The Economic Impact of Music in Seattle and King County

A report for the Mayor's Office of Film + Music

Prepared by: William B. Beyers
Christopher Fowler
Derik Andreoli

Department of Geography, University of Washington

November 2008

Executive Summary

The music industry in Seattle directly creates 11,155 jobs, with $1.2 billion in sales and $487 million in earnings. When the indirect and induced impacts of the industry are considered, the number of jobs supported rises to 22,391, sales are $2.6 billion, and labor income is $972 million. Within the larger King County economy the music industry directly creates 20,193 jobs, with $2.2 billion in sales and $840 million in earnings. The total impact of the music industry on the King County economy is substantially larger, with 38,862 jobs supported, sales of $4.6 billion, and $1.6 billion in labor income. It is estimated that the industry in Seattle generates $90 million in state and local sales and business and occupation taxes. The industry in King County generates at least $148 million in tax revenues. The industry also contributes to the region's economic base, with sales in nonlocal (export) markets of at least 40%.

Researchers developed these figures through a careful analysis of employment statistics for Seattle and King County. The music industry involves a number of streams of spending and production. These include the direct labor of musicians, which is consumed in live venues, in recordings, on radio stations, and through a complex system of production and distribution. Some of this activity is focused on households, within the local area and elsewhere, while another portion is associated with applications as diverse as ringtones and recorded music played as background sound in business environments.

The music economy reaches across most categories of economic activity, including construction, manufacturing, wholesaling, retailing, consumer services, and the public sector. People work in this industry both as employees and as self-employed individuals. About 20% of the music industry workforce is self-employed. These conclusions are based on our analysis of public records on wage and salary employment, private databases identifying individual businesses located in Seattle and King County, and public records related to self-employment. The statistics presented here are likely conservative owing to the difficulty of identifying the universe of industries and occupations related to music.

The largest categories of employment in the music industry are in music and dance, education, broadcasting, software and custom computer services, and eating and drinking establishments. The Seattle region is the home of several globally important companies with a substantial music business, including Real Networks, Amazon.com, Microsoft, and Starbucks.

This study reports a similar level of direct employment in Seattle as found in a 2004 study of the music industry. Total economic impacts as measured by sales and labor income are larger in the current study than reported in the 2004 study. Sales increased by 17%, labor income was 72% higher, and earnings per worker were 75% higher than in the 2004 study. Employment impact estimates in the current study are slightly below those reported in the 2004 study, down 14%. By design, the current study is broadly comparable to the 2004 effort. Nevertheless, the current study utilizes a new model of the regional economy with updated multipliers that, by themselves, account for some of the differences between the studies. Furthermore, changes in the availability and accuracy of certain data sources permitted refinements not possible in the 2004 study.

Table of Contents

List of Tables

List of Figures

Acknowledgements

This study would not have been possible without the help of a number of people. James Keblas, Director of The Mayor's Office of Film and Music, was instrumental in the development of the study. He obtained the resources needed to undertake the project, and provided leadership in the music community that helped us learn about the industry's organization. His staff was also very helpful in the conduct of the study. An advisory committee helped us learn how the various streams in the industry were organized, and helped us develop measures of business activity for some critical businesses in the local industry. Ben Sawyer of Name Finders provided us with data on thousands of business establishments in the local music industry. Tim Norris of the Washington State Employment Security Department helped develop data files for covered employment in Seattle and King County that were crucial to this study.

I. Introduction

This report presents estimates of the economic impact of the music industry on the Seattle economy. It is the second attempt to measure these impacts, with a first report completed four years ago (Beyers, Bonds, Wenzl and Sommers, 2004). The current report is organized as follows. We first present a definition of the components of the industry. We then outline a market structure for these components. The second section of this report reviews briefly other studies of the music industry, while the third section provides a description of the data sources used to try to quantify the economic impact of the industry on the Seattle area economy. The fourth section provides economic impact estimates, while the last section provides some concluding remarks.

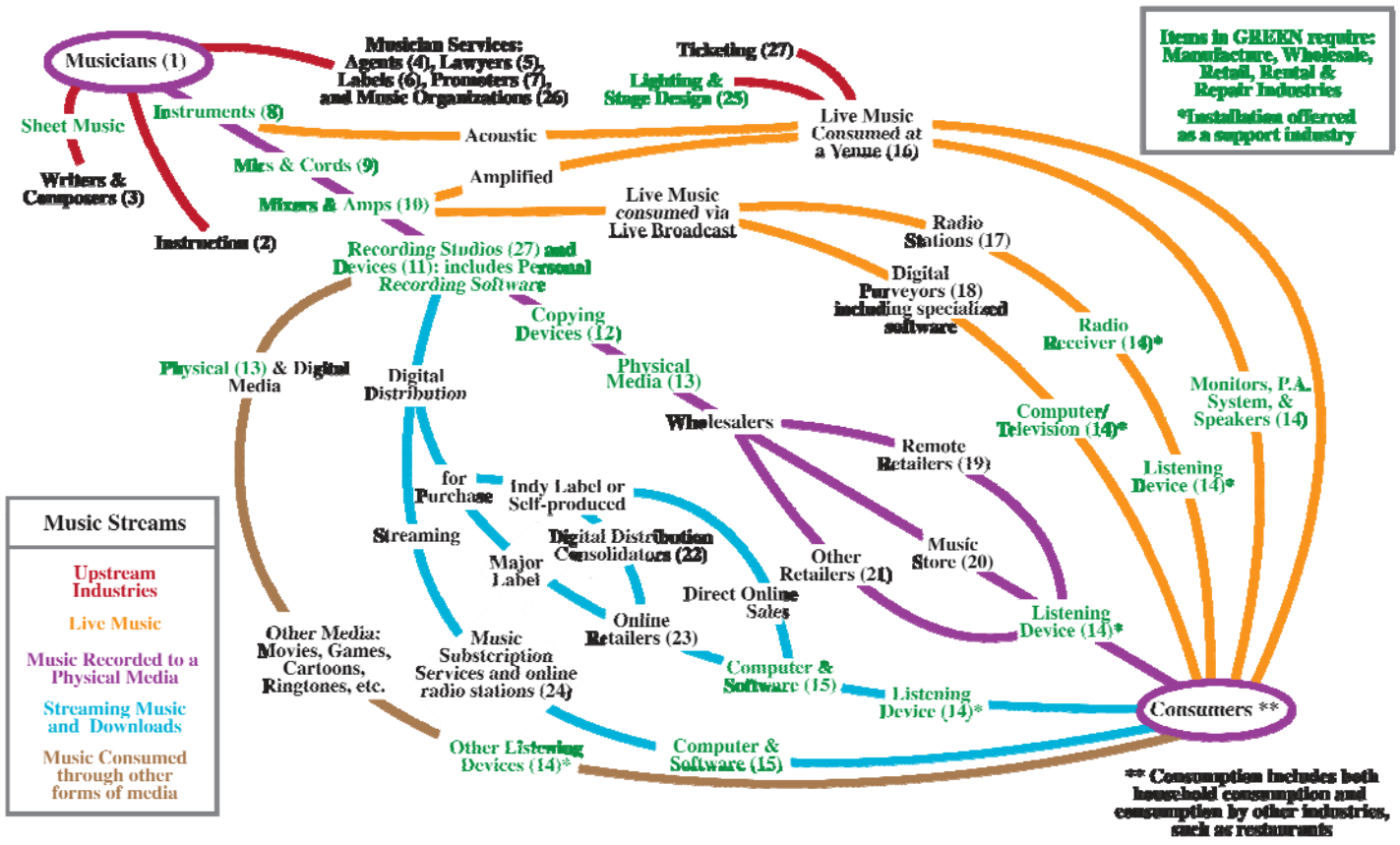
Defining the Music Industry

The music industry has many components, some of which are clearly identifiable as music (such as the Seattle Symphony Orchestra), and others where the connection is less obvious (such as an electrical contractor specializing in setting up sound systems for musical performances). Complicating this even further are individuals and businesses that contribute to the music industry as a secondary or tertiary component of their economic activity (musicians who work a full day in another field before heading out to their gig or a concessions firm that sells admissions tickets for sporting and music events). Defining the industry is, of course, a necessary prerequisite to this analysis.

Figure 1 is an attempt to capture all of the industries involved with music production, distribution, and consumption. This is not a typical interpretation of an industry in that the lines do not represent formal (or even informal) transactions. Instead, they represent actual streams of music as well as the upstream industries which support its composition, production, and distribution. These streams are as numerous as there are ways in which music is consumed – from listening to an iPod while running, to listening to music on a car stereo while driving. These flows include listening to ambiance music while dining out, to listening to your favorite band play live (at the venue music will come through the P.A. system, but if you listen to a live broadcast it may be pumped through radio waves or television cables, etc.). Other streams include muzak and movie scores. There are too many streams to list, but each should be captured in the diagram which was used to flesh out important industries and firms for the purposes of this study.

Figure 1 classifies the music streams into five broad categories: (1) Upstream industries provide support for musicians and venues, supplying infrastructure, or feeding customers to venues. (2) The live performance stream starts with musicians playing either for live performances in venues or captured by sound systems and broadcast live by radio waves or digital streams. (3) Music recorded and then distributed through physical media (such as a CD). (4) Music recorded and distributed through digital media. Each of these streams is focused on consumers. (5) A fifth stream is visualized, in which recorded music is embedded in media such as ringtones for telephones, games, muzak,

Figure 1 Music Streams



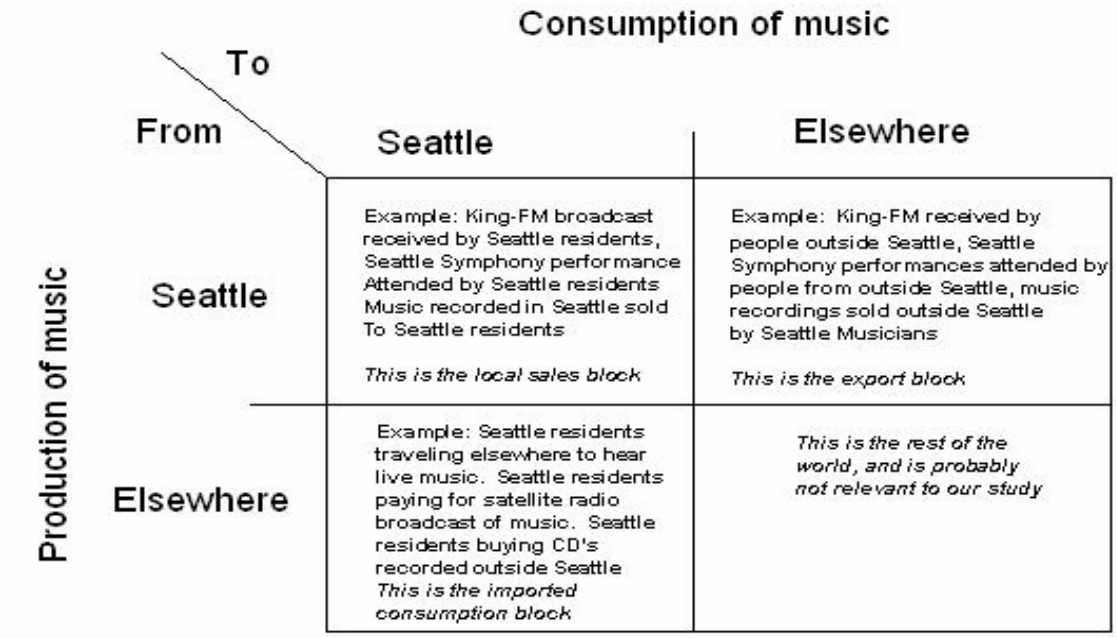
movies etc. This fifth stream may be consumed by households, but it is also a part of the business environment. Clearly there is manufacturing (production) involved to provide capacity to undertake many of the tasks captured in these streams; green type in Figure 1 identifies these components. A key to entity codes is located in Appendix II.

It is possible that the streams captured in Figure 1 fail to represent the entire universe of possible music streams, but we consider this diagram to be relatively comprehensive. Some of the categories in Figure 1 are easily defined industries, while others are parts of larger organizations in which music comprises only a portion of the economic activity. For example, instruction takes place both formally and informally, and within the formal line it would range from individual instructors to schools such as the University of Washington School of Music or Cornish College of the Arts. Neither individual music instructors or the UW School of Music are in a distinct industry category. Rather they – and much of the other economic activity captured in Figure 1 – are part of larger industry classifications. Thus, much of our efforts in preparing this analysis were spent attempting to define these larger categories, and isolating the components of these industries that are music related. This issue will be discussed in more detail in Section III of this report. It should be noted that this diagram was developed, in part, through the assistance of the Advisory Committee appointed to assist the research team.

While Figure 1 captures the breadth of the music industry, it does not identify the geography associated with the structural relationships it captures. Nevertheless, local economic impacts cannot be understood without a characterization of production and consumption as either located in Seattle or elsewhere. The streams identified in Figure 1 could be consumed by households or businesses in Seattle or elsewhere. They could be produced by businesses located in Seattle, or produced in other regions. The economic impact of the music industry in Seattle stems from the production of those categories of activity identified in Figure 1 that are located in Seattle whether they are consumed locally or elsewhere. Our task is capture the pieces of Figure 1 that are produced in Seattle – those which fall into the broad categories found in the first row of Figure 2 - and to develop measures of these components that can be used with a model that calculates economic impacts of these components of the music industry.

Patron spending related to attending Seattle music events is not included in this study. As will be discussed in Section II, some related studies of the music industry include patrons spending, while others exclude such spending. Typically, this spending is divided into local patron spending and tourist patron spending. We exclude such spending in this study because we did not have a statistical basis for estimating this spending except for non-profit arts and cultural organizations.

Figure 2 A Schema for Music Production and Consumption



II. Related Studies

This section provides a brief synopsis of other recent music industry impact studies conducted in Seattle and in other parts of the country. This overview serves two purposes. First, for the reader we include these summaries to give a sense of the alternative ways in which the music industry might be defined and measured. Second, this review provides assurance that the work present here is both 1) consistent with current best practices in this area of research, and 2) that the findings and sources are in line with the findings and sources of other researchers.

ArtsFund, King County, Washington (1993, 1999, and 2004)

ArtsFund has sponsored three sets of economic impacts of arts and cultural organizations in King County, Washington (Beyers & GMA Research 1993, 1999, and 2004). These studies focused only on non-profit arts and cultural organizations whose budgets were above a certain threshold ($26,000 in the 2004 study). Data on revenues and expenditures, as well as data on employment of full time, part time, intern, and contract employees were gathered from individual arts and cultural organizations. These studies included organizations classified as music, dance, visual arts, heritage, theatre, and arts service organizations. Detailed information on patron and organization spending is included in these studies. Economic impacts were calculated for the combined data of these arts and cultural organizations. Hence, the economic impact of the music and dance organizations was not isolated in these studies. The Washington State input-output model was used to calculate economic impacts.

City of Seattle, Washington (2004)

The 2004 City of Seattle study used secondary data developed from multiple sources to estimate the economic impact of the music industry (Beyers, Bonds, Wenzl, and Sommers 2004). The general approach was quite similar to the current study. An advisory committee helped define the activities considered to be related to the music industry. Industries and lines of work that somewhat parallel the streams captured in Figure 1 were included in this earlier study. They included musicians and composers, venues, performance and recoding support, recording activity, labels and royalties, replaying music, distributing music, equipment (industry members, households, and businesses), education & training, support organizations, and business services.

As with the present study, three sources were used to identify levels of business activity: a special tabulation from the Washington State Department of Employment Security, a file of establishment data purchased from a commercial marketing organization (Name Finders), and the 2000 U.S. Census 1% Public Use Microdata Sample (PUMS). The principle difference between these sources and those used in the present analysis is that the PUMS data from the decennial census has been replaced with the newly available data from the American Community Survey (ACS). The ACS data are equivalent to the PUMS in most ways although they rely on a smaller sample and provide more recent results. Again, consistent with the present study, these data were supplemented with data on several key firms whose industrial classification was outside the industry codes selected to be included in the data purchased from Name Finders and development by Employment Security (Real Networks and Amazon). In addition, data on categories such as church musicians and colleges and universities were developed through interviews and other data sources. The PUMS was an important source due to the level of self-employment in the music industry; work by scholars such as Markusen has underscored the importance of extending measures from covered employment to self-employed persons in lines of artistic activity (Markusen & Schrock, 2006).

An effort was made to "triangulate" the data developed from these various sources into a comprehensive estimate of employment. This estimate was then used with earnings data to estimate total labor income of those of workers employed in the music industry. These data were then used with data from input-output models to estimate total sales (revenue) of these businesses. The input-output model was then used to calculate the economic impact of the music industry, as measured by jobs, labor income, sales, and selected tax revenues. The study argued that it was very likely an underestimate of the economic impact of the industry, due to identification and measurement problems.

Unlike the ArtsFund studies, no attempt was made in the 2004 Seattle study to include the economic impacts associated with spending by patrons attending music events.

Austin, Texas (2001)

The Austin study relied on a Directory of the Texas Music Industry as the basis for defining music-related activity (Austin City Connection 2001). Some 96 music business categories are identified in this directory, grouped into the following broader

categories: education, industry services, music videos, media, musical instruments & equipment, recording services, record production, commercial music, tour services, and venues. The state directory provided an enumeration of businesses in each of these categories. Patron spending was also estimated for each of these organizations. The IMPLAN input-output modeling system was used to estimate economic impacts separately for industry output, and for music-related tourism. Local data from the Austin Convention and Visitors Bureau were used to determine the level of tourist activity.

The Austin study did not attempt to estimate the level of self-employment, and does not address some of the music streams identified in Figure 1. However, it is important to note that the Austin study was published in 2001, prior to the explosion of digital music distribution platforms that today are so important in the Seattle music scene.

Chicago, Illinois (2007)

The City of Chicago has a Music Commission that sponsored a study of music in Chicago (Rothfield, Coursey, Lee, Silver and Norris 2007). This is not an economic impact study, but rather is a multi-dimensional assessment of the volume of music activities in Chicago, compared to a sample of American Cities. It is in many ways a benchmarking study, based on a variety of sources, reported in a highly graphic manner. The study measures employment, establishments, payrolls, revenues, numbers of performances, the supply of seats, the availability and affordability of seats, the geography of club location, grassroots activity, recording sales, and the frequency of performances by highly regarded artists.

The economic measures divide the music industry into core and peripheral industries. The authors decided which industries were in these categories through study of NAICS industry descriptions. They measure activity largely through the use of U.S. County Business Patterns (CBP), a source that does not provide data on self-employed individuals. The report acknowledges that the use of CBP data lead to substantial undercounting of the number of people working in the music industry, and they discuss the difficulties associated with obtaining data on self-employed individuals from federal sources such as the Non-Employer statistics. It does provide evidence of activity by individual artists who are likely self-employed through measures such as MySpace.

Georgia (2002 and 2005)

Two studies of the economic impact of the music industry have been undertaken in Georgia (Edmiston and Thomas 2002; Ruston and Thomas, 2005). The second study does not provide much detail about exactly what was included in the study from an industry perspective. *ReferenceUSA* was used as the data source for the businesses included in this study. Using the sales and employment size ranges reported in *ReferenceUSA*, the authors estimated total sales, and then used an input-output model to derive estimates of total economic impact. It is not clear if, or how, self-employed individuals are handled in this study.

Americans for the Arts, National and Regional Analyses (No date)

This national advocacy organization has developed measures of economic impact at the regional and national level. Their latest report, "Arts & Economic Prosperity III," reports on the economic impact of nonprofit arts and cultural organizations in a selected set of metropolitan regions (American for the Arts, no date). Seattle is one of the regions included in this report. Data were gathered from local organizations as a part of this study. The statistics presented for the Seattle area indicate a lower level of coverage of nonprofit arts and cultural organizations than found in the ArtsFund studies. This report does not identify music separate from other categories of nonprofit arts and cultural activity. Americans for the Arts have developed an "Arts & Economic Prosperity III Calculator," that develops for any case study community a version of the benchmark 2002 U.S. input-output model that can be used for impact analysis. Data from the survey results by regions for patrons and organizations are used to calibrate this model; the model is a relatively aggregate 33 sector model. This report includes 27 tables for each region, with data presented for regions of similar size. The Seattle region is in population group E (population range of 500,000 to 999,999 persons) meaning that the benchmark region is the City of Seattle, as opposed to King County used in the ArtsFund studies. In all, this study estimates 4,293 jobs associated with non-profit arts and cultural organizations, but does not allow us to separate out music and dance organizations from the total making it difficult to use in a comparative manner with the results presented here.

Nashville, Tennessee (2006)

The Nashville Area Chamber of Commerce sponsored a study of the economic impact of the music industry in the Nashville-Davidson-Murfreesboro Metropolitan Statistical Area (Raines and Brown 2006). This study calculates economic impacts through the use of multipliers derived from a Regional Economic Multipliers, Inc. (REMI) model. Data input to this model come from measures of work in music related industries in Nashville, as well as from estimates of music-related tourism. Data on tourist spending was gathered in surveys sponsored by the Nashville Convention and Visitors Bureau. Data on employment and earnings were derived from U.S. County Business Patterns and the U.S. Nonemployer statistics database. *ReferenceUSA* was also used to obtain financial data. The tables in this employment report indicate that County Business Patterns and the Nonemployer Series for 2002 were utilized, but there appear to be some inconsistencies in how the categories are reported that make these findings difficult to interpret

The Nashville study contains comparisons of its findings with several other studies, including the 2004 Seattle report. This study reports much higher economic impacts in Nashville than reported in the 2004 Seattle study. There is no doubt but that Nashville is a global center for music. However, this study differed from the 2004 Seattle study in several important respects. First, its geographic scope was much larger than the 2004 Seattle study, covering several counties while the Seattle study limited its analysis to a much smaller geographical area. Second, it includes tourist related impacts.

Summary

Many communities are documenting the economic significance of the music industry. None of these studies are directly comparable, but each finds significant levels of economic impact associated with the music industry. The methodology used in the current study is in the mainstream of these efforts, and it is evident that the 2004 Seattle study had a significant influence over the methodologies used in several of these other studies. In the current study we have extended our approach to measurement, which has produced more comprehensive measures of economic impacts. The ArtsFund and Americans for the Arts studies are focused only on non-profit organizations, while this study includes both non-profit and for-profit musical activity. The Nashville and Austin studies include music related tourist spending, while the current study does not include music related tourist spending. We excluded the economic impact of music-related tourist spending due to a lack of data except for non-profit organizations. Like the current study, the Nashville study includes self-employed music related workers, while the Austin study excludes the self-employed. The current study is an economic impact study of music related employment, while the Chicago study is a benchmarking effort that does not include estimates of the economic impact of the music industry.

We believe that the current study represents an improvement over the 2004 Seattle study, and that it more completely captures the breadth of the music industry than other music industry studies reviewed here. In addition to capturing the emerging digital music stream, this study includes a broad assortment of for-profit and non-profit industry segments. It also delves into the contribution of self-employed workers to the industry to a greater extent than found in previous studies. Furthermore, it develops estimates of consumption and market orientation for the local music industry not found in other music industry studies.

III. Database Development

The complexity of the music industry is clearly demonstrated in Figure 1. This complexity complicates the estimation of economic impacts because the music industry does not fit neatly into any of the existing categories of economic activity. Many of the categories contained in this diagram are part of larger industries, while others are found in industries which are clearly music related. For example, some unknown portion of the industry listed as 'truck transport of used household goods' (NAICS 484210) is engaged in moving musical equipment such as pianos. By contrast, all of NAICS code 339992 (musical instrument manufacturing) is part of the music industry. The twin challenges in this project were uncovering where music related industries are classified in the NAICS system and determining the magnitude of the music component. To achieve this goal we leaned on insights from the Music Advisory Committee and employed a multi-dimensional strategy which utilized multiple data sources.

In this section, we identify our data sources, describe the nature of the information developed from these sources, and provide an overview of the data gathering process which is best described as evolutionary. The first step – which was guided by the music streams identified in Figure 1 – involved selecting from the full list of industries at the 6-

digit NAICS code level all industries which could potentially be related to the music industry. In order to ensure a high capture rate, this step was undertaken simultaneously and independently by multiple researchers. Aided by data reported in the 2004 study (which utilized SIC codes rather than NAICS codes), a database of over 14,000 establishments was purchased from Name Finders. This database included very detailed (8-digit SIC codes) industry descriptions as well as a conversion table which translated the 8-digit SIC codes to the 6-digit NAICS counterpart. Each of the 14,000 plus entries was then coded as 'In', 'Out', or 'Questionable'. See Table 1 for an example. After removing all the 'Out' establishments, and using the firm name to make a decision on any 'Questionable' establishments (in cases where the name did not suggest music industry, the establishment was excluded), we created a new list of music industry participants at the 6-digit NAICS code level.

Armed with a refined list of NAICS industries to include in the study, a request was made of the Washington State Employment Security Department (ESD) to provide a database of establishments and associated wages. These data are based on the quarterly wage reports required of every covered business in Washington State for the purposes of calculating their unemployment tax liability. It is considered to be the most accurate data available for wage and salary employment data. The benefits associated with the comprehensiveness of this data source are somewhat offset by the fact that it includes no information for self-employed individuals.

In order to capture the self-employed segment of the music industry, a similar 'double-blind' procedure was used to identify music related occupations listed in the American Community Survey (ACS). This selection was utilized in two critical ways. First, it allowed the identification of a few additional music related industries which were not picked up in the preceding steps. Second, this selection was later used to estimate the number of self-employed music workers.

A second business list was then purchased from Name Finders (using the updated NAICS codes). The ESD data was then checked for accuracy by comparing it to both the Name Finders list as well as publicly available data published by the U.S. Census Bureau in the County Business Patterns database. A final accuracy check was made against *ReferenceUSA*, an online database that provides information on businesses in detailed NAICS codes and specific geographic regions (such as the City of Seattle or King County.

Finally, in addition to these purchased lists, there were a number of firms which we identified as playing a significant role in the music industry that secondary data would not permit an accurate account of. In these cases, informants in the industry and in other local organizations provided confidential information with the understanding that the information be aggregated up. We feel that these multiple sources have combined to provide us with a comprehensive assessment of music related activity in Seattle and King County.

This was an evolutionary process, in which we discovered where certain music-related categories of employment were classified by government statistical agencies and then revisited and refined our list of industries. For example, piano-tuners are classified in NAICS 811490, Other Personal and Household Goods Repair and Maintenance—not a NAICS code that would ordinarily be thought of as music-related. Having defined a complete list of NAICS codes that included at least some music-related firms, we next set out to define these codes for either partial or total inclusion in our analysis. (see discussion of ACS analysis in Appendix I below for additional description of the process used to identify relevant NAICS codes).

Table 1 Example of SIC Codes Categorized as 1 In, 2 Out, 3 Questionable

SIC	Business Description	Category
7922-0106	Talent agent, theatrical	3
7922-0200	Theatrical production services	3
7922-0201	Ballet production	1
7922-0202	Community theater production	3
7922-0203	Performing arts center production	3
7922-0300	Theatrical companies	3
7922-0301	Amateur theatrical company	3
7922-0302	Burlesque company	1
7922-0303	Opera company	1
7922-0304	Plays, road and stock companies	2
7922-0305	Repertory, road or stock companies: theatrical	2
7922-0306	Summer theater	3
7922-0400	Theatrical producers	3
7922-0401	Legitimate live theater producers	3
7922-0402	Radio producers	3
7922-0403	Television program, including commercial producers	3
7922-0500	Theatrical rental services	3
7922-0501	Equipment rental, theatrical	3
7922-0502	Scenery rental, theatrical	3
7922-0600	Costume and scenery design services	3
7922-0601	Costume design, theatrical	2
7922-0602	Scenery design, theatrical	2
7922-9901	Beauty contest production	2
7922-9902	Concert management service	1
7922-9903	Lighting, theatrical	3
7922-9904	Ticket agency, theatrical	1

The data in Table 2 are broken into two parts: NAICS codes that were entirely included in the study and NAICS codes where only some of the establishments were included. The set of establishments in the NAICS categories from 334612 through 722410 were considered to be entirely within the music industry and are identified as such in the table below. For the NAICS codes defined as 'Questionable' ESD provided a list of some 14,000 establishment purpose codes - brief, self-reported definitions of activities in which each establishment is engaged. These codes had no wage data or firm names associated with them, but they allowed us to identify firms that were clearly music-related within these NAICS codes. Table 3 contains a sample of the establishment

purpose code data to demonstrate the process by which businesses were included or excluded within these less certain NAICS codes. ESD then took our list of establishments to include and aggregated their wage data, reporting figures within NAICS codes where doing so would not compromise establishment privacy and giving us figures across all of these NAICS codes where privacy became an issue (identified with an * in the table below). Where detailed data were not available for privacy reasons we turned to alternative sources for employment estimates, specifically data from the Name Finders file, Reference USA, and U.S. County Business Patterns. It is very likely that we missed establishments with music related business, and there are probably other NAICS codes with music related employment, but this is the most detailed information available at present.

Table 2 Employment Security Department Employment Estimates

			Employment		
	The Music Industry	**Firms**	**Oct-07**	**Nov-07**	**Dec-07**
	City of Seattle	**457**	**5,308**	**5,496**	**5,424**
	King County	**734**	**8,326**	**8,423**	**8,512**
NAICS	**Seattle Total Inclusion Industry Description**	**Firms**	**Oct-07**	**Emp Nov-07**	**Dec-07**
	Seattle Total for this set of NAICS	**336**	**3,688**	**3,900**	**3,924**
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	*	*	*	*
339992	Musical Instrument Manufacturing	*	*	*	*
451140	Musical Instrument and Supplies Stores	31	204	206	208
451220	Prerecorded Tape, Compact Disc, and Record Stores	29	165	170	173
512230	Music Publishers	*	*	*	*
512240	Sound Recording Studios	21	89	89	76
512290	Other Sound Recording Industries	*	*	*	*
515112	Radio Stations	17	682	743	664
711120	Dance Companies	7	304	432	573
711130	Musical Groups and Artists	52	396	402	385
722410	Drinking Places (Alcoholic Beverages)	171	1,769	1,778	1,764
			79	80	81
NAICS	**Seattle Partial Inclusion Industry Description**	**Firms**	**Oct-07**	**Emp Nov-07**	**Dec-07**
	Seattle Total for this set of NAICS	**121**	**1,620**	**1,596**	**1,500**
238210	Electrical Contractors and Other Wiring Installation Contractors	*	*	*	*
334112	Computer Storage Device Mfg.	*	*	*	*
423620	Electrical and Electronic Appliance, Television and Radio Set Wholesalers	3	10	12	11

Table 2, continued		Firms	Emp. Oct.-07	Emp. Nov.-07	Emp. Dec-07
423690	Other Electronic Parts and Equipment Merchant Wholesalers	*	*	*	*
423990	Other Miscellaneous Durable Goods Merchant Wholesalers	10	43	47	48
441310	Automotive Parts and Accessories Stores	*	*	*	*
443112	Radio, Television, and Other Electronics Stores	6	41	41	42
453310	Used Merchandise Stores	*	*	*	*
454111	Electronic Shopping	*	*	*	*
454113	Mail Order Houses	*	*	*	*
511210	Software Publishers	*	*	*	*
515210	Cable and Other Subscription Programming	*	*	*	*
517210	Wired Telecommunications Carriers (except satellite)	*	*	*	*
519120	Libraries and Archives	*	*	*	*
531120	Lessors of Nonresidential Buildings (except miniwarehouses)	*	*	*	*
532299	All Other Consumer Goods Rental	*	*	*	*
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	9	154	108	103
541840	Media Representatives	3	46	46	45
561990	All Other Support Services	*	*	*	*
611310	Colleges, Universities and Professional Schools	*	*	*	*
611610	Fine Arts Schools	25	153	184	150
711110	Theater Companies and Dinner Theatres	*	*	*	*
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities	4	170	163	116
711320	Promoters of Performing Arts, Sports, and Similar Events without Facilities	*	*	*	*
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	*	*	*	*
711510	Independent Artists, Writers, and Performers	9	26	22	22
713990	All Other Amusement and Recreation Industries	*	*	*	*
811211	Consumer Electronics Repair and Maintenance	*	*	*	*

Table 2, Continued		Firms	Emp. Oct-07	Emp. Nov-07	Emp. Dec-07
811490	Other Personal and Household Goods Repair and Maintenance	*	*	*	*

NAICS	The Music Industry in King County Industry Description	Firms	Oct-07	Emp Nov-07	Dec-07
	King Total for this set of NAICS	**490**	**5,307**	**5,442**	**5,560**
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	6	41	42	43
339992	Musical Instrument Manufacturing	*	*	*	*
451140	Musical Instrument and Supplies Stores	50	386	389	419
451220	Prerecorded Tape, Compact Disc, and Record Stores	35	268	277	286
512230	Music Publishers	*	*	*	*
512240	Sound Recording Studios	27	101	104	95
512290	Other Sound Recording Industries	*	*	*	*
515112	Radio Stations	22	794	853	780
711120	Dance Companies	10	320	450	587
711130	Musical Groups and Artists	67	486	431	467
722410	Drinking Places (Alcoholic Beverages)	262	2,809	2,795	2,783

NAICS	King County – Partial Inclusion Industry Description	Firms	Oct-07	Emp Nov-07	Dec-07
	King Total for this set of NAICS	**244**	**3,019**	**2,981**	**2,952**
238210	Electrical Contractors and Other Wiring Installation Contractors	16	131	128	129
334112	Computer Storage Device Mfg.	*	*	*	*
334220	Radio and Television Broadcasting and Wireless Communications Equipment Mfg.	*	*	*	*
334310	Audio and Video Equipment Mfg.	5	264	262	256
423620	Electrical and Electronic Appliance, Television and Radio Set Wholesalers	9	147	146	145
423690	Other Electronic Parts and Equipment Merchant Wholesalers	5	25	22	21
423990	Other Miscellaneous Durable Goods Merchant Wholesalers	17	55	58	60
441310	Automotive Parts and Accessories	8	38	35	36
443112	Radio, Television, and Other Electronics Stores	12	66	65	64
453310	Used Merchandise Stores	*	*	*	*
454111	Electronic Shopping	*	*	*	*

Table 2, continued		Firms	Emp. Oct-07	Emp. Nov-07	Emp. Dec-07
454113	Mail Order Houses	*	*	*	*
484210	Used Household and Office Goods Moving	*	*	*	*
511210	Software Publishers	*	*	*	*
512110	Motion Picture and Video Production	*	*	*	*
512120	Motion Picture and Video Distribution	*	*	*	*
515210	Cable and Other Subscription Programming	*	*	*	*
517210	Wired Telecommunications Carriers (Except Satellite)	*	*	*	*
518210	Data Processing, Hosting, and Related Services	*	*	*	*
519120	Libraries and Archives	*	*	*	*
531120	Lessors of Nonresidential Buildings (except miniwarehouses)	*	*	*	*
532299	All Other Consumer Goods Rental	*	*	*	*
532490	Other Commercial and Industrial Machinery and Equipment Rental and Leasing	9	154	108	103
541690	Other Scientific and Technical Consulting Services	*	*	*	*
541840	Media Representatives	5	74	74	74
561599	All Other Travel Arrangement and Reservation Services	*	*	*	*
561990	All Other Support Services	*	*	*	*
611310	Colleges, Universities and Professional Schools	*	*	*	*
611610	Fine Arts Schools	75	572	601	572
711110	Theater Companies and Dinner Theatres	*	*	*	*
711190	Other Performing Arts Companies	*	*	*	*
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities	5	174	168	121
711320	Promoters of Performing Arts, Sports, and Similar Events without Facilities	10	106	95	133
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	*	*	*	*
711510	Independent Artists, Writers, and Performers	10	26	22	22
713990	All Other Amusement and Recreation Industries	6	41	40	36

Table 2 Continued		Firms	Emp. Oct-07	Emp. Nov-07	Emp. Dec-07
811211	Consumer Electronics Repair and Maintenance	4	33	27	29
811490	Other Personal and Household Goods Repair and Maintenance	*	*	*	*

Notes:
Source: data extracted from 4th quarter 2007 EQUI data.

Table 3 Examples of ESD "Purpose Codes" for selected NAICS Codes Considered In the Music Industry

NAICS	Description
238211	RTL AUDIO VIDEO ELECTRONIC
238211	PROVIDE AUDIO/VIDEO/DATA SYSTE
238211	HOME ELECTRONICS DESIGN/SELL
238211	AUDIO VIDEO CUSTOM INSTALLATIO
238211	AUDIO/VIDEO, HOME AUTOMATION I
238211	INSTALL AUDIO/VIDEO EQUIPMENT
238211	WHSLE, RTL, MFG, SVC, AUDIO, V
238211	AUDIO & VISUAL ENGINEER
238211	AUDIO VIDEO INSTALLATION
238212	SOUND SVC FOR LIVE PERFORMANCE
238212	COMMERCIAL AUDIO/VIDEO CONTRAC
238212	INSTALL SOUND SYSTEM
238212	AUDIO VIDEO SYSTEM CONTRACTOR
238212	DELIVERY AND INSTALL MUSIC PER
238212	SOUND SYSTEM INSTALLATION
238212	LIGHTING DESIGN FOR STAGE PROD
334112	MFR/COPY DVD AND CD ROMS
334220	AUDIO PRODUCTS TO BROADCAST
334310	ENGINEERING DESIGN OF RF AMPLI
334310	MFG/MUSIC MIXER BOARDS
334310	WHSL/MFG DIGITAL AUDIO EQUIP
334310	MANUFACT/WHSLE AMPLIFIER/SPKR
334310	MFG AMPLIFIERS/ELECTRONICS PRO
423620	WHLSLE AUDIO VIDEO EQUIP
423620	WHSL TV AND AUDIO
423620	SALES OF CONSUMER ELECTRONICS
423620	MFG REP STEREO EQUIP
423620	WHSL AUDIO EQUIPMENT
423620	COMMERCIAL MUSIC PROVIDER SOUN
423620	SALES & SERVECE OF SOUND &
423620	TV/VCRS/STEROS /WHSLE/SVC
423620	MFG/SELL IN WALL/CEILING SPEAK

The Employment Security Department data do not cover all categories of employment included in this study. We also have included an estimate of church musicians, University of Washington School of Music employees, Seattle School District

music teachers, and employment in non-profit arts and cultural organizations. We assumed that the administrative employees of the non-profit arts and cultural organizations were covered by Employment Security, while their part-time artistic, professional, and technical (APT) employees, and contract employees, were assumed to not be covered by the Employment Security Department. Data from the ArtsFund/PSRC Economic Impact Study were used to estimate direct purchases by arts and cultural organizations, as well as headcounts and hours worked by artistic/professional/technical and contract employees (Beyers 2007). These headcounts were converted to full time equivalent (FTE) employees in the calculation of economic impacts. In the case of the City of Seattle economic impacts it was estimated that there were 2,277 APT employees, and 3,506 contract workers. The FTE numbers were 301 for APT and 58 for contract workers, based on data on hours worked that were reported in the ArtsFund data base. We also were provided data on employment in several firms in relation to their music-related employment. This included Amazon.com, Real Networks, Starbucks, and Microsoft; these establishments were not included in the ESD data.

American Community Survey: Self-Employed Individuals

Finally, none of the aforementioned data sources includes individuals who are self-employed and therefore not required to register with a business license (the method of identification used by Name Finders) or to pay employment taxes (the method used by ESD). The best available data on these individuals comes from the Census Bureau and its annual American Community Survey (ACS). Appendix I describes the approach taken to develop estimates of self-employed persons from the ACS. This database represents a 1% sample of the U.S. population with detailed weights based on the decennial census that allow us to expand this sample to convey the total population of self-employed individuals in the music industry. We know from conversations with the Music Advisory Committee and other sources that much employment in the music industry is self-employment, and it was absolutely essential that we had a good basis for estimating activity of this type. Table 4 below shows our estimate of self-employment by industry. It is approximately 20% of employment in the music industry, based on the measure in Table 4.

As with the data from Name Finders and ESD this data suffers from uncertainty in cases where individuals are employed in occupations or industries where some significant portions could be music related. Since there was no equivalent of the establishment level data offered by Name Finders and ESD we used the employment figures provided by Name Finders to estimate of the proportion of employment in each NAICS code that was music-related. These proportions were then applied to the ACS results to estimate self-employment in these partial NAICS codes. Although there is uncertainty in these estimates, they are almost certainly conservative.

Table 4 Seattle and King County Music Labor Force

Washington I/O Sector	Seattle Employer	Seattle Self Employed	Seattle Total	King Employer	King Self Employed	King Total
1. Crop Production	0	0	0	0		0
2. Animal Production	0	0	0	0		0
3. Forestry and Logging	0	0	0	0		0
4. Fishing, Hunting, and Trapping	0	0	0	0		0
5. Mining	0	0	0	0		0
6. Electric Utilities	0	0	0	0		0
7. Gas Utilities	0	0	0	0		0
8. Other Utilities	0	0	0	0		0
9. Construction	91	300	391	132	706	838
10. Food, Beverage and Tobacco Manufacturing	0	0	0	0		0
11. Textiles and Apparel Mills	0	0	0	0		0
12. Wood Product Manufacturing	0	0	0	0		0
13. Paper Manufacturing	0	0	0	0		0
14. Printing and Related Activities	0	0	0	0		0
15. Petroleum and Coal Products Manufacturing	0	0	0	0		0
16. Chemical Manufacturing	0	0	0	0		0
17. Nonmetallic Mineral Products Manufacturing	0	0	0	0		0
18. Primary Metal Manufacturing	0	0	0	0		0
19. Fabricated Metals Manufacturing	0	0	0	0		0
20. Machinery Manufacturing	11	14	25	11	14	25
21. Computer and Electronic Product Manufacturing	297	0	297	948		948
22. Electrical Equipment Manufacturing	0	0	0	0		0
23. Aircraft and Parts Manufacturing	0	0	0	0		0
24. Ship and Boat Building	0	0	0	0		0
25. Other Transportation Equipment Manufacturing	0	0	0	0		0
26. Furniture Product Manufacturing	0	0	0	0		0
27. Other Manufacturing	34	30	64	94	79	173
28. Wholesale	82	13	95	225	62	287
29. Retail	1163	135	1298	2242	303	2545
30. Air Transportation	0	0	0	0		0
31. Water Transportation	0	0	0	0		0
32. Truck Transportation	24	18	42	40	38	78

Table 4, continued						
33. Other Transportation/Postal Offices	0	0	0	0		0
34. Support Activities for Storage, Transportation and Warehousing	0	0	0	0		0
35. Software Publishers & Internet Service Providers	126	0	126	651		651
36. Telecommunications	0	0	0	0		0
37. Other Information	1848	0	1848	2303		2303
38. Credit Intermediation and Related Activities	0	0	0	0		0
39. Other Finance and Insurance	0	0	0	0		0
40. Real Estate and Rental and Leasing	92	12	104	210	32	242
41. Legal /Accounting and Bookkeeping /Management Services	62	20	82	121	134	255
42. Architectural, Engineering, and Computing Services	142	8	150	118	32	150
43. Educational Services	550	873	1423	950	2067	3017
44. Ambulatory Health Care Services	0	0	0	0		0
45. Hospitals	0	0	0	0		0
46. Nursing and Residential Care Facilities, Social Assistance	0	0	0	0		0
47. Arts, Recreation, and Accommodation	2443	799	3242	2786	2445	5231
48. Food Services and Drinking Places	1790	0	1790	2815	139	2954
49. Administrative/Employment Support Services	96	13	109	221	49	270
50. Waste Management/Other, and Agriculture Services	51	18	69	79	147	226
Total Employment	8902	2253	11155	13946	6247	20193

A final note on the employment and wage data discussed above. It is clear that many people have secondary occupations, and that many people who spend part of their day engaged in music industry work are predominately employed in some other part of the economy. Markusen has observed that a significant portion of arts employment is missed in estimations of economic impact simply because major statistical sources do not request data on secondary or tertiary sources of employment. Obviously we could not measure these secondary occupations in this study, and thus this portion of the music industry must go unreported here and remain a topic for future research.

Consumption and Other Market Estimates for the Seattle Music Industry

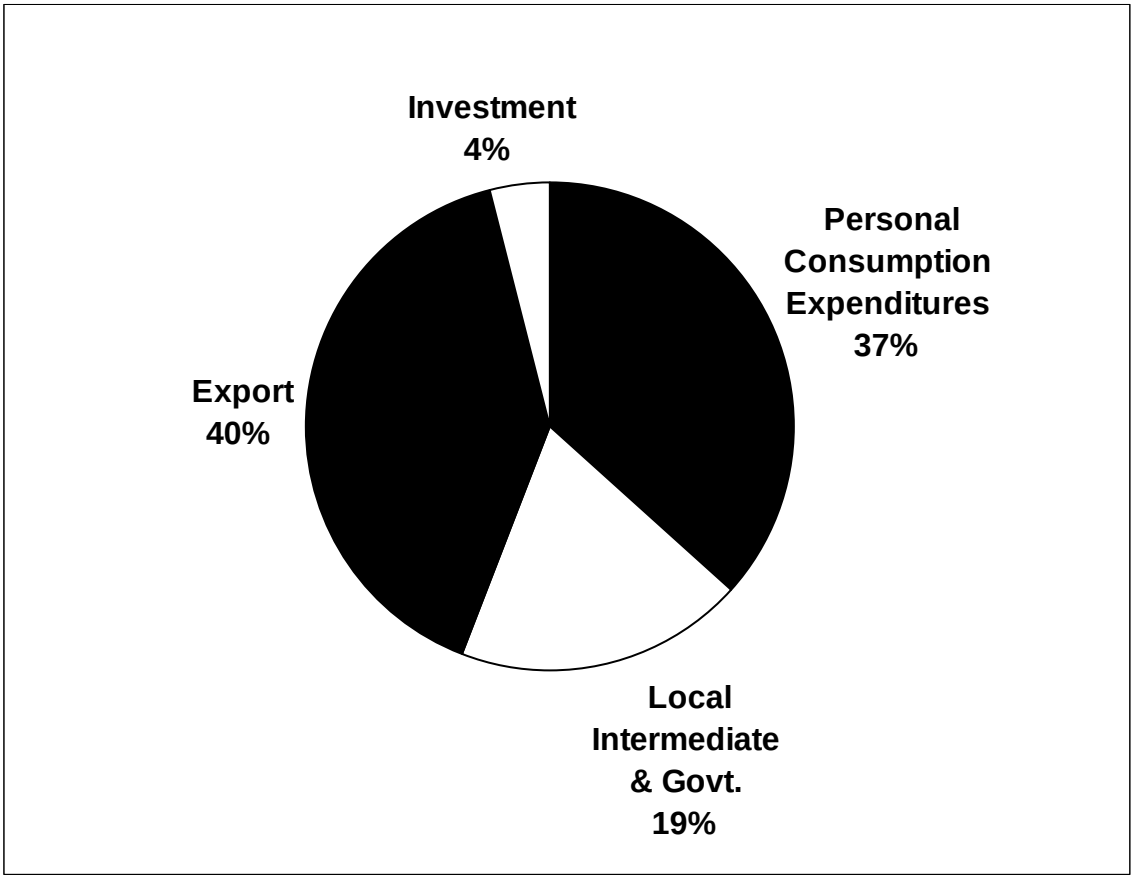
The markets of music industry businesses are divided between local households, local industries purchasing music industry goods and services on intermediate account, sales on investment account, and sales in export markets. Figure 2 sketched out a general schema for these transactional relationships. Table 5 below provides estimates of sales by music industry businesses in Seattle. Using judgment about industrial markets of the individual industries included in Table 4 and the output values reported in Tables 6 and 9, an estimate was made of markets. While we do not have data on industrial markets from survey data for the detailed NAICS codes included in this study, we can estimate likely distributions of these markets for individual industries. For example, the services of local church musicians are probably wholly rendered on behalf of local households (consumers). In contrast, local construction services related to sound systems are not exported, but sold to local households or as local investment. An allocation of the markets of each of the sectors in Table 4 yields a distribution of markets as reported in Table 5 for Seattle and King County, and as in Figure 3 for Seattle.

Table 5 Estimated Markets of Seattle and King County Music Businesses ($ millions)

	Local Consumption	Local Intermediate	Exports	Investment	Total
Seattle	$449.2	$232.4	$492.2	$48.1	$1201.7
King County	$802.2	$325.4	$968.7	$103.3	$2199.6
% Seattle	37.4%	19.3%	41.0%	4.0%	100.0%
% King	36.5%	14.8%	44.0%	4.7%	100.0%

Table 5 reports personal consumption expenditures to be 37% of the sales of the Seattle sectors included in this study. This represents 1.8% of estimated Seattle personal consumption expenditures. An analysis of U.S. personal consumption expenditure data suggests that approximately 3% are related to the music-industry categories included in this study. The categories in the most detailed personal consumption expenditure account reports are not as detailed as the NAICS definitions used in this study, making exact comparisons of national spending and local spending impossible. However, the magnitude of local spending versus national spending is reasonable, as much music-related spending by local residents comes in the form of imports from other parts of the United States or abroad. For example, most CD's sold in local record stores are manufactured elsewhere, and people in Seattle travel to other parts of the U.S. to consume live music performances.

Figure 3 Estimated Markets for the Seattle Music Industry



The share of sales on export account should be interpreted as sales to the rest of the United States, or to foreign countries, as opposed to exports to regions elsewhere in the Washington economy. Manufacturers of music industry equipment and retailers such as Amazon.com are selling large volumes of their output outside the Seattle, King County, and Washington economies. The music industry does play an important role in the economic base of the Seattle economy, bringing revenue into the local area like industries such as aerospace or software. Approximately 19% of sales of the Seattle industry are made locally to businesses and governments. Examples of these sales would be consulting services to people in the music industry or sales by local wholesalers to local retailers. A small fraction of the output of the local music industry is related to capital investment; this is largely the output of the construction sector, but also includes some output by manufacturers. King County shows a larger share of exports than Seattle due to the presence of several categories of employment outside Seattle that have relatively high export propensities.

To the best of our knowledge, these are the first estimates of the industrial and geographic markets of the Seattle music industry. They should be regarded as tentative. Survey data would be required to develop improved estimates of local consumption versus external markets. Data were not developed for King County music industry markets, but they are likely to have a similar distribution of sales. It should be noted that the distribution of markets reported in Figure 3 is similar to that for the overall

Washington economy, with a somewhat higher share of local personal consumption expenditures, and a lower share of intermediate sales. Given the consumer-oriented nature of the music industry, this is an expected structural orientation.

IV. Estimates of Economic Impact

Economic Impact Model

The economic impact estimates were made using an adjusted version of the 2002 Washington State input-output model (Beyers & Lin 2008). The state direct requirements matrix was adjusted through the location quotient method, to create a direct requirements matrix benchmarked against King County, which was then used to calculate multipliers for King County. Appendix III contains a technical appendix describing the input-output model.

Employment was used as the basis for calculating economic impacts. The input-output model contains ratios of employment to output for each sector. These ratios are based on the year 2002. Deflators were applied to these ratios to convert the measures to employment per million dollars of output in $2008. These ratios were used to calculate sales by sector related to their local level of employment. Earnings per worker in some self-employed sectors were lower than wage and salary earnings (with an allowance for benefits considered in the use of the input-output ratios); in these sectors the estimate of sales was reduced to not over-estimate economic impacts. Direct requirements coefficients were used for each industry in Table 4, to calculate direct purchases in each sector.

Seattle Economic Impacts

Table 6 contains estimates of final demands, direct employment, labor income, and other value added estimated as a result of the computations described above for Seattle, while Table 7 contains the aggregate Seattle direct requirements purchases across all sectors. The data in Table 7 are the aggregate estimates of direct purchases made in the local economy made in support of the levels of sales reported in Table 6.

Table 6 Seattle Final Demand, Direct Employment, Labor Income, and Other Value Added

	Final Demand (mils. $2008)	Direct Employment	Labor Income Mils. $2008	Other Value Added Mils$2008
1. Crop Production	$0.000	0	$0.000	$0.000
2. Animal Production	0.000	0	0.000	0.000
3. Forestry and Logging	0.000	0	0.000	0.000
4. Fishing, Hunting, and Trapping	0.000	0	0.000	0.000
5. Mining	0.000	0	0.000	0.000
6. Electric Utilities	0.000	0	0.000	0.000
7. Gas Utilities	0.000	0	0.000	0.000
8. Other Utilities	0.000	0	0.000	0.000

Table 6 continued

9. Construction	54.724	391	17.803	0.542
10. Food, Beverage and Tobacco Manufacturing	0.000	0	0.000	0.000
11. Textiles and Apparel Mills	0.000	0	0.000	0.000
12. Wood Product Manufacturing	0.000	0	0.000	0.000
13. Paper Manufacturing	0.000	0	0.000	0.000
14. Printing and Related Activities	0.000	0	0.000	0.000
15. Petroleum and Coal Products Manufacturing	0.000	0	0.000	0.000
16. Chemical Manufacturing	0.000	0	0.000	0.000
17. Nonmetallic Mineral Products Manufacturing	0.000	0	0.000	0.000
18. Primary Metal Manufacturing	0.000	0	0.000	0.000
19. Fabricated Metals Manufacturing	0.000	0	0.000	0.000
20. Machinery Manufacturing	4.636	25	1.509	0.168
21. Computer and Electronic Product Manufacturing	59.357	297	17.985	-6.374
22. Electrical Equipment Manufacturing	0.000	0	0.000	0.000
23. Aircraft and Parts Manufacturing	0.000	0	0.000	0.000
24. Ship and Boat Building	0.000	0	0.000	0.000
25. Other Transportation Equipment Mfg.	0.000	0	0.000	0.000
26. Furniture Product Manufacturing	0.000	0	0.000	0.000
27. Other Manufacturing	10.996	64	3.314	1.149
28. Wholesale	19.463	95	6.628	6.013
29. Retail	111.458	1298	41.045	25.440
30. Air Transportation	0.000	0	0.000	0.000
31. Water Transportation	0.000	0	0.000	0.000
32. Truck Transportation	5.232	42	2.163	0.896
33. Other Transportation/Postal Offices	0.000	0	0.000	0.000
34. Support Activities for Storage, Transportation and Warehousing	0.000	0	0.000	0.000
35. Software Publishers & Internet Service Providers	43.874	126	15.038	9.248
36. Telecommunications	0.000	0	0.000	0.000
37. Other Information	492.606	1848	143.428	89.863
38. Credit Intermediation and Related Activities	0.000	0	0.000	0.000
39. Other Finance and Insurance	0.000	0	0.000	0.000
40. Real Estate and Rental and Leasing	14.607	104	3.046	8.177
41. Legal /Accounting and Bookkeeping /Management Services	6.908	82	4.483	0.647
42. Architectural, Engineering, and Computing Services	14.637	150	9.720	2.000
43. Educational Services	104.777	1423	39.029	3.432
44. Ambulatory Health Care Services	0.000	0	0.000	0.000
45. Hospitals	0.000	0	0.000	0.000
46. Nursing and Residential Care Facilities, Social Assistance	0.000	0	0.000	0.000
47. Arts, Recreation, and Accommodation	148.574	3242	141.665	35.673
48. Food Services and Drinking Places	98.705	1790	35.446	16.332

Table 6, continued				
49. Administrative/Employment Support Services	5.829	109	3.418	0.756
50. Waste Management/Other, and Agriculture Services	5.350	69	1.653	0.562
Total	$1201.734	11155	$487.374	$194.524

Table 7 Seattle Direct Requirements

	Purchases (mils. $2008)
1. Crop Production	$0.020
2. Animal Production	0.006
3. Forestry and Logging	0.003
4. Fishing, Hunting, and Trapping	1.015
5. Mining	0.041
6. Electric Utilities	10.488
7. Gas Utilities	3.302
8. Other Utilities	4.549
9. Construction	12.672
10. Food, Beverage and Tobacco Manufacturing	14.861
11. Textiles and Apparel Mills	0.089
12. Wood Product Manufacturing	0.599
13. Paper Manufacturing	1.647
14. Printing and Related Activities	17.667
15. Petroleum and Coal Products Manufacturing	0.285
16. Chemical Manufacturing	0.909
17. Nonmetallic Mineral Products Manufacturing	1.845
18. Primary Metal Manufacturing	0.141
19. Fabricated Metals Manufacturing	1.331
20. Machinery Manufacturing	0.826
21. Computer and Electronic Product Manufacturing	1.822
22. Electrical Equipment Manufacturing	0.171
23. Aircraft and Parts Manufacturing	0.004
24. Ship and Boat Building	0.000
25. Other Transportation Equipment Manufacturing	0.109
26. Furniture Product Manufacturing	0.539
27. Other Manufacturing	0.479
28. Wholesale	16.290
29. Retail	7.896
30. Air Transportation	3.970
31. Water Transportation	0.073
32. Truck Transportation	1.734
33. Other Transportation/Postal Offices	8.342
34. Support Activities for Storage, Transportation and Warehousing	2.527
35. Software Publishers & Internet Service Providers	1.470
36. Telecommunications	11.379
37. Other Information	94.176
38. Credit Intermediation and Related Activities	20.590
39. Other Finance and Insurance	9.197

Table 7, continued	
40. Real Estate and Rental and Leasing	23.509
41. Legal /Accounting and Bookkeeping /Management Services	43.293
42. Architectural, Engineering, and Computing Services	3.607
43. Educational Services	0.089
44. Ambulatory Health Care Services	0.025
45. Hospitals	0.000
46. Nursing and Residential Care Facilities, Social Assistance	0.000
47. Arts, Recreation, and Accommodation	19.297
Table 7 continued	
48. Food Services and Drinking Places	2.953
49. Administrative/Employment Support Services	17.780
50. Waste Management/Other, and Agriculture Services	15.528
Total Direct Purchases in King County	$379.142

The data reported in Tables 6 and 7 were used with the input-output model to estimate the impacts reported in Table 8. This table reports three types of impacts: output, employment, and labor income. The sales figures are the estimated values of production in Seattle resulting from the final demands reported in Table 6, and the direct requirements reported in Table 7. The values in Table 8 are all at least as large as the sum of the values in Table 6 and 7, due to the system of multipliers in the input-output model. For example, the arts, recreation and accommodation sector is shown in Table 6 to employ 3,242 people, while Table 8 reports 4,064 persons employed. The difference is due to the indirect and induced effects associated with the aggregate purchasing of music industry businesses, and the system of linkages in the input-output model. Spending of direct earnings reported in Table 6 leads to additional demands for arts, recreation, and accommodation services. This same system of structural relationships is present for all sectors, and the mathematical system used in the input-output model develops aggregate estimates of these impacts. Table 6 reports direct sales of $1.2 billion by Seattle music businesses, while Table 8 reports total sales of $2.6 billion. An estimated 11,115 people are directly employed in the Seattle music industry, while in total 22,391 people in King County are estimated to hold jobs due to the music industry. Similarly, $487 million in direct labor income is bolstered through the input-output linkage system to total labor income of $972 million. It should be noted that the input-output model was benchmarked against King County, as data were not available to calibrate a model specific to the City of Seattle. What this means is that, although it is appropriate to read the data in Tables 6 and 7 as referring specifically to City of Seattle impacts, the multiplier effects reported in Table 8 include industry linkages that broaden the geographic scope with which we report these results. Most clearly these results can be understood as the Total King County impact of the City of Seattle music industry. The broadening of the geographic scope is not without basis. The economic impacts of music industry activity in Seattle have spill-over effects in nearby economies, due to commuting by those working in Seattle but living outside Seattle, and due to the direct purchases made by businesses located in Seattle from suppliers located in the region outside Seattle. While most of the direct purchases of businesses and the residential location of music industry employees measured to work in Seattle are likely to take place in King County, there are also likely to be spillovers into other parts of the Central Puget Sound region. These impacts are not

Table 8 Seattle Economic Impact Estimates

	Output Mils. $2008	Employment	Labor Income Mils. $2008
1. Crop Production	$0.301	2	$0.056
2. Animal Production	0.259	4	0.061
3. Forestry and Logging	0.067	1	0.010
4. Fishing, Hunting, and Trapping	2.389	17	1.058
5. Mining	0.839	3	0.156
6. Electric Utilities	48.527	51	5.222
7. Gas Utilities	14.313	8	0.839
8. Other Utilities	10.091	38	2.241
9. Construction	107.552	658	32.798
10. Food, Beverage and Tobacco Manufacturing	42.519	120	6.267
11. Textiles and Apparel Mills	0.312	3	0.110
12. Wood Product Manufacturing	1.296	6	0.291
13. Paper Manufacturing	4.238	9	0.843
14. Printing and Related Activities	24.296	199	10.313
15. Petroleum and Coal Products Manufacturing	6.093	1	0.082
16. Chemical Manufacturing	3.595	3	0.714
17. Nonmetallic Mineral Products Manufacturing	4.458	18	1.008
18. Primary Metal Manufacturing	0.383	1	0.069
19. Fabricated Metals Manufacturing	3.313	18	0.971
20. Machinery Manufacturing	6.699	36	2.191
21. Computer and Electronic Product Manufacturing	62.005	310	19.124
22. Electrical Equipment Manufacturing	0.469	2	0.112
23. Aircraft and Parts Manufacturing	0.051	0	0.009
24. Ship and Boat Building	0.666	4	0.410
25. Other Transportation Equipment Manufacturing	0.746	2	0.145
26. Furniture Product Manufacturing	1.835	15	0.640
27. Other Manufacturing	13.570	79	4.068
28. Wholesale	92.216	450	30.296
29. Retail	249.616	2,907	92.473
30. Air Transportation	12.759	42	3.143
31. Water Transportation	6.105	13	1.044
32. Truck Transportation	12.693	102	5.078
33. Other Transportation/Postal Offices	27.648	256	13.858
34. Support Activities for Storage, Transportation and Warehousing	7.207	57	3.767
35. Software Publishers & Internet Service Providers	48.396	137	17.667
36. Telecommunications	67.000	173	14.627
37. Other Information	644.164	2,417	187.027
38. Credit Intermediation and Related Activities	98.646	419	24.031
39. Other Finance and Insurance	73.554	290	22.120
40. Real Estate and Rental and Leasing	107.905	768	22.607
41. Legal /Accounting and Bookkeeping /Management Services	73.437	799	49.164
42. Architectural, Engineering, and Computing Services	26.428	252	17.424
43. Educational Services	123.019	1,669	45.180
44. Ambulatory Health Care Services	52.295	510	30.915

Table 8 continued			
45. Hospitals	41.664	323	19.241
46. Nursing and Residential Care Facilities, Social Assistance	25.779	527	13.655
47. Arts, Recreation, and Accommodation	194.790	4,064	160.363
48. Food Services and Drinking Places	156.567	2,842	55.456
49. Administrative/Employment Support Services	48.546	908	28.869
50. Waste Management/Other, and Agriculture Services	82.487	856	24.642
Total	$2633.802	22,391	$972.456
Aggregate Impacts			
Natural Resources and Utilities	$76.784	124	$9.645
Construction and Manufacturing	284.097	1,485	80.165
Retail and Wholesale Trade	341.832	3,357	122.769
Producer and Transport Services	1205.941	5,726	381.556
Consumer Services	725.148	11,700	378.321
Total	$2633.802	22,391	$972.456
State Sales Tax			$36.788
Local Sales Tax			16.979
State B&O Tax			28.945
Local B&O Tax			7.401
Total Taxes			$90.113

captured in the model used in this analysis, and would be very difficult to measure without detailed data on commuting and industry purchasing patterns.

Table 8 also reports tax impacts estimated to be $90 million. Two measures of impact are reported in this table: sales and business & occupation tax. Researchers calculated the business and occupation tax estimates by applying effective tax rates by sector to total sales reported in Table 8. For Seattle B&O taxes we assumed that the difference between the gross and effective tax rates reported by the Washington State Department of Revenue was also applicable to Seattle B&O tax rates. Our sales tax estimates are a function of labor income. For collections of Washington State sales taxes we first developed an estimate based on a fraction of personal income and then adjusted these fractions to allow estimate of sales taxes as a fraction of labor income. We used a similar scaling to estimate local sales tax revenues.

King County Impacts

Researchers employed the exact same procedures described above for the City of Seattle impacts to estimate King County impacts. These impacts are tied to estimated employment by industry in King County, as reported in Table 4. We made adjustments in selected self-employment sectors where per worker income was below the average for covered employment. King County values in Table 9 are all equal to or larger than

Table 9 King County Final Demand, Direct Employment, Labor Income and Other Value Added

	Final Demand Mils. $2008	Direct Employment	Labor Income Mils. $2008	Other Value Added Mils$2008
1. Crop Production	$0.000	0	$0.000	$0.000
2. Animal Production	0.000	0	0.000	0.000
3. Forestry and Logging	0.000	0	0.000	0.000
4. Fishing, Hunting, and Trapping	0.000	0	0.000	0.000
5. Mining	0.000	0	0.000	0.000
6. Electric Utilities	0.000	0	0.000	0.000
7. Gas Utilities	0.000	0	0.000	0.000
8. Other Utilities	0.000	0	0.000	0.000
9. Construction	112.554	838	36.617	1.115
10. Food, Beverage and Tobacco Manufacturing	0.000	0	0.000	0.000
11. Textiles and Apparel Mills	0.000	0	0.000	0.000
12. Wood Product Manufacturing	0.000	0	0.000	0.000
13. Paper Manufacturing	0.000	0	0.000	0.000
14. Printing and Related Activities	0.000	0	0.000	0.000
15. Petroleum and Coal Products Manufacturing	0.000	0	0.000	0.000
16. Chemical Manufacturing	0.000	0	0.000	0.000
17. Nonmetallic Mineral Products Manufacturing	0.000	0	0.000	0.000
18. Primary Metal Manufacturing	0.000	0	0.000	0.000
19. Fabricated Metals Manufacturing	0.000	0	0.000	0.000
20. Machinery Manufacturing	4.636	25	1.509	0.168
21. Computer and Electronic Product Manufacturing	189.462	948	57.408	-20.346
22. Electrical Equipment Manufacturing	0.000	0	0.000	0.000
23. Aircraft and Parts Manufacturing	0.000	0	0.000	0.000
24. Ship and Boat Building	0.000	0	0.000	0.000
25. Other Transportation Equipment Manufacturing	0.000	0	0.000	0.000
26. Furniture Product Manufacturing	0.000	0	0.000	0.000
27. Other Manufacturing	29.725	173	8.957	3.105
28. Wholesale	58.799	287	20.023	18.166
29. Retail	218.536	2545	80.478	49.880
30. Air Transportation	0.000	0	0.000	0.000
31. Water Transportation	0.000	0	0.000	0.000
32. Truck Transportation	9.717	78	4.018	1.664
33. Other Transportation/Postal Offices	0.000	0	0.000	0.000
34. Support Activities for Storage, Transportation and Warehousing	0.000	0	0.000	0.000
35. Software Publishers & Internet Service Providers	255.827	651	92.599	56.626
36. Telecommunications	0.000	0	0.000	0.000
37. Other Information	613.892	2303	178.741	111.988
38. Credit Intermediation and Related Activities	0.000	0	0.000	0.000
39. Other Finance and Insurance	0.000	0	0.000	0.000
40. Real Estate and Rental and Leasing	33.988	242	7.089	19.028
41. Legal /Accounting and Bookkeeping /Management Services	19.652	255	12.753	1.841

Table 9 continued				
42. Architectural, Engineering, and Computing Services	14.637	150	9.720	2.000
43. Educational Services	222.706	3017	82.956	7.295
44. Ambulatory Health Care Services	0.000	0	0.000	0.000
45. Hospitals	0.000	0	0.000	0.000
46. Nursing and Residential Care Facilities, Social Assistance	0.000	0	0.000	0.000
47. Arts, Recreation, and Accommodation	232.054	5231	178.015	55.716
48. Food Services and Drinking Places	160.301	2954	57.559	26.473
49. Administrative/Employment Support Services	13.851	270	8.121	1.796
50. Waste Management/Other, and Agriculture Services	10.622	226	3.281	1.115
Total	$2200.958	20193	$839.844	$337.630

Table 10 King County Direct Requirements

	Purchases (mils. $2008)
1. Crop Production	$0.035
2. Animal Production	0.009
3. Forestry and Logging	0.009
4. Fishing, Hunting, and Trapping	1.692
5. Mining	0.083
6. Electric Utilities	18.479
7. Gas Utilities	6.175
8. Other Utilities	8.548
9. Construction	23.039
10. Food, Beverage and Tobacco Manufacturing	25.999
11. Textiles and Apparel Mills	0.165
12. Wood Product Manufacturing	1.270
13. Paper Manufacturing	2.436
14. Printing and Related Activities	22.956
15. Petroleum and Coal Products Manufacturing	0.602
16. Chemical Manufacturing	2.012
17. Nonmetallic Mineral Products Manufacturing	3.834
18. Primary Metal Manufacturing	0.331
19. Fabricated Metals Manufacturing	2.592
20. Machinery Manufacturing	1.461
21. Computer and Electronic Product Manufacturing	4.959
22. Electrical Equipment Manufacturing	0.388
23. Aircraft and Parts Manufacturing	0.007
24. Ship and Boat Building	0.000
25. Other Transportation Equipment Manufacturing	0.206
26. Furniture Product Manufacturing	1.154
27. Other Manufacturing	0.989
28. Wholesale	35.536
29. Retail	12.463
30. Air Transportation	5.409
31. Water Transportation	0.106

Table 10 continued	
32. Truck Transportation	3.083
33. Other Transportation/Postal Offices	13.704
34. Support Activities for Storage, Transportation and Warehousing	4.368
35. Software Publishers & Internet Service Providers	3.797
36. Telecommunications	22.059
37. Other Information	120.914
38. Credit Intermediation and Related Activities	37.138
39. Other Finance and Insurance	15.692
40. Real Estate and Rental and Leasing	44.450
41. Legal /Accounting and Bookkeeping /Management Services	59.844
42. Architectural, Engineering, and Computing Services	7.588
43. Educational Services	0.181
44. Ambulatory Health Care Services	0.040
45. Hospitals	0.000
46. Nursing and Residential Care Facilities, Social Assistance	0.000
47. Arts, Recreation, and Accommodation	28.098
48. Food Services and Drinking Places	3.716
49. Administrative/Employment Support Services	35.868
50. Waste Management/Other, and Agriculture Services	29.789
Total Direct Purchases	$613.272

Seattle estimates presented in Table 5. The values in Table 10 are also equal to or larger for direct requirements in King County than reported in Table 7. This is due to the larger level of employment in most music industry sectors in King County.

Economic impacts for King County are reported in Table 11. This table reports sales of $4.6 billion, labor income of $1.6 billion, and almost 39,000 jobs supported by the music industry. As is the case for the City of Seattle, the total impacts reported in Table 11 are all at least equal to the values reported in Tables 9 and 10, due to the system of multipliers in the input-output model. The mix of music-related industries in King County is somewhat different than for the City of Seattle, so the impacts are not just proportional to the differences in employment in these regions. For example, almost all of the nonprofit music organizations are located in Seattle, while most music-related computer service and audio equipment manufacturing establishments are located outside Seattle.

Table 11 also reports tax revenue impacts, for both B&O taxes and sales taxes. The sales tax calculation and state B&O tax calculation follows the same methodology described above for Seattle. We could not estimate local B&O tax impacts except for the City of Seattle, and they are reported in Table 11. The music industry in King County leads to almost $148 million in tax revenues, $107 million of which accrues to the State of Washington, and the balance accruing to local governments in King County.

Table 11 King County Economic Impact Estimates

	Output (Mils. $2008)	Employment	Labor Income (Mils. $2008)
1. Crop Production	$0.511	4	$0.095
2. Animal Production	0.439	6	0.104
3. Forestry and Logging	0.121	1	0.018
4. Fishing, Hunting, and Trapping	3.999	29	1.772
5. Mining	1.439	5	0.268
6. Electric Utilities	82.490	86	8.877
7. Gas Utilities	24.704	14	1.449
8. Other Utilities	17.880	67	3.971
9. Construction	203.046	1,296	62.303
10. Food, Beverage and Tobacco Manufacturing	72.565	206	10.695
11. Textiles and Apparel Mills	0.538	5	0.189
12. Wood Product Manufacturing	2.436	11	0.546
13. Paper Manufacturing	6.460	14	1.285
14. Printing and Related Activities	32.780	268	13.915
15. Petroleum and Coal Products Manufacturing	10.372	1	0.139
16. Chemical Manufacturing	6.491	6	1.288
17. Nonmetallic Mineral Products Manufacturing	8.326	33	1.882
18. Primary Metal Manufacturing	0.752	2	0.136
19. Fabricated Metals Manufacturing	5.917	32	1.735
20. Machinery Manufacturing	8.155	44	2.673
21. Computer and Electronic Product Manufacturing	195.827	980	60.145
22. Electrical Equipment Manufacturing	0.897	3	0.215
23. Aircraft and Parts Manufacturing	0.083	0	0.015
24. Ship and Boat Building	1.119	7	0.689
25. Other Transportation Equipment Manufacturing	1.280	3	0.249
26. Furniture Product Manufacturing	3.351	28	1.169
27. Other Manufacturing	34.243	199	10.281
28. Wholesale	189.310	924	62.481
29. Retail	450.652	5,248	166.880
30. Air Transportation	20.152	66	4.964
31. Water Transportation	10.276	22	1.757
32. Truck Transportation	22.398	180	8.972
33. Other Transportation/Postal Offices	45.867	425	22.989
34. Support Activities for Storage, Transportation and Warehousing	12.088	95	6.319
35. Software Publishers & Internet Service Providers	264.751	673	97.787
36. Telecommunications	115.806	300	25.281
37. Other Information	823.478	3,089	239.034
38. Credit Intermediation and Related Activities	168.502	717	41.048
39. Other Finance and Insurance	124.057	489	37.308
40. Real Estate and Rental and Leasing	195.220	1,390	40.892
41. Legal /Accounting and Bookkeeping /Management Services	117.792	1,313	78.665
42. Architectural, Engineering, and Computing Services	35.939	334	23.638
43. Educational Services	253.483	3,433	93.335
44. Ambulatory Health Care Services	88.084	859	52.072

Table 11, continued			
45. Hospitals	70.231	545	32.434
46. Nursing and Residential Care Facilities, Social Assistance	43.440	888	23.010
47. Arts, Recreation, and Accommodation	304.213	6,515	207.208
48. Food Services and Drinking Places	256.542	4,704	90.840
49. Administrative/Employment Support Services	91.175	1,716	54.191
50. Waste Management/Other, and Agriculture Services	143.973	1,586	43.024
Total	$4573.647	38,862	$1640.232
Aggregate Impacts			
Natural Resources and Utilities	$131.582	213	$16.554
Construction and Manufacturing	594.637	3139	169.548
Retail and Wholesale Trade	639.962	6172	229.361
Producer and Transport Services	1956.325	9092	628.653
Consumer Services	1251.141	20247	596.115
Total	$4573.647	38862	$1640.232
State Sales Tax			$62.050
Local Sales Tax			28.638
State B&O Tax			44.577
Seattle B&O Tax			12.625
Total Taxes			$147.890

V. Concluding Comments

Comparison of Results with 2004 Study

The present study was designed to parallel the methodology used in the 2004 study. However, it was not possible to exactly replicate that study, given the complex data sources used in a study of this type. The impact estimates reported here are broadly similar to those found in the 2004 study. There are differences in the databases and the economic model used to estimate economic impacts, and these factors contribute to the varying results in the two studies. The industries included in the studies are not exactly the same, but broadly similar.

The 2004 study estimated that business volume related to music in the City of Seattle was $1.26 billion, while the present study estimates this to be $1.2 billion. The 2004 study estimated direct employment to be 10,691, while the current study estimated direct employment to be 11,155. The 2004 study estimated earnings to be $266 million, while the current study estimates direct labor income to be $487 million. Labor income differs from earnings by the estimated magnitude of benefits, that are about 20% the level of wage and salary earnings. Factoring in benefits to the 2004 estimate of earnings, the level of labor income in the current study is well above that in the 2004 study. This shift

in labor income levels is likely related to changes in the mix of employment estimated to be in the music industry. A higher level of employment in the information sector is included in the current study, and this sector has relatively high earnings. Self-employed incomes also appear to be higher in the current study, compared to the 2004 study.

Comparison of Results with Studies in Other Cities

Although the methodology used in the various music economic studies have varied across cities, it is useful to look at the spectrum of results obtained in several of these studies. Table 12 presents estimates of one measure—employment—across some of the studies reviewed in Section II of this report. The Americans for the Arts study's estimate of employment for Seattle is not just for music organizations, but across all non-profit arts organizations. Clearly, this estimate is low in comparison to the current study, and it is also low in comparison to data measured in the ArtsFund studies for the nonprofit music and dance sectors for King County. The Austin study also appears to lead to a rather lower estimate, one that cannot be explained by the exclusion of self-employed persons from this study. However, it should be noted that the Austin study is relatively old, published in 2001. The Nashville study was benchmarked against several counties, and it appears to yield estimates similar to what we have measured for King County. The Chicago study did not estimate economic impacts, and contained several estimates of direct employment in the music industry. The Chicago study's core industry employment is about 25% of the more inclusive measure developed in that study. However, it must be borne in mind that the Chicago economy is approximately three times the population of the Central Puget Sound region. Thus, one third of the direct employment in the Chicago study's most inclusive measure is about 18,000, similar to what we have measured in King County. Comparisons among these studies are problematic, given their varying assumptions. However, the magnitude of direct and total employment measured in the current study implies a strong music industry sector in Seattle, compared to some other cities often viewed as centers of the industry in the United States.

Table 12 Comparisons of Employment Impact with Selected Studies

	Direct Employment	Total Employment
Seattle	11,155	20,193
King County	20,193	38,862
Americans for the Arts	1,872	4,293
Chicago	12,749 to 53,104	No Estimates
Nashville	19,437	39,263
Austin	3,987	11,200

Research Needs & Limitations of the Analysis

While this study is based on methodology used before in Seattle and in several other cities, there are issues that should be mentioned regarding the accuracy of these economic impact estimates. A future study of the industry in Seattle and King County should attempt to document markets with a higher degree of accuracy than reported here. While the division between local personal consumption, local intermediate and

government, and export or investment markets produced reasonable results, they could be sharpened with survey data. The methodology used to estimate self-employed people also has uncertainties, and continued analysis of sources such as the ACS and PUMS needs to be undertaken. Our reliance on private sources such as Name Finders and *ReferenceUSA* to estimate markets for individual businesses, and the use of purpose-codes from the Employment Security Department, is fraught with problems of identifying music-related businesses.

These problems are not likely to be resolved through the use of available data, but the results reported here appear consistent with reports from other regions, and with the 2004 Seattle study. There is a very good chance that this study has seriously underestimated the economic impact of the music industry in Seattle, for reasons detailed carefully by Markusen and Schrock (2006). Future studies of this industry in Seattle and King County would be improved with greater access to data gathered by organizations such as the Washington State Employment Security Department, but it is recognized that there are legal restrictions on making these details available for research purposes. Access to micro records at Census Bureau Research Centers should also be considered as a basis for development of measures of the type included in this study; it is recognized that there are restrictions imposed by the Census Bureau on access by researchers to these data. However, they have great potential to solve some of the problems encountered in this and similar studies to data for businesses and households working in industries such as music, where simple industry classifications obscure the reality of what people and businesses are actually undertaking in the way of work.

Appendix I: Estimating Self-Employment in the Music Industry in Seattle

Motivation:

In assessing the impact of the economic impact of the music industry we need to be aware of the significant contributions made by individuals who are self-employed. The most comprehensive data on employment and earnings by industry (County Business Patterns, Washington State Employment Security Department) do not report on those individuals who are self-employed, neglecting this key segment of the music industry. To overcome this limitation we have undertaken an analysis using the American Community Survey (ACS), the best available source of information on self-employed and unemployed individuals in Seattle and King County, so that the contribution of these individuals can be incorporated into the larger economic impact assessment.

Data

The American Community Survey is a data product produced annually by the Census Bureau to bridge the gap between decennial censuses. The ACS represents a survey of approximately three million individuals with questions that closely align with those of the decennial census long form. This data is modified to protect individuals' privacy and released in the form of a Public Use Microdata Sample (PUMS). The PUMS data from the ACS offers weighted records – each of which represent an individual profile linking characteristics such as age, race, education, occupation, and income so that the relationships among these variables can be understood more clearly. Used with the appropriate weights for each record the PUMS data gives an estimate of the characteristics for the total population.

The reason the PUMS data is useful to us in our analysis of the music industry in Seattle is it contains data on the occupation, industry, employment status, place of residence, place of work, and income of its sample respondents. These variables allow us to pinpoint individuals who are of interest because they are: a) self- or un-employed, b) reside or work in Seattle, or c) involved in the music industry either through their occupation or their industry. The sections that follow describe the methodology employed to select these individuals from the larger PUMS dataset and a detailed summary of the number of these individuals and their economic impact on Seattle and King County.

Methodology

The analysis of self-employed individuals involved in the music industry can be broken into two parts: the identification of occupation and industry codes that are music related, and the selection of records from the ACS PUMS dataset that represent individuals involved in these areas.

Selection of relevant occupations and industries

The ACS PUMS data includes a number of variables containing information about an individual's employment. Three variables are of particular importance to this analysis: occupation, industry description, and NAICS code. These three variables each

code an individual's specific response to the questions, "what is your occupation?" and "in what industry are you employed?" into three separate classification systems.[1] Unfortunately, there are very few codes assigned specifically to the music industry meaning that significant portions of this industry and its associated occupations are assigned to categories that give no indication that they might be relevant for this study. In order to capture the full range of individuals who might be part of the music industry we began our analysis by examining the "Detailed Response List" for both industry and occupation variables as provided by the Census Bureau for the 2000 Census.

Because of the vast range of possible responses, the Census Bureau allows respondents to self-report their occupation and industry on the long-form. Each unique response is then entered into the "Detailed Response List" for each variable and census employees make a determination as to what Occupation, Industry, and NAICS code each unique response should be assigned. For the 2000 decennial census (the most recent census product for which a detailed response list is available) there were approximately 60,000 unique responses for people's occupations accompanied by some 40,000 unique responses for the industry in which they worked. When the PUMS data is made available to the public, the unique response is removed and only the appropriate codes are retained. What this system of organizing responses means for the user of the PUMS data is a lack of confidence as to whether a given occupation code is relevant or not. The user can see the range of unique responses assigned to each variable code, but cannot know which of these responses was given by the individuals represented by a record in the PUMS dataset. For example, the responses "Acoustical work", a portion of which is music-related, and "Drywall contractor", which is not, were both coded into industry group - 0770 "Construction, including cleaning during and immediately after." Without going to the tightly controlled original long form responses, there is no way of knowing whether a record coded as 0770 should be included in the music industry study or not. While other codes such as 6590 "Sound recording industries" are clearly suitable for inclusion, most of the codes leave significant room for uncertainty.

To capture the maximum number of individuals who might be employed in the music industry we searched record by record through the detailed response lists for both industry and occupation for music-related responses. In each case we noted the occupation, industry, and NAICS codes assigned to the response and so tabulated a list of codes that were clearly or at least partially connected to the music industry broadly defined. This process led to the identification of some 37 occupation codes, 29 industry codes, and 84 NAICS codes that contained music-related jobs. A complete list of these occupations and industries are included as Tables 13 through 15 at the end of this appendix.

Having identified the occupations and industries that could potentially contain contributors to Seattle's music industry we must next develop a methodology that allows us to estimate the proportion of respondents in the PUMS data with a listed industry code who could be expected to work in the music industry. Clearly very few of the people

[1] The data dictionary specifying the census defined categories and their numerical equivalents is available from the census web site at http://www.census.gov/acs/www/Downloads/PUMSDataDict06.pdf

employed in 0770 “Construction, including cleaning during and immediately after” will actually work in acoustics, but some of them may. The approach we take here is to offer a series of estimates that offer a range of possibilities for consideration.

To ascertain the percent of self-employed individuals in a given industry who may be part of the music industry we turn to another dataset employed in this study; the list of businesses in the Seattle area provided by Name Finders. This dataset is described in more detail elsewhere, but in brief it offers a nearly complete list of the businesses in the Seattle area accompanied by their employment figures and associated NAICS code. In support of our analysis of employed (as opposed to self-employed) workers in the music industry we first requested a complete list of all the Seattle-area businesses in the NAICS codes listed in Table 15. Next, we sorted through this list and identified all of the businesses that appeared to be music related. From this we then developed a set of proportions giving the percent of employment in each Seattle NAICS code that is music-related. The results of this proportioning are included in column 4 of Table 15. Unfortunately there is no equivalent way to make this type of estimation for the occupation or industry Codes. While this is an imprecise approach - there is no necessary relationship between the proportions of employed individuals and self-employed individuals - it represents the best available data with which to estimate employment figures. In our final analysis we distinguish between numbers representing only industries known to be entirely music related, numbers representing our estimated percentages of employment, and a much higher number that captures the impact if all of the workers in potentially music-related industries were in fact music related.

Selection of Individual PUMS records for inclusion in the analysis

Having identified the industries and occupations that would be relevant to an analysis of the music industry it remained to identify the individuals within the PUMS data who fit our profile as self-employed, residing or working in Seattle, and associated with Seattle’s music scene either through occupation or industry. This involves selecting records from the larger PUMS data set based on geography, employment status, and occupation/industry.

Geography

To begin this analysis we started with the 2006 ACS PUMS data for Washington State comprising 63,524 records weighted to account for all 6,395,798 residents of the state. From this data set we identified 18,827 records representing the 2,058,181 individuals residing or working in King County. This selection was accomplished using two variables: PUMA, and POWPUMA which represent the “Public Use Microdata Area” and “Place of Work PUMA” respectively. To retain confidentiality for individuals, the PUMS data from the ACS is limited in its geographic specificity. PUMAs, the finest level of geographic detail available for PUMS data, must have a minimum population threshold of 100,000 individuals. Both the PUMA and POW variables in the ACS data give the individuals geographic location in terms of PUMA numbers. For the purposes of this analysis the PUMAs within King County were classified into three groups: Seattle, Metro Seattle, and King County with each progressively larger geographic area

containing all of the PUMAs of the smaller areas. A list of the PUMAs included in each geographic unit is given in Table 16 below.[2]

Selecting by employment status and relevance of occupation and industry

Having selected only the records from the ACS that meet the geographic criteria for this study, the next step of the analysis is to limit the dataset to only those individuals who were self-employed or unemployed. The variable COW, "Class of worker" offers three codes (6,7,9) that define this subset of the population. Applying this further selection criteria, the remaining 1,415 records of interest represented 149,465 individuals. Finally at this stage we are able to further reduce the data to include only those individuals whose occupation or industry appeared in Tables 13 or 14. A detail of some importance here is that the variable for NAICS codes in the PUMS data is hopelessly complicated by the processing required to protect establishment confidentiality. In place of the uniform six-digit codes the data offers a wide assortment of values from two to six digits in length and often followed by a letter. While an effort was made to identify the modified NAICS codes that were relevant to the music industry, the actual selection of records of interest was accomplished using only the more consistent OCCP "Occupation recode," and INDP "Industry recode" variables. The resulting selection process, which eliminated any records where neither the OCCP or INDP variable was in any way related to the music industry, narrowed the dataset to 609 records representing 64,649 individuals. Of these, 46,943 resided or worked in the Seattle Metro Area and 25,164 lived or worked in the City of Seattle.

Analysis

Having selected the relevant records and assigned geographic attributes to each record it was a relatively simple process to estimate the key values associated with self-employed individuals. The complete economic impact study requires an estimate of the number of self-employed individuals and their total income from music-related work. To refine these numbers we estimated three potential levels of inclusiveness:

- *Maximum*—All of the individuals who met our criteria for occupation or industry
- *Best Estimate*—A percentage of the individuals who met our occupation or industry criteria based on the quotients estimated using the Name Finders file and documented in column three of Table 14.
- *Minimum*—As above, but only for those individuals who were employed in occupations that were almost entirely music related (e.g. musicians), or industries that were almost entirely music related (e.g. recording and sound production).

[2] The variable POW includes two values that are not technically PUMAs, but have been included here for consistency. The values 1800 and 2000 do not correspond to any specific PUMA as defined by the Census, but refer to a work location in any of the PUMAs 1801-1805, or 2001-2009 respectively. This distinction is used by the Census to prevent users from being able to identify a specific establishment. As shown in Table 4, the value '1800' was used in the geographic definition for all three areas, while '2000' was only included in the geographic definition for King County. This may slightly underreport the number of individuals working in the Seattle Metro area since 2000 is not included in this geographic definition. Five of the PUMAs (2001-2005) incorporated into the generalized value 2000 are included in this region, but four others (2006-2009) are not. Given the focus of this study on the City of Seattle, this slight discrepancy will not affect study outcomes, but is noted here for completeness.

We applied the above estimations to each of the three geographic extents: King County, Seattle Metro, and City of Seattle. The results of this analysis are presented in Table 17.

Table 13 Occupation Codes Containing Music-related Jobs

Occupation Code	Relevance 1 = Partial 2 = Complete	Detailed Code Description
20	1	MGR-GENERAL AND OPERATIONS MANAGERS
310	1	MGR-FOOD SERVICE MANAGERS
420	1	MGR-SOCIAL AND COMMUNITY SERVICE MANAGERS
430	1	MGR-MISCELLANEOUS MANAGERS, INCLUDING POSTMASTERS AND MAIL SUPERINTENDENTS
500	1	BUS-AGENTS AND BUSINESS MANAGERS OF ARTISTS, PERFORMERS, AND ATHLETES
530	1	BUS-PURCHASING AGENTS, EXCEPT WHOLESALE, RETAIL, AND FARM PRODUCTS
1550	1	ENG-ENGINEERING TECHNICIANS, EXCEPT DRAFTERS
2340	1	EDU-OTHER TEACHERS AND INSTRUCTORS
2600	1	ENT-ARTISTS AND RELATED WORKERS
2700	1	ENT-ACTORS
2710	1	ENT-PRODUCERS AND DIRECTORS
2750	2	ENT-MUSICIANS, SINGERS, AND RELATED WORKERS
2760	1	ENT-ENTERTAINERS AND PERFORMERS, SPORTS AND RELATED WORKERS, ALL OTHER
2850	1	ENT-WRITERS AND AUTHORS
2860	1	ENT-MISCELLANEOUS MEDIA AND COMMUNICATION WORKERS
2920	1	ENT-TELEVISION, VIDEO, AND MOTION PICTURE CAMERA OPERATORS AND EDITORS
3240	1	MED-THERAPISTS, ALL OTHER
4110	1	EAT-WAITERS AND WAITRESSES
4700	1	SAL-FIRST-LINE SUPERVISORS/MANAGERS OF RETAIL SALES WORKERS
4760	1	SAL-RETAIL SALESPERSONS
4800	1	SAL-ADVERTISING SALES AGENTS
4850	1	SAL-SALES REPRESENTATIVES, WHOLESALE AND MANUFACTURING
5410	1	OFF-RESERVATION AND TRANSPORTATION TICKET AGENTS AND TRAVEL CLERKS
5930	1	OFF-MISCELLANEOUS OFFICE AND ADMINISTRATIVE SUPPORT WORKERS, INCLUDING DESKTOP PUBLISHERS
6200	1	CON-FIRST-LINE SUPERVISORS/MANAGERS OF CONSTRUCTION TRADES AND EXTRACTION WORKERS
6240	1	CON-CARPET, FLOOR, AND TILE INSTALLERS AND FINISHERS
6260	1	CON-CONSTRUCTION LABORERS
7010	1	RPR-COMPUTER, AUTOMATED TELLER, AND OFFICE MACHINE REPAIRERS
7200	1	RPR-AUTOMOTIVE SERVICE TECHNICIANS AND MECHANICS
7320	1	RPR-HOME APPLIANCE REPAIRERS
7430	1	RPR-PRECISION INSTRUMENT AND EQUIPMENT REPAIRERS
7700	1	PRD-FIRST-LINE SUPERVISORS/MANAGERS OF PRODUCTION AND OPERATING WORKERS
7750	1	PRD-MISCELLANEOUS ASSEMBLERS AND FABRICATORS
8550	1	PRD-MISCELLANEOUS WOODWORKERS, INCLUDING MODEL MAKERS AND PATTERNMAKERS
8750	1	PRD-JEWELERS AND PRECIOUS STONE AND METAL WORKERS
8960	1	PRD-OTHER PRODUCTION WORKERS, INCLUDING SEMICONDUCTOR PROCESSORS AND COOLING AND FREEZING EQUIPMENT OPERATORS
9620	1	TRN-LABORERS AND FREIGHT, STOCK, AND MATERIAL MOVERS, HAND

Table 14 Industry Codes Containing Music related Businesses

Industry Code	Relevance 1= Partial 2 =Complete	Detailed Code Description
770	1	CON-CONSTRUCTION, INCL CLEANING DURING AND IMM AFTER
1990	1	MFG-PRINTING AND RELATED SUPPORT ACTIVITIES
3090	1	MFG-COMMERCIAL AND SERVICE INDUSTRY MACHINERY
3490	1	MFG-ELECTRICAL LIGHTING, EQUIPMENT, AND SUPPLIES, N.E.C.
3970	1	MFG-TOYS, AMUSEMENT, AND SPORTING GOODS
3980	1	MFG-MISCELLANEOUS MANUFACTURING, N.E.C.
4290	1	WHL-MISCELLANEOUS DURABLE GOODS MERCHANT WHOLESALERS
4580	1	WHL-MISCELLANEOUS NONDURABLE GOODS MERCHANT WHOLESALERS
4790	1	RET-RADIO, TV, AND COMPUTER STORES
5490	1	RET-USED MERCHANDISE STORES
5592	1	RET-MAIL-ORDER HOUSES
6170	1	TRN-TRUCK TRANSPORTATION
6570	1	INF-MOTION PICTURES AND VIDEO INDUSTRIES
6590	2	INF-SOUND RECORDING INDUSTRIES
6675	1	INF-INTERNET PUBLISHING AND BROADCASTING
7180	1	FIN-OTHER CONSUMER GOODS RENTAL
7190	1	FIN-COMMERCIAL, INDUSTRIAL, AND OTHER INTANGIBLE ASSETS RENTAL AND LEASING
7390	1	PRF-MANAGEMENT, SCIENTIFIC, AND TECHNICAL CONSULTING SERVICES
7470	1	PRF-ADVERTISING AND RELATED SERVICES
7490	1	PRF-OTHER PROFESSIONAL, SCIENTIFIC, AND TECHNICAL SERVICES
7580	1	PRF-EMPLOYMENT SERVICES
7670	1	PRF-TRAVEL ARRANGEMENTS AND RESERVATION SERVICES
7780	1	PRF-OTHER ADMINISTRATIVE, AND OTHER SUPPORT SERVICES
7890	1	EDU-OTHER SCHOOLS, INSTRUCTION, AND EDUCATIONAL SERVICES
8560	1	ENT-INDEPENDENT ARTISTS, PERFORMING ARTS, SPECTATOR SPORTS AND RELATED INDUSTRIES
8590	1	ENT-OTHER AMUSEMENT, GAMBLING, AND RECREATION INDUSTRIES
8690	1	ENT-DRINKING PLACES, ALCOHOLIC BEVERAGES
8790	1	SRV-ELECTRONIC AND PRECISION EQUIPMENT REPAIR AND MAINTENANCE
8880	1	SRV-PERSONAL AND HOUSEHOLD GOODS REPAIR AND MAINTENANCE

Table 15 NAICS Codes Containing Music related Businesses

NAICS Code	Relevance 1= Partial 2=Complete	Pct. Employment music related	Detailed Code Description
238210	1	0.020375	Electrical Contractors and Other Wiring Installation Contractors
238310	1	0.083229	Drywall and Insulation Contractors
323100	1	0	Commercial Printing
323119	1	0	Other Commercial Printing
332510	1	0	Hardware Manufacturing
333315	1	0.177419	Photographic and Photocopying Equipment Manufacturing
334111	1	0	Electronic Computer Manufacturing
334112	1	0	Computer Storage Device Manufacturing
334113	1	0	Computer Terminal Manufacturing
334119	1	0	Other Computer Peripheral Equipment Manufacturing

Table 15, continued

334210	1	0	Telephone Apparatus Manufacturing
334220	1	0.556701	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
334290	1	0	Other Communications Equipment Manufacturing
334310	1	0.340081	Audio and Video Equipment Manufacturing
334419	1	0.110714	Other Electronic Component Manufacturing
334611	1	0	Software Reproducing
334612	2	0.237569	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing
334613	1	0	Magnetic and Optical Recording Media Manufacturing
335314	1	0	Relay and Industrial Control Manufacturing
335999	1	0	All Other Miscellaneous Electrical Equipment and Component Manufacturing
337124	1	0	Metal Household Furniture Manufacturing
339932	1	0	Game, Toy, and Children's Vehicle Manufacturing
339992	2	1	Musical Instrument Manufacturing
339999	1	0.064671	All Other Miscellaneous Manufacturing
423620	1	0.135593	Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers
423690	1	0.024972	Other Electronic Parts and Equipment Merchant Wholesalers
423840	1	0	Industrial Supplies Merchant Wholesalers
423990	1	0.127451	Other Miscellaneous Durable Goods Merchant Wholesalers
424990	1	0.000981	Other Miscellaneous Nondurable Goods Merchant Wholesalers
441310	1	0.094198	Automotive Parts and Accessories Stores
443112	1	0.71254	Radio, Television, and Other Electronics Stores
451140	2	1	Musical Instrument and Supplies Stores
451220	2	0.988183	Prerecorded Tape, Compact Disc, and Record Stores
453310	1	0.008669	Used Merchandise Stores
454113	1	0.004324	Mail-Order Houses
484210	1	0.039474	Used Household and Office Goods Moving
484220	1	0	Specialized Freight (except Used Goods) Trucking, Local
484230	1	0	Specialized Freight (except Used Goods) Trucking, Long-Distance
511210	1	0	Software Publishers
512110	1	0.695132	Motion Picture and Video Production
512120	1	0	Motion Picture and Video Distribution
512191	1	0.272727	Teleproduction and Other Postproduction Services
512199	1	0.848101	Other Motion Picture and Video Industries
512220	2	0	Integrated Record Production/Distribution
512230	2	1	Music Publishers
512240	2	1	Sound Recording Studios
512290	2	0.959184	Other Sound Recording Industries
515112	2	0.964211	Radio Stations
515210	1	0	Cable and Other Subscription Programming
516100	1	0	Internet Publishing and Broadcasting
517110	1	0	Wired Telecommunications Carriers
517210	1	0	Wireless Telecommunications Carriers (except Satellite)
517410	1	0	Satellite Telecommunications
517911	1	0	Telecommunications Resellers
517919	1	0.000336	All Other Telecommunications
518210	1	0.016468	Data Processing, Hosting, and Related Services
519110	1	0	News Syndicates
519120	1	0	Libraries and Archives

Table 15, continued

531120	1	0.001116	Lessors of Nonresidential Buildings (except Miniwarehouses)
532299	1	0.267857	All Other Consumer Goods Rental
532490	1	0.078021	Other Commercial and Industrial Machinery and Equipment Rental and Leasing
541690	1	0.004319	Other Scientific and Technical Consulting Services
541840	1	0.244949	Media Representatives
541910	1	0	Marketing Research and Public Opinion Polling
561310	1	0	Administrative and Support Services
561311	1	0.003501	Employment Placement Agencies
561599	1	0.103734	All Other Travel Arrangement and Reservation Services
561990	1	0.004304	All Other Support Services
611310	1	0.021615	Colleges, Universities, and Professional Schools
611519	1	0	Other Technical and Trade Schools
611610	1	0.690227	Fine Arts Schools
711110	1	0.106928	Theater Companies and Dinner Theaters
711120	1	1	Dance Companies
711130	2	1	Musical Groups and Artists
711190	1	0.737822	Other Performing Arts Companies
711310	1	0.561983	Promoters of Performing Arts, Sports, and Similar Events with Facilities
711320	1	0.2	Promoters of Performing Arts, Sports, and Similar Events without Facilities
711410	1	0.02237	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
711510	1	0.044622	Independent Artists, Writers, and Performers
713990	1	0.135071	All Other Amusement and Recreation Industries
722410	1	0.871861	Drinking Places (Alcoholic Beverages)
811211	1	0.467742	Consumer Electronics Repair and Maintenance
811490	1	0.061021	Other Personal and Household Goods Repair and Maintenance

Table 16 PUMAS of Interest by Region

King County	Seattle Metro	Seattle
1800	1800	1800
1801	1801	1801
1802	1802	1802
1803	1803	1803
1804	1804	1804
1805	1805	1805
1900	1900	
2000	2001	
2001	2002	
2002	2003	
2003	2004	
2004	2005	
2005		
2006		
2007		
2008		
2009		

Table 17 ACS Analysis Results

	King County Total	Seattle Metro Total	Seattle Total	
Income	$ 1,845,692,279.00	$ 1,338,633,883.00	$ 760,385,909.00	Maximum Estimate
Employment	64,649	46943	25164	
Income	$ 124,591,346.80	$ 97,344,170.09	$ 52,088,703.78	Best Estimate
Employment	6,247	4,518	2,255	
Income	$ 13,153,620.51	$ 12,942,689.29	$ 509,565.43	Minimum Estimate
Employment	546	525	243	

Appendix II: Details from Figure 1

Table 18 Music Industry Stream Components

Diagram Code	Music Industry Entity	Important Local Players
1	Musicians and DJs	Fleet Foxes, Rocky Votolato, Natalie Portman's Shaved Head, Death Cab for Cutie, Sera Cahoone, Modest Mouse, Blue Scholars
2	Instruction	Cornish, Rock School, Seattle Drum School, Fremont Music School, Suzuki Institute of Seattle, Art institute of Seattle, UW
3	Writers and Composers	Seattlemusic.com, Washington Composers Forum, Gary Paul Bryant, Susan Court, Brendan Hogan
4	Managers / Agents	Fuzed Music, Kelly Curtis, Aero Booking, Ricardo Frazier, Ed Shaw Entertainment Inc., Simon James
5	Lawyers	Washington Lawyers for the Arts, Lance, Rosen, Jen Czeizler, Davis Wright Tremaine, Cinnamon Stephens
6	Labels	Sub Pop, Barsuk Records, C/Z Records, Fourthcity, Ivy Records, Origin, Tooth & Nail
7	Promoters	Mike Thrasher, Infinite Productions, Tasty Shows, One Reel Productions, STG, Live Nation, Lakeside Group. Monqui, Showbox Presents, Square Peg Concerts
8	Instruments & cases	Dusty Strings, Mills Music, Guitar Center, American Music, Emerald City Guitars, Pacific Pro Audio
	Design	Mackie, Vashon Guitars, Greg Keplinger,
	Production	Mackie, Guitar Emporium, Seattle Luthiers, Hammond Ashley Violins
	Wholesale	
	Retail	Dusty Strings, Mills Music, Guitar Center, Gibson, Kennely Keys, American Music, Trading Musician
	Repair	Kennelly Keys Music Inc., AudioGear.com, Mills Music, Guitar Center, Petosa Music
	Rental	Kennelly Keys Music Inc., Mills Music, Guitar Center, American Music, SIR
9	Mics, Cords, and other recording accessories	Mackie (Loud Technologies), Guitar Center, Petosa Music, CD Recording Software
	Design	

	Production	
	Wholesale	
	Retail	Morgan Sound
	Repair	Emerald City Guitars, Guitar Center
	Rental	Morgan Sound, PNTA, Seattle Sound Companies (one reel might know)
10	Mixers and Amplifiers	Mackie (Loud Technologies), Guitar Center, Michael's Village Music, Morgan Sound, AudioGear.com
11	Recording Devices	Mackie (Loud Technologies)
12	Copying Devices and Firms	Paragon, Disc Makers Seattle
13	Physical Media (CDs, Records, etc.)	protape Northwest, ArrowDisk
14	Personal Listening Devices, Radio Receivers, PA Systems, and Computers/ Televisions	Paragon, Zune (Microsoft)
	Design	DrumCorps
	Production	
	Wholesale	Zune
	Retail	Magnolia HiFi, Amazon, Many others
	Repair	Precision Audio and Video
	Installation	Magnolia HiFi, Pacific Pro Audio
15	Computers and Software	Reactor, Fruit Loop
16	Venues	
	Clubs	Triple Door, War Room, Showbox, Showbox Sodo, Tractor Tavern, Neumos, Chop Suey, Jazz Alley, Sunset, High Dive
	Public Space	Seattle Center, Mural Amphitheater, Gasworks Park, Gorge Amphitheater, Zoo, Château St. Michelle, Marimore Park
	Stadiums/Arena	Safeco Field, Qwest Field, Safeco, WaMu Theater, Key Arena, HUB, Heck-Ed, Everett Events Center, White River, Casinos

	Symphony Halls and Opera Houses	Benaroya Hall, 5th Avenue Theater, McCaw Hall
17	Radio Stations	KEXP, KPLU, KUOW
18	Digital Purveyors	Real Networks, KEXP, Amazon, Microsoft
	Software Design for digital Purveyors	Windows Media, Real Networks/Rhapsody
19	Remote Retailers	Amazon, Zune Store (Microsoft), Easy Street, Sonic Boom,
20	Music Stores	Sonic Boom, Easy Street, Wall of Sound, Silver Platters,
21	Other Music Retailers	Starbucks, Barnes and Noble, Nordstrom's, Best Buy, Target
22	Digital Distribution Consolidators	Audio Socket, Amazon mp3,
23	Online Retailers of Digital Music for Purchase	Zune, Real Networks/Rhapsody
24	Music Subscription and Online Radio	Real Networks, KEXP, AEI, KKMO, KING
25	Lighting and Stage Design	Jonas Jenson, NU-Generation, PNTA, Hollywood Lights
26	Non-Profit Music Organizations (501c3, 501c6)	Vera Project, Seattle Symphony, Seattle Opera, Town Hall, Bellevue Chamber Chorus, One Reel, On the Boards, Recording Academy
27	Recording Studios	
**Not included on diagram	Music Media	Sound, The Stanger, Sound on the Sound, Three Imaginary Girls

Appendix III. Technical Notes on the Input-Output Model

The impact estimates developed in this study stem from the utilization of an "input-output model." Models of this type are based on static, cross-sectional measures of trade relationships in regional or national economies. They document how industries procure their inputs and where they sell their outputs. Pioneered by Wassily Leontief, who won the Nobel Prize in Economic Science for his insights into the development of input-output models at the national level, these models have become "workhorses" in regional economic impact analysis in recent decades.

Washington State is fortunate to have a rich legacy of research developing input-output models. Early work was led by Philip J. Bourque and Charles M. Tiebout. Input-output models have now been estimated in Washington State for the years 1963, 1967, 1972, 1982, 1987, 1997 and 2002. No other state in the U.S. has this rich historical legacy of survey-based or quasi-survey based regional input-output models. The current model is based on work completed in 2007-2008 by a team of Washington State government staff and William B. Beyers (Beyers and Lin 2008).

Input-output models decompose regional economies into "sectors"–groups of industries with a common industrial structure. The heart of these models is "Leontief production functions," which are distributions of the cost of producing the output of sectors. Leontief augmented the national accounts schema developed by Kuznets (also a Nobel laureate in economics) to take into account the significant levels of intermediate transactions that occur in economic systems in the process of transforming raw materials and services into "finished products" or "final products." Sales distributions among intermediate and final sources of demand are used as the accounting bases for the development of the core innovation of Leontief: that these relationships can be used to link levels of final demand to total industrial output by way of a system of "multipliers" that are linked through the channels of purchase in every industry to the production of output for final demand.

This system of relationships is based on accounting identities for sales. Mathematically, the system may be represented as follows. For each industry we have two balance equations:

(1) $X_i = x_{i,1} + x_{i,2} + ... + x_{i,n} + Y_i$

(2) $X_j = x_{1,j} + x_{2,j} + ...+ x_{n,j} + V_j + M_j$

where: X_i =total sales in industry i,

X_j = total purchases in industry j

$x_{i,j}$ = intermediate sales from industry i to industry j

Y_i = final sales in industry i

M_j = imports to sector j

V_j = value added in sector j.

For any given sector, there is equality in total sales and total purchases:

(3) $X_i = X_j$ when i=j.

This system of transactions is generalized through the articulation of Leontief production functions, which are constructed around the columns of the regional input-output model. They are defined in the following manner.

Let us define a regional purchase coefficient:

$$r_{i,j} = x_{i,j}/X_j.$$

Rearranging,

$$x_{i,j} = r_{i,j}X_j$$

Substituting this relationship into equation (1) we have:

(4) $$X_i = r_{i,1}X_1 + r_{i,2}X_2 + ... + r_{i,n}X_n + Y_i$$

Each sector in the regional model has this equation structure, and since the values of X_i equal X_j when i=j, it is possible to set this system of equations into matrix notation as:

(5) $$X = RX + Y$$

This system of equations can then be manipulated to derive a relationship between final demand (Y) and total output (X). The resulting formulation is:

(6) $$X = (I-R)^{-1}Y$$

where the $(I-R)^{-1}$ matrix captures the direct and indirect impacts of linkages in the input-output model system. The input-output model utilized in the modeling for this research project was developed by a committee led by Dr. William Beyers and Dr. Ta-Win Lin, and was published in 2008 by the Washington State Office of Financial Management. The model has 50 sectors.

A major issue that surrounds the estimation of the $(I-R)^{-1}$ matrix is the level of "closure" with regard to regional final demand components, which are personal consumption expenditures, state and local government outlays, and capital investment. It is common practice to include the impacts of labor income and the disposition of this income in the form of personal consumption expenditures in the multiplier structure of regional input-output models. The additional leveraging impact of these outlays is referred to as "induced" effects in the literature on models of this type. It is less common to include state and local government expenditures in the induced effects impacts, but it

can be argued that demands on state and local governments are proportional to the general level of business activity and related demographics. In contrast, investment is classically argued to be responsive to more exogenous forces, and is not a simple function of local business volume. In the model that we developed for this impact study we have included personal consumption expenditures and state and local government expenditures as a part of the induced-demand linkages system. We have considered Washington personal consumption expenditures to be a function of labor income. We have considered state and local government expenditures to be a function of other value added.

References

Americans for the Arts (no date) Arts & Economic Prosperity. Washington D.C.

Austin City Connection (2001) Texas Perspectives: The Role of Music in the Austin Economy.

Beyers, W. (2007) Economic Impact of Cultural, Scientific, Zoo, and Botanic Organizations in the Central Puget Sound Region. Prepared for ArtsFund and the Puget Sound Regional Council.

Beyers, W. and GMA Research (1993) An Economic Impact Study of Arts and Cultural Organizations in King County. Seattle: ArtsFund.

Beyers, W. and GMA Research (1999) An Economic Impact Study of Arts and Cultural Organizations in King County. Seattle: ArtsFund.

Beyers, W. and GMA Research (2004) An Economic Impact Study of Arts and Cultural Organizations in King County. Seattle: ArtsFund.

Beyers, W., A. Bonds, A. Wenzl, and P. Sommers (2004) The Economic Impact of Seattle's Music Industry. City of Seattle, Office of Economic Development.

Beyers, W. & T. Lin (2008) The 2002 Washington State Input-Output Model. Available at: http://www.ofm.wa.gov/economy/io/2002/default.asp

Edmiston, K and M. Thomas (2003) "The Commercial Music Industry in Atlanta and the State of Georgia: An Economic Impact Study," FRC Report No. 85. Atlanta: Andrew Young School of Policy Studies, Georgia State University.

Markusen, A. & G. Schrock (2006) "The artistic dividend: urban artistic specialization and economic development implications," Urban Studies 43 (10) pp. 1661-1686.

Raines, P & L. Brown (2006) The Economic Impact of the Music Industry in the Nashville-Davidson-Murfreesboro MSA. College of Business Administration, Belmont University and Nashville Area Chamber of Commerce.

Rothfield, L., D. Coursey, S. Lee, D. Silver, and W. Norris. (2007) Chicago Music City Chicago: The Cultural Policy Center at the University of Chicago.

Rushton, M. & M. Thomas. (2005) The Economics of the Commercial Music Industry in Atlanta and the State of Georgia: Industrial Organization and New Estimates of Economic Impacts. Atlanta: Georgia State University, Andrew Young School of Policy Studies.