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Is Wikipedia a Credible Source for Undergraduate Economics Students?

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ABSTRACT.   Scholars have debated the quality of collaborative websites such as Wikipedia.org in the 21st century. If credible, Wikipedia has the potential to share information and stimulate creativity better than any resource the world has known. If not, Wikipedia has the potential to manipulate history. In the field of Economics, Wikipedia is an accurate source of information. While the site may omit important information, the content available was accurate throughout the duration of this study. Yet the volatile nature of the site must be considered at all times.   No information is discovered in the study to suggest that Wikipedia will always be a reliable tertiary source.

I. Introduction

> If we value the pursuit of knowledge, we must be free to follow wherever that search may lead us. The free mind is not a barking dog, to be tethered on a ten-foot chain.

> **Adlai E. Stevenson Jr.(1900 - 1965)**, *speech at the University of Wisconsin, Madison, October 8, 1952*

The rise of the internet has forever changed the way our world operates. Information can be exchanged easily with little regulation. It is important to know the reliability of the information we share. Wikipedia.org, launched in 2001 by American entrepreneurs Jimmy Wales and Larry Sanger, has become a focal point of the argument about information exchange.   Wikipedia is an online, collaborative encyclopedia, and currently consists of over 7.5 million articles in over 250 languages (History of Wikipedia, 2008, 14).   It is both the largest and fastest growing online reference work (History of Wikipedia, 2008, 1). It is also the second most visited site from Google searches, just after MySpace.com (Nystedt, 2007, 7).   Using a type of software called a Wiki, Wikipedia lets site users edit and post literally anything they want. The idea is to promote progress by allowing the world to efficiently share its knowledge.   If credible, Wikipedia has the potential to share information and stimulate creatively better than any resource the word has

79

80   *Major Themes in Economics, Spring 2008*

known.

Critics have questioned the credibility of the site since its conception. United States Senator Ted Stevens (R-Alaska) introduced a bill in 2007 that would ban Wikipedia from schools receiving Federal internet subsidies (Strange, 2006, 3). China has banned Wikipedia (Wikipedia, 2008, 10). Robert McHenry, former editor-in-chief of Encyclopedia Britannica was credited as saying:

> The user who visits Wikipedia to learn about some subject, to confirm some matter of fact, is rather in the position of a visitor to a public restroom. It may be obviously dirty, so that he knows to exercise great care, or it may seem fairly clean, so that he may be lulled into a false sense of security. What he certainly does not know is who has used the facilities before him (Criticism of Wikipedia, 2008, 6).

Vandalism and inaccuracies are the two primary accusations against Wikipedia. In response to the inquiries, studies have been conducted with the intent of measuring the credibility of Wikipedia. In 2005, the journal Nature published a study claiming Wikipedia was as accurate as Encyclopedia Britannica, the venerable standard- bearer of facts about the world around us. (Terdiman, 2008, 1). In 2006, Thomas Chesney, a lecturer in Information Systems at the Nottingham University Business School, published an empirical study touting the accuracy of Wikipedia (Chesney, 2006, 1).

Wikipedia has responded to accusations that it is not credible by incorporating several measures designed to serve as a control system. This paper intends to discover whether or not the control system currently used by Wikipedia is sufficient to allow undergraduate economics students to use the site as a reliable tertiary source.

II. Background

Today, information crosses physical boundaries without limitations. Wikipedia was launched on January 15, 2001 by American entrepreneurs Jimmy Wales and Larry Sanger and has grown to be the largest and fastest growing reference work in the world (History of Wikipedia, 2008, 1). Wikipedia has evolved into a creative forum for information exchange. While Wikipedia may be the latest locale for information

storage, it is the continuation of an old idea. Around the third century B.C., the Library at Alexandria was constructed near the former Egyptian capital (CNN, 2000, 10). In contrast, many people have opposed information sharing; the library in question was attacked on several occasions, leading to the destruction of much of its original content. Reasons for opposition are not always consistent. The library of Alexandria was allegedly destroyed by the Muslim General Kaliph Omar (Chesser, 2008, 7). Most likely, his motive was simply to destroy the infrastructure of his rivals. Critics of Wikipedia do not renounce the idea of knowledge collaboration. Instead, they fear the information may not be accurate.

Critics of Wikipedia have a case. In 2005, the following excerpt appeared in a Wikipedia article: *"John Seigenthaler Sr. was the assistant to Attorney General Robert Kennedy in the early 1960's. For a brief time, he was thought to have been directly involved in the Kennedy assassinations of both John, and his brother, Bobby. Nothing was ever proven."* (Seigenthaler, 2005, 1). The entry certainly came as a surprise to Mr. Seigenthaler, who was indeed the assistant to Robert Kennedy. Seigenthaler was never linked in any way to the assassination of either of the Kennedy's. A close family friend, Seigenthaler was actually a pall bearer in Robert Kennedy's funeral (Seigenthaler, 2005, 5). The false information was the work of Tennessean Brian Chase, who said he was trying to trick a co-worker (BBC, 2005, 19). Specific criticisms include the encyclopedia's exposure to blatant or subtle vandalism, attempts by strongly opinionated editors to dominate articles, and inaccurate or sometimes non-existent sourcing for controversial assertions in articles (Criticism of Wikipedia, 2008, 1).

Seigenthaler's experience and similar incidents have sparked interest regarding the effectiveness of Wikipedia's control system. Wikipedia is kept in check primarily in two ways. At the time the Seigenthaler article was posted Wikipedia had over 13,000 registered volunteers, many of whom were credited as being experts in particular fields (BBC, 2005, 5). The job of volunteers is to edit previously submitted articles. Wikipedia also counts on site visitors to handle many grammatical and obvious content errors. The more people who use the site, the more accurate it is. More stringent control measures have been instituted in response to recent criticism. Now only registered users can create new articles. While registration is simple and anonymous (even providing a first name is unnecessary), the additional step of registration may deter some from

82   *Major Themes in Economics, Spring 2008*

posting inaccurate articles.

In August 2007, a program called WikiScanner was adopted by Wikipedia. Developed by computer science graduate student Virgil Griffith, Wikiscanner traces the source of millions of changes made to Wikipedia by editors who are not logged in (Wikipedia, 2008, 15). In its first few days of use, Wikiscanner revealed some interesting information. Many edits came from corporations or sovereign government agencies about articles related to them, their personnel or their work, and were attempts to remove criticism (Wikipedia, 2008, 15). Wales plans to make some changes to WikiScanner in the future.

> When someone clicks on 'edit,' it would be interesting if we could say, 'Hi, thank you for editing. We see you're logged in from *The New York Times*. Keep in mind that we know that, and it's public information. That might make them stop and think (Wikipedia, 2008, 15).

Still, anyone can edit previously existing articles. As a result, non-registered users continue to vandalize. Is vandalism damaging the credibility of Wikipedia? Is Wikipedia as accurate as standard encyclopedias? Researchers have attempted to answer these questions in the past couple of years.

III. Academic Research

Two major studies have been conducted to measure the credibility of Wikipedia. Nature, an international weekly journal of science, compared Wikipedia to Encyclopedia Britannica in December of 2005. At the time of the study, Wikipedia had over 3.7 million articles and was the 37th most visited site on the web (Giles, 2005, 1). In the study, administrators chose entries from the websites of Wikipedia and Encyclopedia Britannica on a broad range of scientific disciplines and sent them to a relevant expert for peer review. Each reviewer examined the entry on a single subject from the two encyclopedias; they were not told which article came from which encyclopedia. A total of 42 usable reviews were returned out of 50 sent out, and were then examined by *Nature*'s news team (Giles, 2005, 14). Only eight serious errors, such as misinterpretations of important concepts, were detected in the pairs of articles reviewed, four from each encyclopedia. But reviewers also found many factual errors, omissions or

misleading statements: 162 and 123 in Wikipedia and Britannica, respectively (Giles, 2005, 18). The study showed Wikipedia to be nearly as accurate as Britannica, a notion not widely believed previously.

The study was greeted with criticism by Britannica representatives. In a report published by America's oldest continually published reference work, Britannica stated: "Almost everything about the journal's investigation, from the criteria for identifying inaccuracies to the discrepancy between the article text and its headline, was wrong and misleading" (Encyclopedia Britannica, 2006, 3). Britannica claims Nature sent only "misleading fragments" of some Britannica articles to the reviewers, and in one case, merely put together sections from different articles, and inserted its own material, creating one Britannica article (Encyclopedia Britannica, 2006, 19). In another example, Nature criticized a Britannica article for omissions. However, only 350 words of a 6,000 word document were sent to the reviewer (Encyclopedia Britannica, 2006, 17). Nature responded to the criticism by publishing an editorial refuting all of Britannica's main complaints (Giles, 2005, 1).

A second study also empirically tested the credibility of Wikipedia. Thomas Chesney, a lecturer in Information Systems at the Nottingham University Business School, published a study in 2005, measuring credibility in three ways. A total of 258 academics (research "fellows", research assistants, and PhD students) were asked to participate in the study; 55 completed the survey (Chesney, 2006, 6). Each respondent was randomly assigned to one of two experimental conditions. Under Condition 1, respondents were asked to read an article in Wikipedia related to their area of expertise. Condition 2 respondents were asked to read a random Wikipedia article (Chesney, 2006, 6). Respondents were then asked to grade the articles by completing a brief questionnaire. In short, the experts found Wikipedia's articles to be more credible than the non-experts, suggesting that the accuracy of Wikipedia is high (Chesney, 2006, 16). There was an issue with Chesney's research. Everyone seems to have an opinion about Wikipedia. Because participants were told the articles were from Wikipedia, natural biases may have been reflected in their responses.

In both studies, Wikipedia was portrayed favorably. However, is Wikipedia accurate enough to be used as a reliable tertiary source by undergraduates studying economics? Elements of both the Nature and the Chesney research were used in this study.

84   *Major Themes in Economics, Spring 2008*

IV. Method

The method of this study was twofold. First, 20 principles-level economics topics were chosen. The topics were: the Production Possibilities Frontier, comparative and absolute advantage, elasticity, Giffen goods, minimum wage, Gross Domestic Product, indifference curves, deadweight loss, tariffs, sunk costs, economies of scale, natural monopolies, Prisoner's Dilemma, the poverty line, Utilitarianism, aggregate supply, the multiplier effect, the Phillips curve, inflation targeting, and purchasing power parity. The topics were reviewed to ensure that they existed in both Wikipedia and Gregory Mankiw's Principles of Micro and Macroeconomics. The articles were read and compared on six dimensions: dates, notable people involved, obvious content errors, opposing viewpoints, sources, and additional information/omissions by comparison.[2] If information was present in one source, but missing from the other, an omission was tallied for the source without the information. Omissions in Wikipedia were considered true omissions. Omissions in Mankiw were verified by other sources. The presence or absences of the dimensions were summed in an effort to qualitatively assess the value of the articles. Mankiw was chosen as a reliable source of comparison due to his widely recognized authority on issues regarding basic economic principles. Due to accessibility issues, the second edition of Mankiw was used for topics in Microeconomics, while the fourth edition was used for topics in Macroeconomics.

Second, the Economics Faculty at the University of Northern Iowa were asked to participate in the project. Each of the twelve professors was given two articles related to economics in Wikipedia. One of the articles represented a topic in their area of expertise; the other article represented a random economics topic. For example, an economics professor specializing in the history of economic thought was given a Wikipedia article on Adam Smith. Each "expert" article also served as an "ordinary" article. For example, the Adam Smith article given to the "expert" professor was also given to another professor, representing an area in which he presumably had no expertise. The professors were not told the origin of the articles. The professors were asked to read and evaluate each article. The questionnaire used in the Chesney study was used for evaluation. The study aimed to discover if the results found in Chesney's research were applicable to articles in economics. If the expert articles were graded more favorably than the ordinary articles, a case

could be made for the general reliability of Wikipedia.

V. Results

Results of the article comparisons were encouraging for Wikipedia. There were no date or name discrepancies between Wikipedia and Mankiw. For example, both sources claimed <u>Principles of Political Economics and Taxation</u>, by David Ricardo, was published in 1817. No obvious content errors were found in Wikipedia or Mankiw. Wikipedia did a better job of addressing opposing viewpoints. Opposing viewpoints were addressed in five Wikipedia articles and three Mankiw articles. The average Wikipedia article referenced 9.5 sources. However, if the "Minimum Wage" article (56 sources) is excluded, the average Wikipedia article referenced roughly 4.9 sources. 18 omissions by comparison were found in Mankiw, while just 8 such omissions were found in Wikipedia. Although the difference in omissions may seem staggering, it is not all that surprising. It is important to remember that Mankiw wrote a *Principles* of economics textbook. Many issues discussed in Wikipedia were simply beyond the scope of an entry-level economics class and were thus not included in Mankiw. The article-by-article comparisons can be found in Appendix A.

   Results of the faculty survey were ambiguous. Responses on the questionnaire were converted to credibility scores. Possible answers included: strongly agree, agree, slightly agree, neither agree nor disagree, slightly disagree, disagree, and strongly disagree. Responses were scored in the following manner: strongly agree=1, agree=2, slightly agree=3, neither agree nor disagree=4, slightly disagree=5, disagree=6, strongly disagree=7. Six of the eleven professors graded their expert article more favorably then their ordinary article. However, the average expert article received a credibility score of 2.91, while the average ordinary article received a score of 2.73. Expert articles were graded more favorably than ordinary articles in the Chesney study. However, a difference in means test was calculated that yielded a P-value of 0.73, indicating the two credibility scores were not significantly different. A spreadsheet displaying the results can be found in Appendix B. There are many problems with the collected data. First, the sample size is small. 59 people participated in Dr. Chesney's study; 11 professors participated in this study. Second, it is difficult to equate the grading styles of professors. Some articles were graded significantly different. For

86   *Major Themes in Economics, Spring 2008*

example, the expert gave "History of Central Banking" a credibility score of 5.44, while the non-expert gave the same article a score of 2.22. Likewise, the expert gave the "Economic Development" article a score of 1.56, while the non-expert gave the article a score of 5.22. Finally, because the topics chosen could be found in any Principles of Economics textbook, the professors could be considered experts in many of the topics. As a result, the expert vs. non-expert effect was diluted.

VI. Interpretations and the Future of Wikipedia

The results make a semi-strong argument for the credibility of Wikipedia. The article comparison portion of the study was especially favorable. There were several issues addressed by Wikipedia that Mankiw left out, but more importantly, there were very few issues Mankiw addressed that Wikipedia did not. Many of the topics analyzed are relatively static. Wikipedia seems to do better with largely accepted information than with controversial issues. While the faculty survey did not yield Chesney-like support for Wikipedia, the results were not all that discouraging. The credibility score for the average expert article was 2.91. Assuming the questionnaire measures how the professors feel about the overall credibility of the articles, a score of 2.91 would suggest the professors felt the Wikipedia articles were more than "slightly credible." But what makes Wikipedia so appealing to its users is what will always prevent it from being a truly reliable source. When Wikipedia articles were evaluated in the study, the evaluator had to note the date and time the site was visited. While Wikipedia may accurately claim Ricardo's book was published in 1817 today, it potentially could claim the book was written in 1917 tomorrow. The site's volatility diminishes its credibility. Jim Thomsen, a copy editor at the Kitsap Sun in Bremerton, Washington, sums up the problem, "The bottom line is that Wikipedia can be a great tool as a central clearinghouse for contextual information, but not a single syllable there should be taken at face value" (Shaw, 2008, 24).

   Nevertheless, Wikipedia can be useful. The site can be an efficient means to inspire thought. In-site references can show users additional places to search when conducting research. Many articles have links to external sources, and while articles may be biased, their content may still be accurate. If anything, biased sections should act as a catalyst for thought, opening the minds of readers with preconceptions, and inducing further research.

The future of Wikipedia is uncertain. Wikipedia does not sell ad space. It relies on volunteer operations to sustain operations. The internet has been the home of fads and trends for years. While Wikipedia has been around for the better part of a decade, if volunteers begin to spend their time and efforts elsewhere, the entire site could disappear. More importantly, as schools and others continue to ban access to the site, Wikipedia faces mounting pressure to incorporate more stringent control measures. In 2007, Wales announced plans for Wikipedia 2.0. Editing restrictions are being tested on the German-language version of Wikipedia (Giles, 2007, 5). In the trial, only edits made by a separate class of "trusted" users will be instantly implemented; other users will have to wait until a trusted editor has given the article a brief look before their changes can be viewed by readers (Giles, 2008, 6). While the changes certainly would add more credibility to articles, they would also take away the autonomy of editing that is so appealing to users. As the site continues to develop, Wikipedia will be forced to face the important tradeoff between credibility and freedom.

VII. Conclusion

Wikipedia is a popular site that provides a convenient forum for facts and ideas. However, its credibility continues to be questioned. This study illustrates the relative accuracy of Wikipedia in articles regarding basic economic principles. Both the article comparison and faculty survey describe the site as fairly reliable. However, the study does not provide evidence suggesting Wikipedia should be used as a reliable tertiary source for undergraduate economics students. The volatile nature of the site diminishes its credibility.

88   *Major Themes in Economics, Spring 2008*

Appendix A
Article Comparison

Production Possibilities Frontier –

Sources: Mankiw – Principles of Macroeconomics
                      Wikipedia – Production Possibilities Frontier (as of
                      2/26/08). 0 sources.

Similarities: Both recognized the PPF as a mathematical model
measuring production in an economy with two goods and services subject
to limited productive resources and technology. The two sources had
similar graphs. Both showed efficient, inefficient, and infeasible points
on the graph. Both discuss the concepts of tradeoffs and opportunity
costs. Both showed that an increase in technology shifted the curve
outward. Both recognize the two endpoints on the graph as extreme
points, or points where only one good is produced.

Differences: Wikipedia recognized the slope of the PPF at any given
point to be its marginal rate of transformation (MRT). Wikipedia
suggested "transformation curve" as an alternate name for the PPF.
Wikipedia distinguishes between productive and allocative efficiency
points on the curve by acknowledging that while all points on the curve
are productively efficient, some may be less profitable than others as a
result of market demand. Therefore there is only one point on the curve
where factors are fully and productively employed, and is the
combination of goods and services society values the highest (Johnson,
2008, 1). Wikipedia states that PPF's can be constructed from the
contract curves in Edgewood Box diagrams of factor intensity.

Comparative vs. Absolute Advantage –

Sources: Mankiw – Principles of Macroeconomics
                      Wikipedia – Comparative Advantage/Absolute
                      Advantage (as of 2/26/08). 12 sources.

Similarities: Both define absolute advantage as the ability to produce
a good using fewer inputs than another producer (Wikipedia uses the
word "country" instead of "producer). Both discuss the concepts of

opportunity cost and specialization and their place in comparative advantage. Both referenced Adam Smith's *Wealth of Nations* and David Ricardo's 1817 work *Principles of Political Economics and Taxation.* Both recognize that while free trade is generally considered to be beneficial to all parties involved, the effects of free trade on individuals differ. Both use the simple two countries, two goods example to illustrate the concept of comparative advantage.

Differences: Wikipedia states that the concept of comparative advantage is generally first attributed to Robert Torrens in his 1815 essay on Corn Laws (Ruffin, 2005, 711). Wikipedia lists further opposing viewpoints such as: some believe the concept of comparative advantage is impossible to falsify, the concept of comparative advantage may not hold where factors of production are internationally mobile (Bhagwati, Srinivaso, 67), and free trade may reduce economic diversity to risky levels (Bhagwati, Srinivaso, 67). Wikipedia lists assumptions associated with the basic illustration of comparative advantage including equal size economies and full-employment. Mankiw listed 1776 as publication date for Smith's work.

Elasticity –

Sources -   Mankiw – Principles of Macroeconomics
                Wikipedia – Elasticity (economics), Elasticity of Demand/Supply (as of 2/26/08). 3 sources.

Similarities -   Both discuss differences between elastic and inelastic demand and supply. Both list the following as determinants of price elasticity of demand: close substitutes, necessities vs. luxuries, time horizons, and definition of markets. Both list time as the key determinant of price elasticity of supply. Both use the same mathematical formulas to calculate price elasticity of demand and supply. Both discuss the midpoint method of calculating price elasticity of demand and supply. Both recognize income elasticity and cross-price elasticity of demand. Both discuss the connection between elasticity and revenue. Both use similar graphs to illustrate price elasticity of demand and supply.

Differences – Mankiw defines elasticity as a measure of the responsiveness of quantity demanded or quantity supplied to one of its

90   *Major Themes in Economics, Spring 2008*

determinants. Wikipedia defines elasticity as the ratio of a proportional change in one variable with respect to a proportional change in another variable. Wikipedia references another determinant of demand. Wikipedia claims the demand for habit forming (or addictive) goods will naturally exhibit inelastic properties (Schaller, 2006, 1). Mankiw uses more graphs then Wikipedia to illustrate the connection between elasticity and revenue.

Giffen Good –

Sources -   Mankiw – Principles of Microeconomics
                 Wikipedia – Giffen Good (as 2/28/08). 7 sources.

Similarities -   Both define a Giffen good as a good for which an increase in the price increases the quantity demanded. Both reference an upward sloping demand curve. Both claim the upward sloping demand curve occurs because the income effect dwarfs the substitution effect. Both use potatoes and the Irish potato famine as an example of a possible Giffen good. Both claim a Giffen good must be an inferior good. Both acknowledge the viewpoint that Giffen goods may not exist at all.

Differences -   Wikipedia lists other preconditions (other than being an inferior good) for the development of a Giffen good. Wikipedia claims there must be a lack of good substitutes present and the good must represent a substantial percentage of the buyer's income, but not so much that none of the associated normal goods are consumed (Jensen, Miller, 2002, 1). Wikipedia gives a couple more examples for possible Giffen goods. Robert Jensen and Nolan Miller have suggested rice and wheat noodles may be Giffen goods in China (Jensen, Miller, 2002, 1). Author and journalist Sasha Abramsky in 2005 suggested gasoline can be a Giffen good under certain circumstances (Abramsky, 2005, 1)

Minimum Wage –

Sources: Mankiw – Principles of Microeconomics
                 Wikipedia – Minimum Wage (as of 2/28/08). 56 sources.

Similarities: Both sources define a minimum wage as laws dictating the lowest price for labor an employer may pay an employee. Wikipedia uses the word "wage" instead of "price." Both claim minimum wage laws in the United States began with the Fair Labor Standards Act of 1938. Both claim minimum wage laws cause the quantity supplied of labor to exceed the quantity demanded of labor, resulting in unemployment. Both recognize minimum wage laws have the greatest effect on teenagers, and are not binding for those with high skills and much experience. Both refer to minimum wage laws as price floors. Both acknowledge the political debate surrounding minimum wage laws.

Differences: Wikipedia claims minimum wage laws were first enacted in Australia and New Zealand in 1896 (Lippincott). Wikipedia acknowledges another opposing viewpoint. David Card and Alan Krueger wrote the 1997 book <u>Myth and Measurement: The New Economics of the Minimum Wage.</u> They present the negative employment effects as minimal (Card, Krueger, 1995, 1). Some have argued their research is flawed (Aide, Galloway). Wikipedia offers alternative policy measures such as a negative income tax or earned tax credits (Harvey, 1984, 1).

Gross Domestic Product –

Sources: Mankiw – Principles of Macroeconomics
                  Wikipedia – GDP (Gross Domestic Product) (as of 2/28/08). 5 sources.

Similarities: Both define GDP as the market value of all final goods and services produced within a country in a given period of time. Both explain, in depth, key terms in the definition such as "final", "produced", and "domestically". Both calculate GDP in the following manner: Y=C+I+G+NX, with C representing consumption, I representing investment, G representing government expenditures, and NX representing Net Exports. Both state income=expenditure for the economy as a whole. Both distinguish between GDP and GNP (Gross National Product).

Differences: Mankiw explains how to relate real and nominal GDP through the use of the GDP deflator. He measure the deflator in the

92   *Major Themes in Economics, Spring 2008*

following manner: GDP deflator=(Nominal GDP/Real GDP)(100). Mankiw uses The Circular-Flow Diagram to illustrate how GDP measures the flow of money. Mankiw mentions what GDP does not measure: leisure, volunteer work, and effects on the environment. Mankiw says that the official measurement of GDP can be found in the System of National Accounts, founded in 1993 by the International Monetary Fund, the European Union, the Organization for Economic Cooperation and Development, the United Nations, and the World Bank (UNSD, 2008, 1).

Indifference Curves –

Sources: Mankiw – Principles of Microeconomics
                Wikipedia – Indifference Curve (as of 3/1/2008).   5
                sources.

Similarities: Both define indifference curves essentially the same. Mankiw defines an indifference curve as a curve that shows consumption bundles that give the consumer the same level of satisfaction. Wikipedia defines an indifference curve as a graph showing different bundles of goods, each measured as to quantity, between which a consumer is indifferent. Both list the following properties of indifference curves: they are negatively sloped, they are complete, they are bowed inward, and higher curves are better than lower curves. Both recognize the slope at any given point of an indifference curve to be its Marginal Rate of Substitution. Both discuss and present graphs for perfect substitutes and perfect compliments.

Differences: Wikipedia states indifference curves were developed by Francis Ysidro Edgeworth, Vilfredo Pareto, and others in the first part of the 20th century (Kemp, 2001, 157).   Wikipedia acknowledges assumptions of rationality and continuity when working with indifference curves (Turnbull, 2005).

Deadweight Loss –

Sources: Mankiw – Principles of Macroeconomics
                Wikipedia – Deadweight Loss (as of 3/1/2008).   1
                source.

Similarities: Both accurately define deadweight loss. Mankiw defines deadweight loss as a fall in total surplus that results from a market distortion, such as a tax. Wikipedia defines deadweight loss as the loss of economic efficiency that can occur when equilibrium for a good or service is not Pareto optimal. Both recognize that a market distortion creates a wedge between the price buyers pay and the price sellers receive. Both define producer and consumer surplus.

Differences: Mankiw focuses primarily on taxes. Wikipedia lists other market distortions such as monopoly pricing, externalities, subsidies, and price ceilings/floors. Wikipedia lists "excess burden" and "allocative inefficiency" as alternate name for deadweight loss. Wikipedia acknowledges differences between Hicksian and Marshallian deadweight loss (Lavergne, Requillart, Simioni, 2001, 157). Mankiw discusses the link between taxation and tax revenue. He discusses the Laffer Curve and its significance as well as its impact on Ronald Reagan's administration.

Tariff –

Sources: Mankiw – Principles of Macroeconomics
                  Wikipedia – Tariff (as of 3/1/2008). 2 sources.

Similarities: Both define a tariff as a tax on imported goods. Both state a tariff raises theprice of imported goods above the world price. Both acknowledge the deadweight loss associated with tariffs.

Differences: Wikipedia suggests two types of tariffs, ad valorem and specific (Lockwood, Wong, 2000, 183). Wikipedia suggests three purposes for tariffs: revenue, protective, and prohibitive (Hill, Bolnick, 1893, 54).

Sunk Cost –

Sources: Mankiw – Principles of Microeconomics
                  Wikipedia – Sunk Cost (as of 3/4/2008). 11 Sources.

Similarities: Both define a sunk cost as a cost that has already been incurred and cannot be recovered. Both give examples of spilt milk and a lost movie ticket. Both reference the opportunity cost concept. Both

94   *Major Themes in Economics, Spring 2008*

recognize that when consumers disregard sunk costs, they are behaving rationally.

Differences: Wikipedia mentions loss aversion and the sunk cost fallacy (Friedman, et al., 2007, 59). Wikipedia presents the viewpoint illustrating most consumers take loss aversion into account when making decisions; Wikipedia states Daniel Kahneman won a Nobel prize for his work on the limitations of consumer rationality with his late collaborator, Amos Tversky (Vendrik, Woltjer, 2007, 1493).

Natural Monopoly –

Sources: Mankiw – Principles of Microeconomics
                     Wikipedia – Natural Monopoly (as of 3/21/2008).   14
                     sources.

Similarities: Both define a natural monopoly as a situation that arises because a single firm can supply a good or service to an entire market at a smaller cost than could two or more firms. Both recognize that economies of scale are present in natural monopolies. Both discuss the high fixed costs and low marginal costs generally associated with natural monopolies. Both state that natural monopolies are regulated by the government. Both use the distribution of water as an example.

Differences: Mankiw states that goods that are excludable but not rival create natural monopolies. Wikipedia suggests the concept of a natural monopoly can be attributed to John Stuart Mill (Tynan, 2007, 49). Wikipedia specifically refers to economies of scale in social costs.

Prisoner's Dilemma –

Sources: Mankiw – Principles of Microeconomics
                     Wikipedia – Prisoner's Dilemma (as of 3/21/2008). 22
                     sources.

Similarities: Both define the prisoner's dilemma essentially the same. Mankiw defines the prisoner's dilemma as a particular "game" between two captured prisoners that illustrates why cooperation is difficult to

maintain even when mutually beneficial. Wikipedia defines prisoner's dilemma as a type of non-zero-sum game in which two players each "cooperate" with or "defect" (betray) the other player; the concern of each player is his own payoff only, without concern for others' payoff. Both reference an association with game theory, Nash equilibrium, and John Nash. Both define the dominant strategy approach as the best strategy for a player to follow regardless of the strategies pursued by others. Both discuss the concept of self-interest. Both use the arms race of the Cold War as an example. Both suggest cooperation can be achieved if the game is played many times. Both reference the Prisoner's Dilemma tournament. Both state that the "tit-for-tat" strategy prevailed in the tournament.

Differences: Mankiw states that a lack of cooperation (caused by the prisoner's dilemma) in oligopolies can have either a good or bad effect on society. He references a lack of cooperation in oil cartels as having a good effect, and a lack of cooperation in the arms race as having a bad effect. Wikipedia states rational choice leads two players to defect rather than cooperate. Wikipedia calls this a Pareto-suboptimal solution (Buccella, 2007, 19). Wikipedia defines iterated prisoner's dilemma as the situation when the prisoner's dilemma is played repeatedly (Basu, 2005, 56). Wikipedia states the prisoner's dilemma was originally framed by Merill Flood and Melvin Dresher while working at RAND in 1950 (Siegel, 2001, 1172). Wikipedia states the prisoner's dilemma was formalized and given its name by Albert Tucker (Siegel, 2001, 1172). Wikipedia states that Nobel Prize winner Robert Aumann wrote about iterated prisoner's dilemma in a 1959 paper, and that interest in iterated prisoner's dilemma was kindled by Robert Axelrod in his 1984 book *Evolution of Cooperation* (Axelrod, 1984, 1). Wikipedia states the tit-for-tat strategy that won the prisoner's dilemma tournament was developed by Anatol Rapoport (Marks, 1992, 17).

Utilitarianism –

Sources: Mankiw – Principles of Microeconomics
               Wikipedia – Utilitarianism (as of 3/21/2008).   16 sources.

Similarities: Both define utilitarianism essentially the same. Mankiw

96   *Major Themes in Economics, Spring 2008*

defines utilitarianism as the political philosophy according to which the government should choose policies to maximize the total utility of society. Wikipedia defines utilitarianism as the ethical doctrine that the moral worth of an action is solely determine by its contribution to overall utility in maximizing happiness or pleasure as summed among all persons. Both credit John Stuart Mill and Jeremy Bentham with founding utilitarianism.

Differences: Mankiw discusses the redistribution of income under utilitarianism.[3]

Poverty Line –

Sources: Mankiw – Principles of Microeconomics
                     Wikipedia – Poverty Line (as of 3/21/2008). 6 sources.

Similarities: Both define the poverty line essentially the same. Mankiw defines the poverty line as an absolute level of income set by the federal government for each family size below which a family is deemed to be in poverty. Wikipedia defines the poverty line as the minimum level of income deemed necessary to achieve an adequate standard of living. Both discuss the difference between absolute and relative poverty. Both referenced the negative relationship between economic growth and poverty.

Differences: Mankiw states official data on the poverty line began to be collected in 1959. Mankiw states the correlation between the poverty line and race, age, and family composition. Mankiw acknowledges the point of view that the income gap is leaving some people behind. Amidst economic growth, the typical family had gotten better but the poor do not always share in that growth. Wikipedia recognizes the basic needs approach for measuring the poverty rate. Wikipedia acknowledges the point of view that an income marginally above the poverty line is essentially the same as an income marginally below it (poverty is continuous rather than discrete); as a result indices are used to more accurately measure the poor (Xu, 1998, 143). Wikipedia acknowledges that public and private charitable goods are not included when measuring the poverty rate.

Long Run Aggregate Supply –

Sources: Mankiw – Principles of Macroeconomics
                Wikipedia – Aggregate Supply (as of 3/21/08).   0
                sources.

Similarities: Both define aggregate supply as the total supply of goods
and services produced by a national economy during a specific time
period. Both define the Aggregate Supply Curve as a curve showing the
quantity of goods or services that firms choose to produce and sell at each
price level. Both claim that the aggregate supply curve is vertical in the
long run. Both list labor, capital, and technology as determinants of long
run aggregate supply. Both emphasize that the price level does not affect
the long run determinants of GDP (quantity does not depend on demand).
Both reference the natural rate of output.

Differences: Mankiw lists the discovery of natural resources as an
additional determinant of long run aggregate supply.

Multiplier Effect –

Sources: Mankiw – Principles of Macroeconomics
                Wikipedia – Spending Multiplier (as of 3/21/08).   3
                sources.

Similarities: Both define the multiplier effect essentially the same.
Mankiw defines the multiplier effect as the additional shifts in aggregate
demand that result when expansionary fiscal policy increases income and
thereby increases consumer spending. Wikipedia defines the multiplier
effect as what occurs when an initial spending rise leads to a greater
increase in national income; an initial change in aggregate demand can
cause further change in aggregate output for the economy. Both state the
intensity of the multiplier depends on society's marginal propensity to
consume (MPC). Both have similar mathematical calculations for a
society's multiplier. Both acknowledge the multiplier effect can be
associated with any event that alters spending on any component of GDP.

Differences: Mankiw references the investment accelerator, a positive
feedback from demand to investment. Mankiw also references the

98   *Major Themes in Economics, Spring 2008*

crowding out effect that can occur as a result of government purchases. Wikipedia states the intensity of the multiplier also depends on society's marginal propensity to import (MPI) (Shinohara, 1957, 608).

Long Run Phillips Curve –

Sources: Mankiw – Principles of Macroeconomics
                Wikipedia – Phillips Curve (as of 3/21/08). 6 sources.

Similarities: Both define the Phillips curve essentially the same. Mankiw defines the Phillips curve as a curve that shows the short-run tradeoff between inflation and unemployment. Wikipedia defines the Phillips curve as the historical inverse relationship between the rate of unemployment and the rate of inflation in an economy. Both attribute the curve to A.W. (Alban William) Phillips in a 1958 paper entitled: "The Relationship Between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861-1957." Both state Paul Samuelson and Robert Solow recorded similar findings in the United States after Phillips' work was published.   Both reference the Phillips curve relationship to the money supply. Both reference Milton Friedman as a leader in analyzing the relationship in the long run. Both state the long run Phillips curve is vertical at the natural rate of unemployment.

Differences: Wikipedia states the Non-Accelerating Inflation Rate of Unemployment (NAIRU) is an alternate name for the natural rate of unemployment. Wikipedia states Edmond Phelps won a Nobel Prize in 2006 for his work on the Phillips curve (The Nobel Prize Internet Archive, 2008, 2).

Inflation Targeting –

Sources: Mankiw – Principles of Macroeconomics (excerpt
                written by Ben Bernanke, Frederick Mishkin, and Adam
                Posen
                Wikipedia – Inflation Targeting (as of 3/21/08).   3
                sources.

Similarities: Both describe inflation targeting as a policy in which a central bank estimates and makes public an inflation target and attempts

to steer actual inflation towards the target through the use of monetary tools.   Both believe inflation targeting would bring transparency, accountability, and economic stability to monetary policy.

Differences: The excerpt in Mankiw states inflation targeting would prevent deflation. Wikipedia states inflation targeting was pioneered in New Zealand in 1990 (Laurentian U; U Fribourg, 2006, 615). Wikipedia acknowledges the point of view that inflation targeting would give the Federal Reserve too little flexibility to stabilize growth and/or employment in the event of an external economic shock. (U AL; Queensland U. Technology, 2007, 411).

Purchasing Power Parity –

Sources: Mankiw – Principles of Macroeconomics
Wikipedia – Purchasing Power Parity (as of 3/21/08). 1 source.

Similarities: Both define purchasing power parity (PPP) essentially the same. Mankiw defines PPP as the theory of exchange rates whereby a unit of any given currency should be able to buy the same quantity of goods in all countries. Wikipedia defines PPP as the theory that uses the long-term equilibrium exchange rate of two currencies to equalize their purchasing power. Both reference arbitrage and the law of one price. Both acknowledge PPP determines exchange rates. Both give the same mathematical formula to calculate the exchange rate between two countries. Both acknowledge the point of view that tradeable goods are not always perfect substitutes when produced in different countries.

Differences: Mankiw acknowledges that not all goods are easily traded (ex. Price of haircuts in New York vs. Paris). Wikipedia references the Geary Khamis (international) dollar (Cuthbert, 1999, 235).

100   *Major Themes in Economics, Spring 2008*

Appendix B
Article Questionnaire

For each article, please answer the following questions:

1) I perceived the information to be believable

   a. Strongly agree
   b. Agree
   c. Slightly agree
   d. Neither agree nor disagree
   e. Slightly disagree
   f. Disagree
   g. Strongly disagree

2) I perceived the information to be accurate

   a. Strongly agree
   b. Agree
   c. Slightly agree
   d. Neither agree nor disagree
   e. Slightly disagree
   f. Disagree
   g. Strongly disagree

3) I perceived the information to be trustworthy

   a. Strongly agree
   b. Agree
   c. Slightly agree
   d. Neither agree nor disagree
   e. Slightly disagree
   f. Disagree
   g. Strongly disagree

4) I perceived the information to be unbiased

a. Strongly agree
b. Agree
c. Slightly agree
d. Neither agree nor disagree
e. Slightly disagree
f. Disagree
g. Strongly disagree

5) I perceived the information to be complete

a. Strongly agree
b. Agree
c. Slightly agree
d. Neither agree nor disagree
e. Slightly disagree
f. Disagree
g. Strongly disagree

6) I could comprehend the article

a. Strongly agree
b. Agree
c. Slightly agree
d. Neither agree nor disagree
e. Slightly disagree
f. Disagree
g. Strongly disagree

7) The article was clear

a. Strongly agree
b. Agree
c. Slightly agree
d. Neither agree nor disagree
e. Slightly disagree
f. Disagree
g. Strongly disagree

102   *Major Themes in Economics, Spring 2008*

8) The article was understandable

a.   Strongly agree
b.   Agree
c.   Slightly agree
d.   Neither agree nor disagree
e.   Slightly disagree
f.   Disagree
g.   Strongly disagree

9) I could explain the subject of the article to someone else using only the information in the article and nothing else

a.   Strongly agree
b.   Agree
c.   Slightly agree
d.   Neither agree nor disagree
e.   Slightly disagree
f.   Disagree
g.   Strongly disagree

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	O=ordinary article								Professor Survey Evaluation - Appendix B														
2	E=expert article																						
3																							
4	Professor	O:1	O:2	O:3	O:4	O:5	O:6	O:7	O:8	O:9	AVERAGE	E:1	E:2	E:3	E:4	E:5	E:6	E:7	E:8	E:9	AVERAGE		SUM OF AVERAGES
5																							
6	Professor 1	2	2	2	4	4	1	2	2	2	2.33	1	1	1	2	3	1	1	1	2	1.44		3.78
7	Professor 2	2	2	2	2	4	3	5	3	3	2.89	1	1	1	2	3	1	2	1	2	1.56		4.44
8	Professor 3	2	2	2	2	5	1	1	1	2	2.00	1	1	1	6	1	1	1	1	2	1.67		3.67
9	Professor 4	1	2	2	1	3	1	1	1	3	1.67	2	2	4	3	4	1	3	2	5	2.89		4.56
10	Professor 5	2	2	4	4	5	1	1	1	2	2.44	2	3	2	1	2	1	2	2	3	2.00		4.44
11	Professor 6	6	6	7	4	7	2	5	3	7	5.22	6	6	7	6	7	2	6	3	7	5.56		10.78
12	Professor 7	2	2	2	2	4	2	2	2	2	2.22	2	2	2	4	1	2	2	2	2	2.11		4.33
13	Professor 8	2	2	3	2	6	2	4	6	6	3.67	5	5	6	6	7	2	6	6	6	5.44		9.11
14	Professor 9	2	2	2	3	4	1	2	2	1	2.11	2	2	2	3	1	2	2	2	2	2.00		4.11
15	Professor 10	2	2	2	3	5	1	3	2	3	2.56	2	2	3	5	6	5	5	5	6	4.33		6.89
16	Professor 11	1	3	3	4	6	1	1	1	6	2.89	1	3	3	1	5	2	5	2	5	3.00		5.89
17																							
18	AVERAGE	2.18	2.45	2.82	2.82	4.82	1.45	2.45	2.18	3.36	2.73	2.27	2.55	2.91	2.82	4.55	1.64	3.18	2.45	3.82	2.91		5.64
19	STANDARD DEVIATION	1.33	1.21	1.54	1.08	1.17	0.69	1.57	1.47	2.01	0.99	1.68	1.63	2.02	1.94	1.75	1.21	1.94	1.63	1.99	1.53		2.36
20																							
21	Article	E	O																				
22																							
23	Adam Smith	2.00	2.33																				
24	Child Labor	1.67	2.11																				
25	Econometrics	1.44	3.67																				
26	Economic Development	1.56	5.22																				
27	History of Central Banking	5.44	2.22																				
28	History of Money	2.00	2.00																				
29	Minimum Wage	2.11	2.56																				
30	Pension	3.00	2.89																				
31	Publicly Funded Health Care	2.89	2.44																				
32	Real Estate Economics	5.56	1.67																				
33	Reconstruction	4.33	2.89																				
34																							
35	AVERAGE	2.91	2.73																				
36	STANDARD DEVIATION	0.99	1.53																				

104   *Major Themes in Economics, Spring 2008*

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Endnotes

1. Due to their origin, statistics from Wikipedia have the potential to be biased.
2. The author of the study is not an authority in the topics researched.

Meier: Is Wikipedia a Credible Source **105**

Therefore, only information found in Mankiw or Wikipedia were considered for omissions. General omisssions may have existed in both Mankiw and Wikipedia but were not included in the study.

3. Mankiw discusses utilitarianism in the context of economics. Wikipedia discusses utilitarianism more generally.