commercials of software or technologies intended for business markets. Such as the commercial ‘IBM Business Consultancy’ that advertise innovation in the workplace.<sup>61</sup> It also involves the commercial by WPG as found upon a further sampling of topic 4 in table 9.1. These articles discuss events happening due to technological innovation. The articles reflect the swarming effect, their adaption to the new disruptive innovation. One of the more prevalent and important words in all of the analysis of 2005 is the word software. Considering the audiences of the Economist magazine this makes sense. Software is one of the products that adhere to the previous technologies of the computer and the internet.

The word drug, as well as drugs, are both added to the list. One of the samples under the word ‘drug is the advertisement of Wyeth, an American pharmaceutical company. The article advertises how the company has applied new technologies for both their drug development as well as their customer service.<sup>62</sup> This is why it was selected by topic modeling to be fitted in the same topic as technologies such as internet and software.

In the second analysis, Mobile is also a newcomer to the topic. So far it has appeared that the mobile or mobile phone hasn’t received much attention yet. This despite the technology being of great importance to most people especially within the business world. One of the articles that features the word Mobile titled ‘Making the connection’ discusses the new threshold that mobile phones have passed that of 2 billion phones. The article continues by saying that mobile phones

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<sup>59</sup> ‘Answering the Call- Busy Signals’, *The Economist*, September 10th, 2005, p66.

<sup>60</sup> ‘Power at Last’, *The Economist*, April 2, 2005, p9.

<sup>61</sup> ‘The Other IBM’ *The Economist*, 10 sep, 2005, p67.

<sup>62</sup> ‘Wyath High Performance R&D’, *The Economist*, march 12th, 2005, p14.

hold the potential to change underdeveloped countries in which the amount of mobile phones is less prevalent.<sup>63</sup>

### 4.3 The last Year

The last year to be analysed is the year 2010. Some 50 years after the first analysis there are still similarities between some topics found in the very first analysis of 1960 and the last analysis of 2010. This showcases how the format and discussion points of the Economist magazine have remained steadily intact with their format. In fact, it seems quite similar to the very first analysis of 1960. With words such as oil, new, and energy once again fitted into a topic together with the word data. This consistency proves that the disruption caused by the coverage of disruptive technologies is responsible for the discrepancy in their output. The second analysis set at twenty topics reveals that the word Data does belong to the same topic such as computers and internet. However, upon sampling the word data, it appears not to refer to online data or data mining. The word is found in relation to other energy sources or in terms of business research. Used in sentences such as ‘ the data allowed them to calculate the share of the most-preferred brand as a fraction of the purchases of the two leading brands’<sup>64</sup> Thus it can be established that topic 6 does not refer to any new technology. For the first time in thirty years, there is no longer a topic that corresponds to new technology. Therefore for the last year, one extra analysis has been run in the year 2010. This time the analysis was set out for 40 topics. When set at 40 topics as can be seen in table 11.3 there are only two topics that could refer to new technologies and business. Topic 1 refers to new modes of travel and transportation with words such as electric referring to the new electric cars. Topic 2 seems more familiar with words again such as data, online, internet, and Google. Although these topics are found in the third search it shows how the topics have lost a significant amount of

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<sup>63</sup> ‘Making the Connection’, *The Economist*, October 1st, 2005, p84..

<sup>64</sup> ‘The Marmite effect’, *The Economist*, 25 September 2010, p94.

attention by the year 2010. The Economist has clearly prioritised other topics in their output of the year of 2010.

Interestingly enough the coverage of new technologies has stagnated by the year of 2010. Whatever influenced the Economist to cover these technologies less could vary due to a variety of factors. But it does seem as though the influence of Schumpeter's ideas have in fact stagnated and started their own process of liquidation. Only one year after the column that was named in his honour was conceived did his influence on the topic distribution of the Economist already seem to decline.

#### **4.4 Chapter four in Summary**

Chapter four set out to find how the topic distribution in the 2000s was set and how this differed from the previous chapters. Again similar patterns emerged as seen in chapter 2. The swarming effect has occurred twice in the chapter firstly with the computer, then followed by the internet. The process which topic modeling makes clear is the early emergence of the technology followed by a steady increase in frequency followed by a process of normalisation characterised by a decline in the use of the word. By the last year of analysis for the research the topic modeling has seemed to indicate that the discussion of new technologies was in decline. The business cycle as described by Schumpeter consists of a similar pattern as seen within the topic distribution of the Economist. The swarming effect seems to have taken place mostly in the year 2000 and 2005 for the technologies such as software and internet. But by the year 2010, they had steeply declined in the usage of that year.

## 5. Conclusion

In this research, the earlier proclaimed luxuries of the readily available sources and the perspective of hindsight have been utilised through topic modeling. A part of the enormous bulk of digitised sources of the Economist has been analyzed in order to create a chronological overview of the output of the magazine. This output has furthermore been linked in correlation with the Schumpeterian business cycle. Of the three periods as described by Schumpeter the most prevalently illustrated through topic modeling is that of the swarming period.

New technologies and the swarming effect they created were visible prior to the 1980s as seen in chapter one. New business and technologies received a steadily consistent amount of attention. It has, however, become clear that from the 1980s onwards the topic distribution diverges from the previous decade. The topic in which these new technologies are discussed no longer resembles the topics in the prior decades. Especially the way in which innovative technologies have forced the magazine to disband its more traditionally consistent output has shed light upon the change of the reporting of new industries. This change in the report is linked to the new way in which the economic discourse followed disruptive technologies. This change in a way of viewing simultaneously occurred with the disappearance of Keynes from the economic discourse with Joseph Schumpeter taking his place. The business cycle as Schumpeter envisioned it can be applied all throughout history. However, starting in the 1980s these concepts started to resonate with the way in which the economy grew. What is unique about the Economist magazine in the period following the 1980s is the divergence within the intensity in which it was discussed as established through topic modeling. Meaning that the new technologies received unprecedented attention in the yearly output of the Economist magazine. This divergence happened simultaneously with the swarming effect of these technologies. Which shows the influence of Schumpeter's business cycle on the writings of the Economist.

In 2009 the Economist named a column after Joseph Schumpeter. Topic modeling has shown that for almost thirty-year prior to that their writings have been influenced by his works. Unknowingly or not. The sampled articles showcase the importance of the concepts such as disruptive technologies and creative destruction in the use of the language of The Economist.

When compared to the research by Goldstone and Underwood in which their study found it difficult to relate any conceptual ideas to the large bulks of text. This study has shown that with more precise techniques it is possible to find clearer relations between concepts and the text. By focusing on the concepts of Schumpeter it has created a clearer method of analysing texts for the influence of concepts. Now it has become apparent that the influence of Schumpeter's ideas extends beyond academic economic discourse. As Giersch already wrote in 1984, Schumpeter had become popular within the academic discourse.<sup>65</sup> The results of the topic modeling analysis now hint that Schumpeter's influence is even visible beyond the academic discourse and visible within the more popular economic mainstream discourse per Economist magazine.

Topic modeling has proven to be a unique tool in order to gain unprecedented insight into the text. It has been able to categorise a large amount of text of the Economist and whilst doing so it has cleverly been able to distinguish words to the belonging topics. The topics illustrated the frequency of words used and their context. Furthermore, the topics enabled access to specific articles belonging to that topic. Hereby illustrating that topic modeling is a tool that can be used for the many other newly and largely amiable digitised sources.

This use of topic modeling thus fits into the vision of Yang et al. Who saw topic modeling as a tool to tackle these largely available sources.<sup>66</sup> Within this specific research, topic modeling has shown how the shift within economic discourse became apparent in Economist magazine starting in

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<sup>65</sup> Giersch, Herbert, *The Age of Schumpeter*, 103.

<sup>66</sup> Yang, Torget and Mihalcea, "Topic modeling on historical newspapers." 96.

the 1980s. It has shown the previously unseen connection between the economic academic discourse and that of popular economic discourse. Namely, how much these concepts actually affected the output of the Economist. The search for Schumpeter has proven to function not only as a showcase for the use of topic modeling but it has also been able to scrutinise the influence Schumpeter had on the popular economic discourse. The meaning of which is significant when taking into account the audience of the Economist which they refer to as the leaders of the world. These policymakers of the world are hence influenced by the great Joseph Schumpeter unbeknownst or not his influence would shape the ideas of the men and women who shape the very economy they read about.

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