ASSESSING THE EFFECTIVENESS OF MUSIC LYRICS IN CONVEYING ECONOMIC CONCEPTS

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ABSTRACT

Numerous economic concepts are present in popular music lyrics. We conduct a study to examine the effectiveness of using music to convey economic concepts. The empirical results suggest that there is an opportunity to improve student understanding by using music lyrics to introduce and reinforce economic concepts, but the selection of topic and music matter.

INTRODUCTION

An examination of the economics education literature raises questions regarding the instructional practices of economics instructors. Peer reviewed journals are filled with articles presenting innovative assignments and techniques for teaching economics. However, periodic survey results suggest that the vast majority of economics instructors remain firmly committed to the traditional chalk and talk approach to instruction (Watts & Becker, 2008; Becker & Watts, 2001; Becker & Watts, 1996). Watts and Becker (2008) argue that their survey provides evidence that economics instructors are slowly beginning to move away from the traditional approach in favor of more innovative instructional methods. We are puzzled by the fact that journals are filled with examples of educational innovation yet survey data show only a limited departure from the traditional chalk and talk. Perhaps chalk and talk remains popular because experience reveals that it is most effective.

Colander (2004) warns that economics instructors should not get consumed in the delivery of a course but rather should focus on the content of the course. The quality of a course is ultimately a function of the content; innovative delivery can, at most, build on the foundation established by substantive content. Regardless, the challenge facing economics education research is to assess the effectiveness of innovative approaches to teaching economics so as to validate innovative approaches to instruction. As economists, we are acutely aware that scarcity implies choice and that every choice of how to use class time comes at a cost. At issue is whether the marginal benefits of an innovation offset the associated marginal costs.

This study evaluates the efficacy of using songs (music and lyrics) to complement substantive content presented using a conventional lecture format. Our intent is to stimulate

evaluation of innovations reported in pedagogical articles so as to elevate the innovations that improve instruction and to eliminate innovations that interfere with learning.

Section II reviews the salient literature. Section III states the guiding research question and associated hypotheses. It also describes the research design of the study. Section IV summarizes the data and presents the econometric model. In Section V we report our findings. Discussion and concluding remarks in Section VI complete the paper.

LITERATURE REVIEW

While traditional chalk and talk dominates economics instruction, alternative approaches to teaching economics are commonly employed by economics instructors (Becker & Watts, 1995; Becker & Watts, 2001; Watts & Becker, 2008). Watts and Becker (2008) survey economics instructors and report a litany of alternative approaches (e.g. classroom games, simulations, experiments, literature, the business press, case studies, and cooperative learning) as evidence that economics instruction is moving beyond the traditional chalk and talk approach. Alternatives to chalk and talk have been compiled in an edited volume by Becker, Watts, and Becker (2006).

Academic journals chronicle methodological approaches implemented by economics instructors. Watts and Smith (1989) identify an extensive list of references to economic concepts in literature for use in instruction. Watts (2003) compiles literary selections and organizes the excerpts by topic for easy access and comparison. Hartley (2001) presents an entire course reliant on reading material drawn from the Great Books of Western Civilization. McCannon (2007) presents a course designed to develop critical thinking skills that employs game theory to study biblical scripture. Perhaps most famously, although not pedagogical in purpose, Rockoff (1990) posited that Frank Baum intended his *Wizard of Oz* children's story as an allegorical commentary on monetary policy of the late 19th century. Hansen (2002) has since offered a counter-argument challenging Rockoff's assertion but Dighe (2007) maintains that the *Wizard of Oz* remains a useful teaching tool to facilitate discussion of the competing interpretations.

Modern students and instructors may not relate to literature, drama, or game theoretic analysis of scripture. However, instructors have begun to use movies and television programs to illustrate economic concepts (Leet & Houser, 2003; Sexton, 2006; Mateer & Li, 2008). Indeed the animated series *The Simpsons* has inspired a cottage industry of innovative assignments (Hall, 2005; Considine, 2006; Gillis & Hall, 2010; Luccasen & Thomas, 2010). The focus of this paper, however, is the use of music to teach economics.

Empirical evidence suggests that music training contributes to cognitive development (Schlaug, Norton, Overy & Winner, 2005). A series of papers established what is popularly known as the Mozart Effect (Leng & Shaw, 1991; McGrann, Shaw, Shenoy, Leng & Mathews, 1994; Shaw, Silverman & Pearson, 1985; Shenoy, Kaufman, McGrann & Shaw, 1993). Efforts to duplicate the experimental results have varied (Rauscher & Shaw, 1998). Crncec, Wilson, and

Prior (2006) provide evidence of no Mozart Effect in children. Bangerter and Heath (2004) consider the persistence of the Mozart Effect despite the mixed empirical results as evidence of a broader social phenomenon regarding the role of the media promoting the initial findings. Regardless, Rubin (1977) finds that music prompts aid recall while Calvert (2001) and Calvert and Tart (1993) find that children and adults recall more educational material verbatim after exposure to ABC television's *Schoolhouse Rock*. To what extent can music convey college level economic concepts?

Tinari and Khandke (2000) assembled a collection of songs from which individuals and groups choose selections as the basis for further research regarding an economic event or concept. Harter (2003) offered students a choice to write short essays based on popular music or a longer essay based on an economics murder novel. Hall and Lawson (2008) suggest that music motivates students and advocate a structured writing assignment based on specific selections from a wide variety of music. Kane (1999) presents songs that illustrate principal-agent problems. Hall, Lawson, Mateer, and Rice (2008) author two websites featuring music and lyrics for use in economics instruction.

It should be noted that utilizing music in college courses is not the exclusive domain of economics faculty. Music has been used to teach biology, geography and social studies (Kandyba, 2003; Jurmu, 2005; White & McCormack, 2006). Walczak and Reuter (1994) employ popular music to teach sociology, and Albers and Bach (2003) play music prior to class to set-up the lecture in their sociology class. Weinrauch (2005) emphasizes the use of metaphors in music lyrics to teach courses in marketing strategy while Dettmar (1998) claims rock and roll music is essential in his introductory course to postmodernism. Despite the popularity of music as a teaching tool in a wide variety of disciplines, we have not found a single effort to assess its effectiveness.

Despite the apparent abundance of published papers pertaining to innovative instruction, papers reporting innovative teaching are rarely cited. We consider the lack of citations as evidence of the need to examine the effectiveness of using music as a teaching innovation. We limited our evaluation to the effectiveness of using music when teaching economics.

RESEARCH QUESTION, HYPOTHESES, AND RESEARCH DESIGN

Published papers report anecdotal evidence in the form of individual student comments regarding inclusion of music in class; however, no paper reports greater efficacy. It seems reasonable, therefore, to subject the use of music to teach economics to empirical examination. Given this void in the literature, we ask, does music contribute to the understanding and retention of economic concepts?

To answer this question, we pose two hypotheses for testing:

H1 *Exposure to music relating to economic concepts improves understanding.*
H2 *Exposure to music relating to economic concepts improves retention.*

To test these hypotheses, we conducted an experiment using two undergraduate classes of macroeconomic principles. In each class, music was used to complement a topic presented as part of the class lecture but not addressed in the textbook. In one class, we used two songs performed by Styx, "Too much time on my hands" (1981) and "Blue collar man" (1978), which address potential consequences of unemployment on individuals. In the second class, we used "I'd love to change the world" (1971) by Ten Years After, which illustrates the competing visions of human behavior and their relationship to the selection of an economic system.

Handouts with the printed lyrics for each song were distributed immediately preceding the playing of each song. Each class experienced music for one topic. Discussion of the lyrics and their relationship to the economic topic immediately followed the music. An unannounced quiz administered during the following class meeting assessed the impact of the music in comparison to the class that did not experience the music. Retention is examined by evaluating the student performance on a final exam question.

DATA AND ECONOMETRIC MODEL

Student performance data were collected in two macroeconomics principles classes that met at eight and ten in the morning four days per week. Both classes met in the same room with the same instructor. A conscious effort was made on days when music was used in a class to ensure that the classroom experience was otherwise identical for each class. The instructor slowed the pace of the lecture in one class to offset the time used to play the music in the other. Although attendance may be expected to vary based on the scheduled class time, student attendance did not adversely affect data collection. Descriptive statistics for the data are summarized in Table 1.

Table 1: Descriptive Statistics

Independent Variables	N	Minimum	Maximum	Mean	Std. Dev.
Gender (Base case: Male)	45	0	1	.33	.477
ACTMath	44	17	33	24.3182	4.43964
GPA	45	1.96	4	3.0171	.58166
Section (Base case: 8am class)	45	0	1	.69	.468
Engineering College (Base case: Business College)	45	0	1	.1778	.38665
Other College (Base case: Business College)	45	0	1	.0444	.20841
Micro A (Base case: D in microeconomics)	43	0	1	.2558	.44148

Table 1: Descriptive Statistics					
Independent Variables	N	Minimum	Maximum	Mean	Std. Dev.
Micro B (Base case: D in microeconomics)	43	0	1	.4186	.49917
Micro C (Base case: D in microeconomics)	43	0	1	.2558	.44148

Due to missing data, the dataset used in the statistical analysis included 43 observations. The class section scheduled at eight in the morning was less popular among students as evidenced by the discrepancy in enrollment. The early class consisted of fourteen students including two women whereas 31 students including 13 women enrolled in the later class. Previous research shows that women, on average, receive lower grades in economics courses (Anderson, Benjamin & Fuss, 1994). Therefore, we created a dummy variable, using male as the base case, to control for the gender of a student. Research also indicates that performance in economics courses is correlated with the score on the math component of the ACT (Ballard & Johnson, 2004). Prior studies show that performance in economics courses is positively correlated with the student's grade point average at the beginning of the academic term (Benedict & Hoag, 2004). All 45 students had existing grade point averages prior to enrolling in the course. Data collection was conducted during the spring quarter so the grade point average of each student reflected at least two quarters at the university.

Generally, freshman engineering students and sophomores from the business college enroll in the macroeconomic principles course. The course is required of students in both colleges. In addition, students from other colleges may enroll in the course. Dummy variables were created using the business college as the base case. These variables were intended to control for variation in curricular demands and student perceptions of the relevance of the economics courses. We constructed dummy variables for the class times using the earlier class as the base case. Research shows that previous performance in an economics course predicts performance in subsequent courses (Benedict & Hoag, 2004). We created dummy variables to represent student performance in the prerequisite microeconomics principles course using a D grade in microeconomic principles as the base case. To enroll in the principles of macroeconomics course, a student must pass microeconomic principles.

Econometric Model

We developed an econometric model using the student's score on an unannounced quiz or final exam question pertaining to the economic topic as the dependent variable. Quiz scores ranged from zero to three points. Final exam scores ranged from zero to two points. Grading reflects half point increments to accommodate partial credit for responses requiring multiple components. The variable of interest, Music, is a dummy variable indicating whether the student was exposed to music relating to the topic.

$$\text{Score} = B_0 + B_{1*}\text{Music} + B_{2*}\text{Gender} + B_{3*}\text{GPA} + B_{4*}\text{ACTMATH} + B_{5*}\text{ENGINEERING\_COLLEGE} + B_{6*}\ \text{OTHER\_COLLEGE} + B_7\text{SECTION} + B_{8*}\text{MICRO\_A} + B_{9*}\ \text{MICRO\_B} + B_{10*}\text{MICRO\_C} + \square$$

SECTION V – RESULTS

Table 2 reports the regression results using the student's score on an unannounced quiz question as the dependent variable. The regression examines the use of the two songs by Styx addressing the consequences of unemployment. The F-statistic is not statistically significant at any conventional level and the adjusted R-squared value (.151) reflects the goodness of fit after adjusting for the number of independent variables in the regression model.

The coefficient estimate for the variable of interest, Music, is positive (1.771) and statistically significant (p = .024) indicating that, on average, exposure to the music positively impacted performance on the unannounced quiz question. The sign of the coefficient estimates for the control variables Gender and GPA is as expected but not statistically significant. The coefficient estimate of the ACTMATH variable is negative and the magnitude of the estimate (-.014) is close to zero. Moreover, the estimate does not approach statistical significance at any conventional level. The coefficient estimates of the microeconomic principles grade and Engineering College dummy variables are positive but not statistically significant whereas the coefficient estimates for the Other College and Section dummy variables are negative and not statistically significant.

Table 2: Unemployment Quiz (STYX)

Model Utility & Independent Variables	Statistical Estimate	Standard Error	p-value
R^2	.394	n. a.	n. a.
Adjusted R^2	.151	n. a.	n. a.
F statistic	1.625	n. a.	.157
Constant	-2.315	1.697	.185
Gender	-.494	.542	.370
ACTMATH	-.014	.057	.813
GPA	.724	.553	.202
Micro A	.940	1.376	.501
Micro B	1.381	1.159	.245
Micro C	1.340	1.152	.255
Engineering College	.030	.528	.956
Other College	-.301	1.157	.797

Table 2: Unemployment Quiz (STYX)			
Model Utility & Independent Variables	Statistical Estimate	Standard Error	p-value
Section	-.452	.762	.557
Music	1.771	.736	.024*
* Statistically significant at the 5% level. n. a. Not applicable			

Table 3 reports the regression results using the student's score on an unannounced quiz question as the dependent variable. The regression examines the use of the song "I'd love to change the world" by Ten Years After. This song was selected due to its references to themes associated with competing visions of human behavior that influence the choice of economic systems. The F-statistic is nearly statistically significant at the 10% level. The adjusted R-squared value (.159) is consistent with the value reported in Table 2. The coefficient estimate for the variable of interest, Music, is negative (-.822) and statistically significant ($p = .045$) indicating that exposure to the song, on average, negatively impacted performance on the unannounced quiz question. This finding contradicts the previous result.

Table 3: Economic Systems Quiz (Ten Years After)			
Model Utility & Independent Variables	Statistical Estimate	Standard Error	p-value
R^2	.348	n. a.	n. a
Adjusted R^2	.159	n. a.	n. a.
F statistic	1.838	n. a.	.101
Constant	-.041	1.524	.979
Gender	-092	.423	.829
ACTMATH	-.011	.058	.852
GPA	.721	.520	.175
Micro A	-.522	.975	.597
Micro B	-1.005	.732	.180
Micro C	-.635	.744	.400
Engineering College	.887	.527	.103
Other College	-1.063	.844	.217
Music	-.822	.394	.045*
* Statistically significant at the 5% level. n. a. Not applicable			

Table 4 reports the regression results using performance on the final exam unemployment question as the dependent variable. The F-statistic indicates that the regression is statistically

significant (p = .095) and the adjusted R-squared (.170) is consistent with the regression results presented in Tables 2 & 3. The coefficient estimate of Music is positive (.909) and statistically significant (p = .028). Similar to the unemployment quiz, this finding indicates that, on average, exposure to the music positively impacted performance on the final exam question.

Table 4: Unemployment Final Exam (STYX)

Model Utility & Independent Variables	Statistical Estimate	Standard Error	p-value
R^2	.372	n. a.	n. a.
Adjusted R^2	.170	n. a.	n. a.
F statistic	1.838	n. a.	.095**
Constant	-.958	.930	.311
Gender	.304	.265	.259
ACTMath	.046	.034	.191
GPA	.145	.326	.661
Micro A	.742	.617	.238
Micro B	.959	.463	.047*
Micro C	1.280	.471	.011*
Engineering College	.290	.330	.386
Other College	-.663	.536	.225
Section	-.870	.430	.052**
Music	.909	.394	.028*

* Statistically significant at the 5% level.
** Statistically significant at the 10% level.
n. a. Not applicable

DISCUSSION AND CONCLUDING REMARKS

In hindsight, it is clear that the music selected to illustrate consequences of unemployment related more directly to the topic than the music selected to accompany the topic of competing visions of human behavior and their relationship to selection of an economic system. However, the discrepancy of the results may be explained by the nature of the topics. The topic of consequences of unemployment is tangible and students can more easily recognize the topic in the music by Styx. In contrast, it is more difficult to recognize the subtle references to competing visions of human behavior and their nuanced connection to selection of an economic system reflected in the song by Ten Years After. The selection of the topic and music in this instance may have been overly ambitious.

Findings of this study contribute evidence that exposure to music may positively influence learning of economic concepts. More importantly to instructors, the results reveal that both the choice of topic and the selection of music to complement the topic matter. The disconcerting finding is that music may interfere with understanding of more complicated topics or in instances when the music does not relate as directly as it might otherwise.

In terms of duration, the findings show that music may have a positive and statistically significant effect on student performance on both an unannounced quiz question early in the quarter and a final exam question at the end of the quarter. The goodness of fit of the model improved over time. Nonetheless, this research program would benefit from future research that improves the goodness of fit of the regression model. Similarly, we would encourage future research that explores the effectiveness of music when presenting more complex topics.

This study examines the use of music to convey economics concepts in macroeconomics principles courses. We evaluate the efficacy of using music lyrics to illustrate content otherwise delivered using a lecture format. We acknowledge that there is no proverbial free lunch and that every choice incurs an opportunity cost. Using scarce class time to play and discuss music that illustrates an economic concept necessarily incurs an opportunity cost that varies by instructor and class, but there can be no argument that adding music to the course displaces something. This paper does not assess the cost side of the calculation, but rather we focus on assessing the potential benefits of adding music.

In conclusion, the findings of this study offer evidence that music may contribute positively to learning economic concepts. However, the findings also suggest that the choice of topic and music matter. Although encouraged by the findings, we take Colander (2004) very seriously and acknowledge that there is opportunity cost associated with using music.

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REFERENCES

Albers, B. D. & R. Bach (2003). Rockin' Soc: Using popular music to introduce sociological concepts. *Teaching Sociology*, 31(2), 237-245.

Anderson, G., D. Benjamin, & M. A. Fuss (1994). The determinants of success in university introductory economics classes. *Journal of Economic Education*, 25(2), 99-119.

Ballard, C. L. & M. F. Johnson (2004). Basic math skills and performance in an introductory economics class. *Journal of Economic Education*, 35(1), 3-23.

Bangerter, A. & C. Heath (2004). The Mozart effect: Tracking the evolution of a scientific legend. *British Journal of Social Psychology*, 43(4), 605-623.

Becker, W. E. & M. Watts (1995). Teaching tools – Teaching-methods in undergraduate economics. *Economic Inquiry*, 33(4), 692-700.

Becker, W. E. & M. Watts (1996). Chalk and talk: A national survey on teaching undergraduate economics. *American Economic Review*, 86(2), 448-453.

Becker, W. E. & M. Watts (2001). Teaching methods in US undergraduate economics courses. *Journal of Economic Education*, 32(3), 269-279.

Becker, W. E., M. Watts, & S. Becker (2006). *Teaching economics: More alternatives to chalk and talk*. Cheltenham, UK: Edward Elgar Publishing.

Benedict, M. E. & J. Hoag (2004). Seating location in large lectures: Are seating preferences or location related to course performance? *Journal of Economic Education*, 35(3), 215-231.

Calvert, S. L. (2001). Impact of televised songs on children's and young adult's memory of educational content. *Media Psychology*, 1(4), 325-342.

Calvert, S. L. & M. Tart (1993). Song versus verbal forms of very-long-term, long-term, and short-term verbatim recall. *Journal of Applied Development Psychology*, 14(2), 245-260.

Colander, D. (2004). The art of teaching economics. *International Review of Economics Education*, 3(1), 63-76.

Considine, J. (2006). *The Simpsons*: Public choice in the tradition of Swift and Orwell. *Journal of Economic Education*, 37(2), 217-228.

Crncec, R., S. J. Wilson, & M. Prior (2006). No evidence for the Mozart effect in children. *Music Perception*: *An Interdisciplinary Journal*, 23(4), 305-318.

Dettmar, K. J. H. (1998, September 25). An introduction to postmodernism: Just let them hear some of that rock 'n' roll music, *Chronicle of Higher Education*, B4-5.

Dighe, R. S. (2007). The fable of the allegory: The *Wizard of Oz* in economics: Comment. *Journal of Economic Education*, 38(3), 318-324.

Gillis, M. T. & J. Hall (2010). Using *The Simpsons* to improve economic instruction through policy analysis. *American Economist*, 55(1), 84-92.

Hall, J. C. (2005). Homer Economicus: Using *The Simpsons* to teach economics. *Journal of Private Enterprise*, 20(2), 165-176.

Hall, J. C. & R. A. Lawson (2008). From ABBA to Zeppelin, Led: Using music lyrics to teach introductory microeconomics. *Perspectives on Economic Education Research*, 4(1), 23-26.

Hall, J. C., R. A. Lawson, G. D. Mateer & A. Rice (2008). Teaching private enterprise through tunes: An abecedarium of music for economists. *Journal of Private Enterprise*, 23(2), 157-166.

Hansen, B. A. (2002). The fable of the allegory: The *Wizard of Oz* in economics. *Journal of Economic Education*, 33(3), 254-264.

Harter, C. (2003). Murder versus music: Giving students a choice in introductory economics. *Journal of Economic Educators*, 3(4), 1-20.

Hartley, J. E. (2001). The Great Books of economics. *Journal of Economic Education*, 32(2), 147-159.

Jurmu, M. C. (2005). Implementing musical lyrics to teach physical geography: A simple model. *Journal of Geography*, 104(4), 179-186.

Kandyba, V. (2003, May 30). Professor uses music to bring biology to life, *Chronicle of Higher Education*, A10.

Kane, S. (1999). Teaching principal-agent problems using examples from popular music. *Financial Practice and Education*, 9(1), 116-120.

Leet, D. & S. Houser (2003). Economics goes to Hollywood: Using classic films and documentaries to create an undergraduate economics course. *Journal of Economic Education*, 34(4), 326-332.

Leng, X. & G. L. Shaw (1991). Toward a neural theory of higher brain function using music as a window. *Concepts in Neuroscience*, 2(2), 229-258.

Luccasen, A. & M. K. Thomas (2010). Simpsonomics: Teaching economics using episodes of *The Simpsons*. *Journal of Economic Education*, 41(2), 136-149.

Mateer, D. & H. Li (2008). Movie scenes for economics. *Journal of Economic Education*, 39(3), 303.

McCannon, B. C. (2007). Using game theory and the Bible to build critical thinking skills. *Journal of Economic Education*, 38(2), 160-164.

McGrann, J. V., G. L. Shaw, K. V. Shenoy, X. Leng & R. B. Mathews (1994). Computation by symmetry operations in a structured model of the brain: Recognition of rotational invariance and time reversal. *Physical Review*, E49, 5830-5839.

Rauscher, F. H. & G. L. Shaw (1998). Key components of the Mozart Effect. *Perceptual and Motor Skills*, 86, 835-841.

Rockoff, H. (1990). The Wizard of Oz as a monetary allegory. *Journal of Political Economy*, 98(4), 739-760.

Rubin, D. C. (1977). Very long-term memory for prose and verse. *Journal of Verbal Learning and Verbal Behavior*, 16(5), 611-621.

Schlaug, G., A. Norton, K. Overy & E. Winner (2005). Effects of music training on the child's brain and cognitive development. *Annals New York Academy of Sciences*, 1060, 219-230.

Sexton, R. L. (2006). Using short movie and television clips in the economics principles class. *Journal of Economic Education*, 37(4), 406-417.

Shaw, G. L., D. J. Silverman & J. C. Pearson (1985). Model of cortical organization embodying a basis for a theory of information processing and memory recall. *Proceedings of the National Academy of Sciences of the United States of America*, 82(8), 2364-2368.

Shenoy, K. V., J. Kaufman, J. V. McGrann & G. L. Shaw (1993). Learning by selection in the trion model of cortical organization. *Cerebral Cortex*, 3(3), 239-248.

Tinari, F. D. & K. Khandke (2000). From rhythm and blues to Broadway: Using music to teach economics. *Journal of Economic Education*, 31(3), 253-270.

Walczak, D. & M. Reuter (1994). Using popular music to teach sociology: An evaluation by students. *Teaching Sociology*, 22(3), 266-269.

Watts, M. (2003). *The literary book of economics*. Wilmington, DE: ISI Books.

Watts, M. & W. E. Becker (2008). A little more than chalk and talk: Results from a third national survey of teaching methods in undergraduate economics courses. *Journal of Economic Education*, 39(3), 273-286.

Watts, M. & R. F. Smith (1989). Economics in literature and drama. *Journal of Economic Education*, 20(3), 291-307.

Weinrauch, J. D. (2005). An exploratory use of musical metaphors to enhance student learning. *Journal of Marketing Education*, 27(2), 109-121.

White, C. & S. McCormack (2006). The message in the music: Popular culture and teaching in social studies. *Social Studies*, 97(3), 122-127.