Arts Majors as Entrepreneurs and Innovators

Richard J. Paulsen[1], Neil Alper[2], and Gregory Wassall[3]

Abstract

This study examines the role of college graduates with degrees in the arts, STEM, and other creative fields as entrepreneurs and innovators in the United States' economy. As creativity is a trait of art students and is important for those acting as entrepreneurs and innovators in an economy, arts majors have the potential to play an important role in these areas. Using American Community Survey data, we look to identify arts, STEM, and other creative majors who are working in entrepreneurial occupations, those where self-employment is common, and innovative industries, those that are copyright-intensive. As it is possible that the nature of arts occupations may be inherently more entrepreneurial and innovative, we compare arts majors to STEM and other creative majors also likely to work in such occupations. Using logistic regression, we find that majoring in a core arts field more than doubles an individual's likelihood of working in an entrepreneurial occupation or an innovative industry relative to non-creative majors. Other creative majors, like communications and STEM majors, are also associated with an increased likelihood of working as entrepreneurs or innovators. Relative to STEM and other creative majors, majoring in a core arts field is associated with the greatest increase in the likelihood of working in an entrepreneurial occupation and third greatest increase in the

[1] Corresponding Author: Assistant Professor of Economics, Bloomsburg University of Pennsylvania, Department of Economics, 228 Sutliff Hall, 400 E 2nd Street, Bloomsburg, Pennsylvania, USA. Email: rpaulsen@bloomu.edu. ORCID: 0000-0001-6138-312X

[2] Associate Professor of Economics Emeritus, Northeastern University, Department of Economics, Boston, MA, USA. ORCID: 0000-0001-9312-8035

[3] Associate Professor of Economics, Northeastern University, Department of Economics, Boston, MA, USA. ORCID: 0000-0002-0602-9221

likelihood of working in an innovative industry. While arts graduates play an important role in artistic creation, this paper highlights a role for these graduates as entrepreneurs and innovators in the U.S. economy. (Keywords: Entrepreneurship, Innovation, Arts, Arts Majors) (JEL Codes: J24, L26, O34, Z11)

1. Introduction

Innovation and entrepreneurship are terms often associated with economic growth. Entrepreneurs create new businesses that can spur employment and economic growth (Fölster 2000). Innovation, through the development of intellectual property, also has the potential to spur economic growth (Park 2010; Towse, Handke, and Stepan 2008). Since entrepreneurs generate new business ideas and innovators generate new works of intellectual property, creativity is important in determining success as an entrepreneur or an innovator (Kritikos 2014). One group of college graduates for whom creativity is an integral part of education are arts majors (Tepper and Kuh 2011). However, their role in entrepreneurship and innovation has not been studied.

The role of entrepreneurs and innovators in economic growth increasingly aligns with the creation of small businesses (Kritikos 2014). Economic activity shifted from large to small firms in the U.S. in the late 20th century. Fortune 500 companies accounted for 20 percent of employment in 1970; they accounted for 8.5 percent in 1996 (Carlsson 1999). In 2016 the U.S. had approximately 5.6 million firms. The majority of these were small businesses; 89.0 percent employed fewer than 20 workers and 98.2 percent employed fewer than 100 workers. Small businesses contribute substantially to employment and the creation of intellectual property ("Facts & Data on Small Business and Entrepreneurship" 2018). Firms with few employees are especially common within artistic and creative industries (Bujor and Avasilcai 2014). Arts entrepreneurship and promotion of the arts have increasingly been used as strategies to create economic development and to attract other industries and high-skilled workers (Phillips 2010).

To understand the role arts majors play in entrepreneurship and innovation in the U.S. economy, we use American Community Survey (ACS) data. We find considerable evidence of this role. Arts majors are far more likely to work in an entrepreneurial occupation or an

innovative industry than college graduates on average. While just under 20 percent of college graduates work in entrepreneurial occupations and just under ten percent work in innovative industries, having an arts major more than doubles the likelihood of each. Many STEM and other creative majors are also more likely to work in entrepreneurial occupations or innovative industries.

We present findings for STEM and other creative majors in addition to arts majors for two reasons. First, STEM and other creative majors are likely to involve creative thinking. Understanding the role graduates of these majors play in entrepreneurship and innovation holds is important. Second, the careers that arts majors pursue may be intrinsically more entrepreneurial and innovative than those of college graduates generally. By comparing arts majors to STEM and other creative majors who are also likely to pursue fields that are intrinsically more entrepreneurial and innovative, our findings that arts majors compare favorably to persons in these fields holds greater value.

2. Literature Review

In the literature review we discuss five topics. We begin with the literature on the careers of arts majors. Second, we review the literature on the definition and identification of entrepreneurs. Third, we explore the theoretical and empirical work connecting entrepreneurship and self-employment. Fourth, we examine innovation. Last, we summarize the key takeaways of these sections and tie them to our study.

2.1 Careers of Arts Majors

The careers of arts majors have been examined using large scale surveys, such as the Strategic National Arts Alumni Project (SNAAP) survey, the American Community Survey (ACS), and national surveys outside the United States.

Lindemann, Tepper, Gaskill, Jones, Kuh, Lambert, et al. (2012), Lena, Gaskill, Houghton, Lambert, Miller and Tepper (2014), Gerber and Childress (2017), and Frenette and Dowd (2018) use SNAAP data to analyze the career experience of U.S. arts graduates. Lindemann, Tepper, Gaskill, Jones, Kuh, Lambert, et al. (2012) find that more than half of arts graduates hold jobs associated with the arts. For the others, 60 percent report that their arts training is relevant to their jobs. Over 60 percent of respondents had previously been or were currently self-employed, working freelance or working as independent contractors. A small number of respondents had also founded companies. Lena, Gaskill, Houghton, Lambert, Miller and Tepper (2014) find that among recent graduates the most common reasons for not working as professional artists were that artistic work was not available, that they held higher paying or steadier jobs in other fields, or that they had debt. For non-recent graduates, having a higher paying or steadier job was the most common reason. Gerber and Childress (2017) use SNAAP data to highlight the roles of arts graduates in teaching and serving other functions in non-profit settings. Frenette and Dowd (2018) use SNAAP data to determine what predicts employment in the arts for arts graduates. Being male and being white are both positively predictive of arts employment. Having a double major where an arts and non-arts major are paired decreases the likelihood of employment in the arts, while having a graduate arts degree increases this likelihood.

Wassall and Alper (2018) and BFAMFAPhD (2014) use ACS data to study the occupations and earnings of U.S. arts graduates. Approximately 40 percent of working artists do not have any college degree, and most college educated artists have a degree in a field outside the arts. Among arts majors, a majority work in non-arts occupations. For those working in the

arts, having an arts major leads to an earnings premium. However, earnings for arts majors are low relative to most other college graduates.

Bille and Jensen (2018), using Danish data, examine which factors influence whether an individual is employed in the arts. Their primary finding is that for three of five groups of art occupations, having a college degree in an arts major is a significant predictor of remaining employed in the arts. Rengers (2002) looks at the employment and earnings of arts graduates in the Netherlands. Having a partner is found to increase the likelihood of being employed, while having children is found to decrease it.

2.2 Entrepreneurship/Entrepreneurs

What is entrepreneurship, and who are entrepreneurs? These concepts lack universally accepted definitions. The Center for American Entrepreneurship states that 'Entrepreneurship is an elusive concept to pin down' ("What is Entrepreneurship?" n.d.). This is because entrepreneurship is a concept that is studied by a diverse range of disciplines, with differing foci and differing vocabulary.

Economists' dominant definition of the entrepreneurial process is from Schumpeter (Audretsch 2003). Schumpeter viewed entrepreneurship as a process that leads to marketplace disequilibrium rather than equilibrium. A difficulty in defining the entrepreneurial process suggested by Audretsch (2003) is that it can involve a variety of organizational structures. In the arts it can involve the activities of an individual, groups of individuals, projects, the production of a performance, and firms that are either for-profit or not-for-profit.

A universally accepted definition of entrepreneurs is difficult to come up with. An all-encompassing definition comes from Dictionary.com: 'Entrepreneurs, in the purest sense, are those who identify a need---any need---and fill it. It's a primordial urge, independent of product,

service, industry or market' (Nelson 2012). A definition that's more economics focused is: '... a person, who through innovation and/or insight, adds value to a product or service and moves it to a higher level of economic return' (Radich 2014). Radich (2014) identifies social entrepreneurs who produce products or services that do not necessarily generate higher levels of economic return but benefit specific groups or society as a whole. These entrepreneurs are in government, education and politics. They innovate and take risks but create non-monetizable benefits from the products and services they produce. Taken collectively, entrepreneurship is a process of new creation, with entrepreneurs as the creators.

Defining entrepreneurs empirically is generally much simpler and frequently revolves around self-employment (Christnacht, Smith, and Chenevert 2018). According to Blanchflower and Oswald (2007), '(t)he most commonly studied class of entrepreneurs is those who are self-employed.' This is especially true for studies that use national samples of the labor force. Blanchflower and Oswald (2007) study self-employed entrepreneurs using labor force surveys for the U.K., Canada, and the U.S. In a separate study of U.S. self-employed entrepreneurs Blanchflower expands the definition to include people who own small firms (Blanchflower 2007).

Woronkowicz and Noonan (2019) provide a review of the empirical literature describing what is known about the basic characteristics of self-employed entrepreneurs. This includes education, labor market characteristics, family and individual financial matters, earnings, and demographic characteristics. Blanchflower and Oswald (2007) find that having a self-employed parent is positively correlated with self-employment. A recent study by the Kauffman Foundation on early stage entrepreneurs finds a negative correlation between educational attainment and becoming a new entrepreneur. It also finds that immigrants are twice as likely to

become new entrepreneurs as native born (Fairlie, Desai, and Herrmann 2019). From a sample of U.S. residents with scientific bachelors' degrees, Kahn, La Mattina, and MacGarvie (2017) find an immigrant entrepreneurship premium. Lazear's study of MBA graduates finds that '(e)ntrepreneurs are individuals who are multifaceted. Although not necessarily superb at anything, entrepreneurs have to be sufficiently skilled in a variety of areas to put together the many ingredients required to create a successful business. As a result, entrepreneurs tend to be more balanced individuals' (Lazaer 2005).

2.3 Self-Employed

Due to the empirical relationship between self-employment and entrepreneurship, it is important to understand what it means to be self-employed. Szaban and Skrzek-Lubasinska (2018) classify the self-employed into five categories: dependent self-employed, hybrid self-employed, one-person replicative business owners, one-person innovative start-up owners, and freelancers/individual professionals. These five groups differ in their level of entrepreneurship. Innovative start-up owners meet all but one of 33 characteristics of entrepreneurship. Business owners and freelancers also meet most characteristics, while hybrid self-employed and dependent self-employed meet fewer than half the characteristics (Szaban and Skrzek-Lubasinska 2018). Two factors that may determine the type of self-employment a person may engage in are educational status and the stage of the business cycle.

The link between self-employment and entrepreneurship has been tested empirically. A study of the self-employed in Andalusia found that about 60 percent innovated or acted in an entrepreneurial way, and that the likelihood of innovating was positively related to education (Plotnikova, Romero, and Martinez-Roman 2016). An empirical study of German workers found

that relative to other workers, self-employed workers perform more tasks and those tasks performed require more skill (Lechmann and Schnabel 2014).

2.4 Innovation/Innovators

Like defining entrepreneurship, defining innovation is also difficult. The Merriam-Webster dictionary defines innovation as 'the introduction of something new' or 'a new idea, method, or device: novelty' ("Innovation" 2020). Innovation is a term that has different meanings across disciplines, like entrepreneurship. This interdisciplinarity is a key factor in the difficulty of formulating a universal definition.

Baregheh, Rowley, and Sambrook (2009) present a multidisciplinary definition of innovation. The authors examine what language these definitions have in common. When defining the nature of innovation, 'new' is by far the most frequently used word. 'Change' and 'improve' are second and third most frequent. In defining the means of innovation, the terms 'idea', 'invention', 'technology', 'market', and 'creativity' all occur at high frequencies. In defining the type of innovation, the terms 'product', 'service', 'process', and 'technical' occur most frequently. Innovations are new, changed, or improved products, services or processes, and the process of innovation involves generating ideas and being creative.

Measuring innovation creates fewer challenges. Works of intellectual property are frequently used as measures of innovation (Teece 2018; Park 2010; Towse, Handke, and Stepan 2008). Intellectual property law protects creators of physical products through the awarding of patents, creators of artistic works through copyrights, and creators of brands through trademarks. While patents, copyrights, and trademarks may not exhaustively encompass all innovation that occurs within an economy, these do serve as quantifiable starting points to measure innovation.

2.5 Summary

The literature on the careers of arts majors finds that most work outside the arts, and many are self-employed. The importance of creativity in both entrepreneurship and innovation makes them candidates to contribute in these areas. In defining entrepreneurship and innovation empirically, it is common to relate self-employment to entrepreneurship and intellectual property to innovation. While not perfect measures of these concepts, we will use these in our empirical definitions.

3. Data

3.1 The American Community Survey

Our principal data source is the Census Bureau's American Community Survey (ACS)[4]. The ACS is an annual survey of U.S. residents; it began after the completion of the 2000 Census. A unique random sample of households is chosen every year; the samples can be appropriately weighted using Census population weights to combine ACS Public Use Micro Sample (PUMS) data from different years. We use a combined 2013-2017 ACS PUMS as our primary source of data.

The primary reason we use the ACS is that beginning with the 2009 survey it collected information about the major field of study from survey participants who graduated four-year colleges. The ACS recognizes just over 150 majors. Also, the ACS PUMS contains up to two major codes for each college graduate. Thus, persons who were double majors are identified by both major codes. In addition, the size of the five-year sample allows for reliable estimates for detailed majors, such as arts majors.

There is no accepted set of college majors that can be called arts majors. We employ two definitions. The first set, called 'core arts majors', consists of nine majors likely to be considered

[4] For a detailed description of the American Community Survey, see https://www.census.gov/programs-surveys/acs.

classic arts majors: fine arts; drama and theater arts; music; visual and performing arts; commercial art and graphic design; film, video and photographic arts; art history and criticism; studio arts; and miscellaneous fine arts.[5] The architecture major is also included in this group because architects are one of the National Endowment for the Arts eleven arts occupations.

The second group, 'extended arts majors' encompasses language and drama education; art and music education; English language and literature; and composition and speech. These four majors have less artistic content, but they provide skills that would help graduates enter artistic fields.

3.2 Descriptive Statistics

Table 1 presents descriptive statistics for the sample of college graduates. The full sample contains approximately 2.6 million observations. Using sampling weights[6] the population of college graduates is estimated at 52.4 million. The first column presents results for the population of college graduates. The second and third columns present comparable data for core arts majors and extended arts majors. Core arts majors comprise 5.4 percent of the sample, while extended arts majors comprise 4.3 percent. Relative to all college graduates, arts majors are less likely to be employed, more likely to be employed part-time, and have lower earned income conditional on being employed. Relative to core arts majors, extended arts majors are more likely to be employed and have higher earned income conditional on being employed. Self-employment is more common among arts majors than all college graduates.

Table 1
Descriptive Statistics

Variable	Full Sample	Core Arts Majors	Extended Arts Majors
Employed	96.7%	95.5%	96.3%
Part-Time	15.2%	22.4%	21.3%
Self-Employed	10.2%	17.5%	11.3%

[5] Table A-1 in the Online Appendix gives detailed codes for all major groupings.
[6] The ACS variable PERWT variable is used for frequency weights in all calculations.

Earned Income	$77,159	$57,689	$63,896
Male	49.6%	45.4%	34.9%
Age	43.4	41.7	44.8
White	79.5%	84.5%	86.9%
Black	9.0%	6.2%	6.4%
Asian	10.6%	8.7%	6.5%
Hispanic	7.9%	8.3%	5.8%
Married	61.7%	51.6%	57.7%
Masters or Higher	36.5%	26.9%	46.3%
All Core Arts Majors	5.4%		
Fine Arts	1.2%		
Commercial Art & Graphic Design	1.1%		
Music	0.9%		
Architecture	0.8%		
Drama and Theater Arts	0.5%		
Film, Video, and Photographic Arts	0.4%		
Art History	0.3%		
Studio Arts	0.2%		
Visual and Performing Arts	0.2%		
Miscellaneous Fine Arts	0.0%		
All Extended Arts Majors	4.3%		
English Lang., Literature, Composition, and Speech	3.3%		
Art and Music Education	0.6%		
Language and Drama Edu.	0.5%		
STEM and other Creative Majors	69.4%		
Engineering Majors	8.2%		
Science Majors	8.4%		
Social Science Majors	8.6%		
Business and Economics Majors	24.3%		
Computer, Math, and Stats Majors	5.6%		
Non-Art Education Majors	9.7%		
Communication Majors	4.6%		
Observations	2,617,082	141,758	119,128
Weight Total	52.4 M	2.8 M	2.3 M

[a] The sample is restricted to those who have graduated with at least a bachelor's degree and are in the labor force. Sampling weights are used in calculations.

Arts majors also differ significantly from the all college graduates in many demographic characteristics. Relative to the full sample, core arts majors are less likely to be male, more likely to be white, and less likely to be married. Core arts majors are less likely to have a degree beyond a bachelor's. Extended arts majors are more likely to have a higher degree.

Most arts majors do not work directly in the arts. Wassall and Alper (2018), using a 2009 to 2013 combined sample from the ACS, find that, depending on one's definition of arts major, between 15 and 25 percent of all arts majors work as artists in the United States. This finding is consistent with our updated data. In Table A – 2 in the Online Appendix we see that 23.9 percent

of core arts majors work in arts and entertainment occupations, and 16.7 percent of all arts majors (core plus extended) work in these occupations. As for industry of choice for arts majors, Online Appendix Table A – 3 shows that less than seven percent work in arts, entertainment, and recreation.

4. Entrepreneurship and Innovation

4.1 Entrepreneurship

Following the literature on entrepreneurship, we use self-employment in defining entrepreneurship when examining the role of majoring in the arts in entrepreneurship.

The ACS reports on 539 unique occupations and places them into 23 major occupation groups.[7] We impose a cutoff, defining an entrepreneurial occupation as any that has at least 20 percent self-employment.[8] This left 84 four-digit ACS occupations[9] with 'farmers, ranchers and other agricultural managers' having the highest percentage self-employed (84 percent) and 'electronic home entertainment equipment installers and repairers' having the lowest (20 percent). One of the top five entrepreneurial occupations, 'artists and related workers' (60 percent self-employed), is in the 'Artists and Entertainers' major occupation group, as is the 'editors' occupation, (20 percent self-employed). Our analysis is based on the aggregation of these occupations into their appropriate major occupation groups, 16 of the 23 in the ACS.

The following tables show the distribution of college graduates in entrepreneurial occupations. Table 2a provides this information for core and extended arts majors. Table 2b provides the same information for STEM and other creative majors.

---

[7] For more information see 'Industry and Occupation,' www.census.gov/topics/employment/industry-occupation/about/occupation.html##targetText=This%20system%20consists%20of%20539,into%2023%20major%20occupational%20groups.

[8] Our primary findings are robust to using 15 and 25 percent as cutoffs.

[9] See appendix Table A – 4 for a detailed list of the 84 entrepreneurial occupations and the 16 major occupation groups.

Table 2a
Distribution of Arts Majors in Entrepreneurial Occupations

			Core Arts Majors					
Entrepreneurial Occupation	Core Arts Majors	Extended Arts Majors	Fine Art	Drama	Music	Visual and Performing Art	Graphic Design	Film, Video, and Photography
Manager	4.87%	2.90%	0.93%	0.37%	0.55%	0.08%	0.85%	0.28%
Business Operations	3.73%	3.65%	0.70%	0.46%	0.67%	0.07%	0.62%	0.23%
Finance	2.08%	2.77%	0.46%	0.16%	0.42%	0.05%	0.36%	0.11%
Computer	17.83%	6.30%	4.53%	0.68%	1.32%	0.41%	8.14%	1.24%
Legal	2.14%	8.69%	0.34%	0.37%	0.51%	0.06%	0.10%	0.14%
Educator	14.46%	9.36%	2.07%	1.36%	7.72%	1.39%	0.82%	0.32%
Arts and Entertainment	40.25%	9.09%	7.16%	2.43%	4.05%	0.64%	12.36%	3.27%
Medical	1.76%	2.36%	0.48%	0.19%	0.43%	0.11%	0.13%	0.07%
Cleaning Services	6.28%	2.96%	1.65%	0.29%	0.77%	0.06%	1.07%	0.18%
Personal Services	7.84%	4.80%	2.13%	1.18%	0.87%	0.42%	1.63%	0.48%
Sales	3.96%	3.43%	1.00%	0.37%	0.55%	0.08%	0.87%	0.25%
Farmers	3.57%	3.80%	1.43%	1.09%	0.40%	0.00%	0.34%	0.16%
Construction	8.53%	2.35%	2.55%	0.74%	0.78%	0.07%	1.26%	0.37%
Installers	7.26%	3.33%	1.27%	0.55%	3.21%	0.24%	0.68%	0.72%
Production	25.59%	4.45%	9.49%	1.52%	1.74%	0.69%	6.46%	0.90%
Transportation	4.22%	3.60%	1.01%	0.59%	0.67%	0.07%	0.72%	0.27%

	Core Arts Majors				Extended Arts Majors		
Entrepreneurial Occupation	Art History	Studio Arts	Misc. Fine Arts	Architecture	Language and Drama Ed.	Art and Music Ed.	Literature and Composition
Manager	0.22%	0.14%	0.03%	1.53%	0.17%	0.20%	2.53%
Business Operations	0.26%	0.10%	0.07%	0.61%	0.18%	0.15%	3.33%
Finance	0.17%	0.06%	0.01%	0.37%	0.20%	0.21%	2.36%
Computer	0.30%	0.93%	0.18%	0.66%	0.30%	0.33%	5.68%
Legal	0.36%	0.06%	0.03%	0.23%	0.14%	0.10%	8.45%
Educator	0.47%	0.33%	0.05%	0.32%	1.23%	3.27%	4.91%
Arts and Entertainment	0.83%	1.14%	0.17%	9.26%	0.34%	1.29%	7.49%
Medical	0.15%	0.08%	0.01%	0.14%	0.12%	0.10%	2.15%
Cleaning Services	0.14%	0.30%	0.02%	1.92%	0.25%	0.36%	2.37%
Personal Services	0.47%	0.43%	0.09%	0.40%	0.66%	0.67%	3.49%
Sales	0.24%	0.13%	0.02%	0.58%	0.30%	0.27%	2.86%
Farmers	0.00%	0.17%	0.00%	0.00%	0.06%	2.16%	1.58%
Construction	0.15%	0.44%	0.04%	2.30%	0.18%	0.32%	1.85%
Installers	0.05%	0.30%	0.04%	0.44%	0.18%	1.70%	1.45%
Production	0.90%	2.30%	0.36%	2.06%	0.59%	1.23%	2.76%
Transportation	0.11%	0.10%	0.06%	0.63%	0.20%	0.22%	3.19%

Table 2b
Distribution of Non-Art Creative Majors in Entrepreneurial Occupations

	STEM Majors	Other Creative Majors

Entrepreneurial Occupation	Computer	Engineering	Science	Communication	Non-Art Education	Social Science
Manager	3.98%	11.40%	5.75%	4.17%	4.64%	12.58%
Business Operations	8.50%	11.04%	7.32%	4.93%	3.42%	15.60%
Finance	3.71%	4.74%	3.81%	3.38%	3.30%	16.48%
Computer	22.62%	6.29%	4.65%	12.80%	1.70%	8.88%
Legal	2.06%	3.78%	4.77%	4.48%	1.95%	43.96%
Educator	4.00%	3.23%	7.13%	4.18%	18.50%	10.05%
Arts and Entertainment	4.12%	4.65%	3.18%	14.05%	3.14%	7.62%
Medical	1.77%	3.09%	49.55%	0.91%	2.23%	5.76%
Cleaning Services	3.41%	5.15%	6.48%	3.45%	11.08%	9.86%
Personal Services	2.53%	1.99%	6.14%	4.98%	16.22%	8.96%
Sales	3.52%	5.17%	4.92%	6.14%	5.84%	13.36%
Farmers	4.05%	5.41%	13.08%	0.64%	7.87%	12.87%
Construction	3.96%	14.99%	6.73%	3.07%	6.64%	9.87%
Installers	5.27%	19.11%	6.92%	3.75%	5.04%	6.85%
Production	3.73%	5.87%	5.95%	3.36%	9.32%	9.45%
Transportation	6.74%	10.46%	6.31%	3.99%	7.01%	14.14%

Core art majors account for 40 percent of workers with bachelor's degrees in the entrepreneurial arts and entertainment occupations. A large segment comes from graphic design, architecture and fine arts majors. Another ten percent of artists and entertainers have degrees in an extended arts major. Those with a degree in literature or composition account for a large segment of this group (80 percent).

There are three additional entrepreneurial occupation groups in which core arts majors account for sizeable shares of workers. Core arts majors account for one-quarter of college educated workers in entrepreneurial production occupations, most common of which are graduates with degrees in fine arts and graphic design. Core arts majors also account for more than ten percent of workers in both entrepreneurial computer and entrepreneurial educator occupations. Graphic design majors account for about half of core arts majors in the entrepreneurial computer occupations, while music majors account for almost half of core arts majors in the entrepreneurial education occupations. Among STEM majors, computer majors account for almost one-quarter of workers in entrepreneurial computer occupations. Almost 13 percent of web developers are communication majors and almost nine percent are social science

majors. The STEM majors comprise more of the entrepreneurial educator occupation than core arts majors. Non-art education majors account for close to 20 percent of those in this occupation.

4.2 Innovation

We define innovation based on intellectual property (IP) creation. We define IP intensive industries as either copyright, patent, or trademark intensive based on a joint report of the Economics & Statistics Administration and the U.S. Patent and Trademark Office (Economics & Statistics Administration and U.S. Patent and Trademark Office 2016). For our analysis, we focus on only those industries that are copyright-intensive. We do this for multiple reasons. First, while patents and copyrights are innovative works directly, trademarks indirectly promote innovation through their ability to allow brands to build reputations and become recognizable to consumers. Second, while patents are innovative works, arts majors are unlikely to be directly involved in the creation of physical inventions. Although we restrict our analysis to copyright-intensive industries, we present results for patent and trademark intensive industries in the online appendix.

The ACS reports just over 250 unique industries using the North American Industry Classification System (NAICS) code. Thirteen of those industries are identified as copyright intensive. These industries include newspaper, periodical, book, and directory publishers; software publishers; motion picture and video industries; sound recording industries; radio and television broadcasting; cable and other subscription programming; other information services; specialized design services; computer systems design and related services; advertising and related services; other professional and technical services; performing arts companies, and independent artists, writers, and performers[10] (Economics & Statistics Administration and U.S.

[10] The corresponding NAICS codes, respectively, are 5111, 5112, 5121, 5122, 5151, 5152, 5191, 5414, 5415, 5418, 5419, 7111, and 7115.

Patent and Trademark Office 2016). Some are newer, coming into relevance with the rise of the internet economy. A number of these industries are closely linked to artistic output; 8.2 percent of college graduates work in one of the copyright-intensive industries.[11]

The following tables show the distribution of college graduates in the innovative copyright intensive industries. Table 3a provides this information for both the core arts majors and the extended arts majors. Table 3b provides the same information for STEM majors and some other creative majors.

Table 3a
Distribution of Arts Majors in Innovative Industries

			Core Arts Majors					
Copyright Industries	Core Arts Majors	Extended Arts Majors	Fine Art	Drama	Music	Visual and Performing Art	Graphic Design	Film, Video, and Photography
Newspaper	8.71%	12.34%	2.65%	0.39%	0.57%	0.13%	3.43%	0.99%
Software	5.12%	3.26%	1.25%	0.41%	0.67%	0.14%	1.30%	0.43%
Movie and Video	30.24%	6.61%	5.22%	6.25%	2.15%	0.75%	2.47%	12.42%
Sound Recording	29.91%	7.99%	2.71%	2.40%	20.71%	0.87%	1.34%	1.20%
Radio/TV	9.01%	5.06%	1.73%	1.33%	1.02%	0.23%	1.46%	2.49%
Internet	7.20%	5.98%	1.35%	0.64%	0.91%	0.27%	1.98%	1.08%
Special Design	53.17%	3.72%	11.06%	1.32%	0.58%	0.51%	31.94%	1.04%
Computer Systems	3.60%	2.65%	0.80%	0.26%	0.58%	0.09%	1.01%	0.31%
Advertising	13.58%	6.29%	3.45%	0.84%	0.72%	0.36%	5.60%	1.23%
Other Prof. Services	14.77%	5.83%	3.59%	0.82%	0.84%	0.36%	2.63%	4.90%
Artists and Performers	30.61%	10.22%	6.47%	6.78%	9.94%	1.31%	1.93%	2.11%
Periodicals and Books	11.49%%	16.49%	2.80%	0.92%	1.02%	0.20%	4.01%	1.30%
Other Info	5.73%	5.75%	1.05%	0.59%	0.50%	0.07%	1.31%	1.46%

	Core Arts Majors				Extended Arts Majors		
Copyright Industries	Art History	Studio Arts	Misc. Fine Arts	Architecture	Language and Drama Ed.	Art and Music Ed.	Literature and Composition
Newspaper	0.24%	0.27%	0.06%	0.28%	0.59%	0.37%	11.40%
Software	0.37%	0.07%	0.21%	0.37%	0.08%	0.08%	3.10%

[11] Appendix Table A – 5 gives a more detailed breakdown of the distribution of copyright workers across these industries in the ACS sample.

Movie and Video	0.63%	0.48%	0.25%	0.72%	0.12%	0.31%	6.22%
Sound Recording	0.52%	0.25%	0.15%	0.58%	0.47%	1.29%	6.23%
Radio/TV	0.32%	0.16%	0.11%	0.33%	0.08%	0.30%	4.68%
Internet	0.31%	0.20%	0.12%	0.48%	0.09%	0.14%	5.76%
Special Design	1.43%	1.53%	0.24%	5.10%	0.14%	0.56%	3.05%
Computer Systems	0.14%	0.13%	0.07%	0.31%	0.11%	0.14%	2.40%
Advertising	0.70%	0.51%	0.10%	0.47%	0.18%	0.13%	5.98%
Other Prof. Services	0.62%	0.74%	0.14%	0.74%	0.32%	0.38%	5.14%
Artists and Performers	0.83%	1.26%	0.33%	0.55%	0.44%	1.67%	8.15%
Periodicals and Books	0.68%	0.57%	0.08%	0.35%	0.60%	0.35%	15.55%
Other Info	0.21%	0.18%	0.00%	0.38%	0.40%	0.06%	5.29%

Table 3b
Distribution of Non-Art Creative Majors in Innovative Industries

	STEM Majors			Other Creative Majors		
Copyright Industries	Computer	Engineering	Science	Communication	Non-Art Education	Social Science
Newspaper	3.86%	2.80%	2.78%	34.86%	3.71%	11.78%
Software	22.05%	18.38%	5.78%	5.71%	1.53%	9.83%
Movie and Video	6.78%	3.92%	2.69%	23.66%	1.85%	9.78%
Sound Recording	7.32%	5.39%	2.93%	13.96%	0.94%	8.73%
Radio/TV	8.19%	5.01%	2.88%	33.93%	2.16%	10.69%
Internet	21.66%	13.18%	5.15%	10.39%	1.63%	12.70%
Special Design	3.78%	4.51%	2.56%	6.53%	2.81%	6.10%
Computer Systems	29.11%	19.58%	5.93%	4.02%	1.57%	8.13%
Advertising	5.08%	2.72%	2.66%	25.74%	2.13%	11.62%
Other Prof. Services	5.51%	5.11%	5.89%	10.18%	4.29%	12.73%
Artists and Performers	3.05%	2.91%	3.84%	12.00%	4.16%	10.27%
Periodicals and Books	5.59%	3.14%	3.84%	16.29%	4.02%	12.87%
Other Info	15.70%	9.44%	5.25%	15.04%	1.48%	15.04%

College graduates with at least one core arts major account for more than one quarter of all college graduates who work in four of the thirteen copyright intensive industries. The greatest intensity is the specialized design services industry; over half of college graduates in this industry possess a core arts major. This industry includes businesses that provide interior, industrial and graphic design services. More than half of core arts majors who work in this industry are graphic design majors. None of the STEM or other creative major groupings

individually account for greater than ten percent of workers in the specialized design services industry.

Core arts majors account for around 30 percent of graduates in three additional copyright intensive industries. The first are the performing arts companies, and independent artists, writers, and performers (artists and performers) industries. These include venues that produce or organize and promote live presentations of the performances of actors and actresses, singers, dancers, musical groups and artists, and the independent (freelance) artists. Music majors are one-third of these core arts majors; fine art and drama and theater arts majors each account for another 20 percent of them. The second of these three is the motion picture and video industries. This industry group includes businesses that are primarily engaged in the production and/or distribution of movies, videos, television programs, or commercials, in the showing of movies; or providing postproduction and related services. Film, video and photography majors account for 40 percent of the core arts majors working in this industry group. Drama and fine arts majors combined to account for about an additional 40 percent of these workers. Beyond core arts majors, almost one-quarter of those with college degrees who work in these industries are communication majors. The last of these three is the sound recording industries group. This industry group includes businesses that produce and distribute musical recordings, publish music, or provide sound recording and related services. More than two-thirds of core arts majors working in these industries are music majors. None of the STEM majors account for as much as eight percent of the college graduate workers in this industry group; communication majors account for fourteen percent.

Among the remaining innovative industry groups, other professional and technical services,[12] advertising and related services, and periodical, book, and directory publishers, have core arts majors accounting for between ten and 15 percent of the workers with college degrees. In the remaining innovative copyright industries neither core arts majors nor extended arts majors are well represented. However, some of the non-arts creative majors are well represented within these industries. Computer, engineering, communication, and social science majors are well represented in these industries.

5. Empirical Methodology

The descriptive evidence presented thus far suggests a substantial role for arts majors as entrepreneurs and innovators within the economy. Specifically, 44 percent of core arts majors are employed in an entrepreneurial occupation or innovative industry, with 37.5 percent employed in entrepreneurial occupations and 19.6 percent employed in copyright intensive industries. Logistic regressions will be used to complement this descriptive evidence. This will allow us to test for differences in the employment of arts majors in entrepreneurial occupations and innovative industries relative to STEM majors, other creative majors, and non-creative majors, holding constant demographic and employment related characteristics.

First, logistic regressions are estimated with an indicator for entrepreneurial occupation as the dependent variable. The estimating equation considered is

$$Entrepreneur_i = \beta_0 + \beta_1 CoreArts_i + \beta_2 ExtendedArts_i + \boldsymbol{\beta_M M}_i + \boldsymbol{\beta_D D}_i + \boldsymbol{\beta_E E}_i + \varepsilon_i$$

where $CoreArts$ is a binary variable indicating that the individual majored in a core arts major and $ExtendedArts$ is a binary variable indicating that the individual majored in an extended arts major. The vector $\boldsymbol{M}$ is a group of binary variables indicating the various non-arts creative major

[12] ACS code 7490 or NAICS code 5419.

groupings. Demographic controls, the vector $\boldsymbol{D}$, include age and age-squared, binary variables indicating married, white, Black, Asian, Hispanic, and male, as well as an interaction of male and married. Employment related controls, the vector $\boldsymbol{E}$, include indicators for part-time employment and having a degree beyond a bachelor's degree, as well as regional indicators. Additionally, one regression includes binary variables indicating the broad occupational groupings as identified in Online Appendix Table A – 2. Majoring in the arts could increase the likelihood of working in an occupational grouping where entrepreneurship is common, or it could increase the likelihood of working in an entrepreneurial occupation within an occupational grouping. This regression will allow us to parse out those two effects.

A logistic regression is then estimated with an indicator for employment in innovative industries as the dependent variable. The estimating equation to be considered is

$$Innovator_i = \beta_0 + \beta_1 CoreArts_i + \beta_2 ExtendedArts_i + \beta_{\boldsymbol{M}} \boldsymbol{M}_i + \beta_{\boldsymbol{D}} \boldsymbol{D}_i + \beta_{\boldsymbol{E}} \boldsymbol{E}_i + \gamma_i$$

where the independent variables mirror those in the entrepreneur regressions.

6. Results

Logistic regression results testing for the impact of being an arts major on employment in entrepreneurial occupations and innovative industries are presented in Table 4. In the first two regressions, the dependent variable is Entrepreneur. In the third regression, the dependent variable is Innovator. The coefficients presented in the Table 4 are marginal effects estimated at means.

Table 4
Logit Regression: Dependent Variables are Binaries for Whether or Not Employed in Entrepreneurial Occupation, Innovative Industry

Major Grouping	Entrepreneurial Occupation	Entrepreneurial Occupation	Innovative Industry
Core Arts Majors	0.220***	0.080***	0.139***
	(0.000)	(0.000)	(0.000)
Extended Arts Majors	0.041***	0.020***	0.063***
	(0.000)	(0.000)	(0.000)

Engineering	-0.049***	0.011***	0.042***
	(0.000)	(0.000)	(0.000)
Science	0.084***	0.081***	-0.001***
	(0.000)	(0.000)	(0.000)
Social Science	0.065***	0.023***	0.018***
	(0.000)	(0.000)	(0.000)
Business and Economics	0.032***	0.025***	0.016***
	(0.000)	(0.000)	(0.000)
Computer, Math, and Stats	-0.049***	0.007***	0.185***
	(0.000)	(0.000)	(0.000)
Non-Art Education	-0.076***	-0.011***	-0.033***
	(0.000)	(0.000)	(0.000)
Communication	0.086***	0.023***	0.153***
	(0.000)	(0.000)	(0.000)
Demographic Controls	Yes	Yes	Yes
Occupational Grouping Indicators	No	Yes	No
Observations	2,533,410	2,533,410	2,533,410

[a] The sample is restricted to those who have graduated with at least a bachelor's degree, are in the labor force, and are employed. Coefficient estimates reported are marginal effects estimated at means. Standard errors are in parenthesis. Sampling weights are used in calculations. *** indicates $p < 0.01$.

The regression results suggest a substantial role for art majors as entrepreneurs and innovators. In the first specification, being a core arts major is associated with a 22.0 percentage point increase in employment in an entrepreneurial occupation relative to non-creative majors. As about 19.4 percent of the population of employed college graduates are employed in an entrepreneurial occupation, majoring in the core arts more than doubles this likelihood. While smaller, majoring in an extended arts field increases this likelihood by 4.1 percentage points. The impact of majoring in the core arts is substantial in comparison to having a STEM or other creative major. Among other creative majors, the coefficient on communication majors is highest at 8.6 percentage points. Among STEM majors, the coefficient on science majors is highest at 8.4 percentage points. The second specification adds controls for broad occupational groupings. When adding these controls, the coefficient on core arts major falls to 8.0 percentage points. As such, about two-thirds of the impact of being a core arts major on entrepreneurship is due to an increased likelihood of being employed in an entrepreneurial occupation group, and one-third is due to an increased likelihood of entrepreneurship within occupational groupings.

The third specification tests for the impact of majoring in the arts on employment in innovative industries.[13] Majoring in the core arts is associated with a 13.9 percentage point increase in employment in copyright intensive industries. As eight percent of all college graduates are employed in copyright intensive industries, core arts majors are more than twice as likely to be employed in these industries. Majoring in an extended arts field is associated with a 6.3 percentage point increase in the likelihood of innovative employment. Two other groups of creative majors, computer, math, and stats majors at 18.5 percentage points and communication majors at 15.3 percentage points are more likely than core arts majors to be employed in these industries.

Majoring in the arts also increases their likelihood of succeeding in these areas. Online Appendix Table A – 6 presents the results of a logistic regression where the dependent variable indicates whether a worker has above average earnings in an entrepreneurial occupation or innovative industry. Of note are the positive and significant coefficients on the arts majors variables. These positive earnings impacts may also explain the motivation for arts majors to choose work as entrepreneurs and innovators.

7. Conclusions

This paper investigates the role college graduates with arts majors play as entrepreneurs and innovators in the U.S. economy. As creativity is deeply intertwined with entrepreneurship and innovation, we hypothesize that the role for arts majors in these areas is substantial. Using American Community Survey data, we test this hypothesis. We define entrepreneurial occupations as those in which self-employment is high, and innovative industries as those that are copyright-intensive. We then identify a substantial role for arts majors in entrepreneurship

[13] Comparable results for employment in patent and trademark intensive industries are presented in Online Appendix Table A – 7.

and innovation. We find that majoring in the arts more than doubles the likelihood of working in an entrepreneurial occupation or innovative industry. We find that when compared to STEM and other creative majors, arts graduates compare favorably in their probability of working in these areas.

There are several reasons why these findings are important. First, entrepreneurship and innovation are important drivers of an economy; having a better understanding of who is playing these roles can help to inform policy geared at promoting these areas. Almost 20 percent of college graduates work in entrepreneurial occupations and almost ten percent work in innovative industries. Of core arts majors working in innovative industries, nearly half work in professional, scientific, and technical services industries and more than a quarter work in information industries. While more than half of core arts majors working in entrepreneurial occupations work within arts, entertainment, and recreation, nearly 40 percent work in entrepreneurial occupations within management, education, and other fields.

Second, student loan debt in the U.S. is large and rising, and there has been concern about funding students in fields for which job prospects are bleak. Job prospects and salary income within the arts and entertainment fields are not strong (Wassall and Alper 2018). While there is value in artistic creation itself, these findings suggest that arts majors obtain skills that are transferable so that many can work as entrepreneurs and innovators.

Third, the findings of this work have important policy implications. As arts majors play an important role in entrepreneurship and innovation, which are drivers of economic growth, these findings provide support for further investment in arts education. While our work focuses on the role of college graduates with degrees in the arts, investment in art education at the primary and secondary levels is necessary as well. Without exposure to the arts at the primary

and secondary levels it is unlikely that there would be a pipeline of students interested in majoring in the arts at the college level. Further, exposure at these earlier levels may also nurture creativity in students who do not ultimately pursue a college degree or a creative college field.

There is a growing body of work stressing the importance of entrepreneurship education within arts higher education programs (Bridgstock 2013; Pollard and Wilson 2013) as well as works providing guidance on how to do so (Hong, Essig, and Bridgstock 2010; Toscher 2019). In light of this research, there is evidence that entrepreneurship education in arts higher education is growing (White 2013; Essig and Guevara 2016). Even among the share of arts majors that go on to work in the public school system, evidence suggests that entrepreneurial training leads to increased entrepreneurial activities in and outside the classroom (Hanson 2019).

A final policy implication of this work relates to the importance of interdisciplinarity in higher education. Recent work studying firms in the U.K. has found significant economic returns to combining arts and science skills (Siepel, Camerani, Pellegrino, and Masucci 2016). Works looking at the returns to double majoring similarly suggest economic returns to pairing arts skills with science and other skillsets (Del Rossi and Hersch 2008; Alper and Wassall 2016). Our findings of significant percentages of arts majors working in entrepreneurial occupations and innovative industries outside of the arts suggests this interdisciplinarity is valued by U.S. firms as well.

While our findings take an important first step in identifying the role that arts majors play as entrepreneurs and innovators in the U.S. economy, there are many important avenues for future research still to be explored. The size of the dataset allows for an analysis at a more granular level. Some major U.S. cities are known as being hubs for technology and innovation, and some are know as being creative hubs. An understanding of where arts majors are most

commonly playing roles as entrepreneurs and innovators, and how creative and innovative hubs may interact in determining this, could add value. Further, analyses of this nature looking at this issue outside the U.S. could be of value. Last, cost-benefit analyses to help inform policymakers about where resources dedicated to the arts could be most efficiently targeted would be important, especially in light of the economic crises experienced in the 21st century, notably the Great Recession and the Coronavirus pandemic.

Works Cited

Alper, N. & Wassall, G. (2016). Double-Majoring in the Arts: Cohort and Related Effects. 19th International Conference on Cultural Economics. Conference Presentation.

Audretsch, D. B. (2003). *Entrepreneurship: A survey of the literature.* Enterprise Directorate-General European Commission, Enterprise Papers No. 14. https://op.europa.eu/en/publication-detail/-/publication/e6e50a79-612b-4e88-b3c9-88f1ff3f01ee

Baregheg, A., Rowley, J. & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management Decision, 47(8)*, 1323-1339. https://doi.org/10.1108/00251740910984578

Bridgstock, R. (2012). Not a dirty word: Arts entrepreneurship and higher education. *Arts & Humanities in Higher Education, 12(2-3)*, 122-137. https://doi.org/10.1177/1474022212465725

BFAMFAPhD. (2014). Artists Report Back: A National Study on the Lives of Arts Graduates and Working Artists. http://bfamfaphd.com/#artists-report-back

Bille, T. & Jensen, S. (2018). Artistic Education Matters: Survival in the Arts Occupations. *Journal of Cultural Economics, 42*, 23-43. https://doi.org/10.1007/s10824-016-9278-5

Blanchflower, D. G. (2007). Entrepreneurship in the United States. IZA Discussion Paper 3130, Institute of Labor Economics (IZA). https://www.iza.org/en/publications/dp/3130/entrepreneurship-in-the-united-states

Blanchflower, D. G. & Oswald, A. J. (2007). What Makes a Young Entrepreneur? IZA Discussion Paper 3139. https://www.iza.org/publications/dp/3139/what-makes-a-young-entrepreneur

Blumberg, B. & Pfann, G. (2015). Roads Leading to Self-Employment: Comparing Transgenerational Entrepreneurs and Self-Made Start-Ups. IZA Discussion Paper 9155, Institute of Labor Economics (IZA). https://www.iza.org/publications/dp/9155/roads-leading-to-self-employment-comparing-transgenerational-entrepreneurs-and-self-made-start-ups

Bujor, A. & Avasilcai, S. (2014). Creative Entrepreneurship in Europe: A Framework of Analysis. *Fascicle of Management and Technological Engineering, 1*, 151-156. DOI: 10.15660/AUOFMTE.2014-1.2960

Carlsson, B. (1999). Small business, entrepreneurship, and industrial dynamics. In Z. Acs (Ed.), Are small firms important?: 99-110. Boston and Dordrecht: Kluwer Academic Publishers.

Christnacht, C., Smith, A., & Chenevert., R. (2018). Measuring Entrepreneurship in the American Community Survey: A Demographic and Occupational Profile of Self-Employed Workers. SEHSD Working Paper Number 2018-28: 1-27. https://www.census.gov/library/working-papers/2018/demo/SEHSD-WP2018-28.html

Del Rossi, A. F., & Hersch, J. (2008). Double your major, double your return? *Economics of Education Review, 27*, 375-386. https://doi.org/10.1016/j.econedurev.2007.03.001

Desai, S. (2017). "Measuring entrepreneurship: Type, motivation, and Growth," *IZA World of Labor 2016*, 327. DOI: 10.15185/izawol.327

Economics & Statistics Administration and U.S. Patent and Trademark Office. (2016). Intellectual Property and the U.S. Economy: 2016 Update. https://www.uspto.gov/sites/default/files/documents/IPandtheUSEconomySept2016.pdf

Eisenmadd, T. R. (2013). Entrepreneurship: A Working Definition. Harvard Business Review. https://hbr.org/2013/01/what-is-entrepreneurship

Essig, L., & Guevara, J. (2016). A Landscape of Arts Entrepreneurship in US Higher Education. Alliance for the Arts in Research Universities: 1-67. https://herbergerinstitute.asu.edu/sites/default/files/a_landscape_of_arts_entrepreneurship_in_us_higher_education_0.pdf

Evans, D. S., & Leighton, L. S. (1989). Some Empirical Aspects of Entrepreneurship. *The American Economic Review, 79(3)*, 519-535. http://www.jstor.org/stable/1806861

Facts & Data on Small Business and Entrepreneurship. (2018). https://sbecouncil.org/about-us/facts-and-data/

Fairlie, R., Desai, S., & Herrmann, A. J. (2019). 2017 National Report on Early-Stage Entrepreneurship. Kauffman Indicators of Entrepreneurship: 1-32. https://indicators.kauffman.org/wp-content/uploads/sites/2/2019/02/2017-National-Report-on-Early-Stage-Entrepreneurship-February-20191.pdf

Fölster, S. (2000). Do Entrepreneurs Create Jobs? Small Business Economics, 14:137-148. https://doi.org/10.1023/A:1008141516160

Frenette, A. & Dowd, T. J. (2018), Who Stays and Who Leaves? Arts Education and the Career Trajectories of Arts Alumni in the United States. National Endowment for the Arts Working Paper 1-67. https://www.arts.gov/sites/default/files/Research-Art-Works-ASU2.pdf

Gerber, A. & Childress, C. (2017). The Economic World Obverse: Freedom through Markets after Arts Education. *American Behavioral Scientist, 61*, 1532-1554. https://doi.org/10.1177/0002764217734275

Hanson, J. (2019). Entrepreneurship Among Public School Arts Educators: The Case of Music Teachers in New York State, *Artivate: A Journal of Entrepreneurship in the Arts, 8(1)*, 45-66. http://artivate.org

Hipple, S. F. & Hammond, L. A. (2016). Self-employment In The United States. U.S. Bureau of Labor Statistics, Spotlight on Statistics. www.bls.gov/spotlight/2016/self-employment-in-the-united-states/pdf/self-employment-in-the-united-states.pdf

Hong, C., Essig, L., & Bridgstock, R. (2010). The Enterprising Artist and the Arts Entrepreneur: Emergent Pedagogies for New Disciplinary Habits of Mind. In book: Exploring More Signature Pedagogies, Publisher: Stylus, 68-81.

Innovation (2020). Merriam-Webster.com Dictionary. https://www.merriam-webster.com/dictionary/innovation

Kahn, S., La Mattina, G., & MacGarvie, M. J. (2017). 'Misfits,' 'stars,' and immigrant entrepreneurship. *Small Business Economics, 49*, 533-557. https://doi.org/10.1007/s11187-017-9848-8

Kelley, D. J., Ali, A., Brush, C., Corgett, A., Kim, P., & Majbouri, M. (2017). Global Entrepreneurship Monitor 2016 United States Report. GEM, Babson College. https://www.gemconsortium.org/report/gem-usa-2016-report

Kritikos, A. S. (2014). Entrepreneurs and their impact on jobs and economic growth. *IZA World of Labor, 8*, 1-10. DOI: 10.15185/izawol.8

Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics, 23(4)*, 649-680. http://dx.doi.org/10.1086/491605

Lechmann, D. S. J., & Schnabel, C. (2014). Are the self-employed really jacks-of-all-trades? Testing the assumptions and implications of Lazear's theory of entrepreneurship with

German data. *Small Business Economics, 42*, 59-76. https://doi.org/10.1007/s11187-012-9464-6

Lena, J. C., Gaskill, S., Houghton, R. F., Lambert, A. D., Miller, A. L. & Tepper, S. J. (2014). Making It Work: The Education and Employment of Recent Arts Graduates, SNAAP Annual Report 2014. Bloomington, IN: Center for Postsecondary Research, Indiana University, School of Education. http://snaap.indiana.edu/pdf/2014/SNAAP_AR_2014.pdf

Lindemann, D. J., Tepper, S. J., Gaskill, S., Jones, S. D., Kuh, G. D., Lambert, A. D., Lena, J., Miller, A. L., Park, K., Rudolph, E. B., & Vanderwerp, L. (2012). Painting with Broader Strokes: Reassessing the Value of an Arts Education. Bloomington, IN: Indiana University and Vanderbilt University, Strategic National Arts Alumni Project. http://snaap.indiana.edu/pdf/SNAAP_Special%20Report_1.pdf

Nelson, B. (2012). The Real Definition Of Entrepreneur---And Why It Matters. Forbes. www.forbes.com/sites/brettnelson/2012/06/05/the-real-definition-of-entrepreneur-and-why-it-matters/#505bc1564456.

Park, W. G. (2010). The Copyright Dilemma: Copyright Systems, Innovation, and Economic Development. *Journal of International Affairs Editorial Board, 64(1)*, 53-68. http://www.jstor.org/stable/24385185

Phillips, R. J. (2010). Arts Entrepreneurship and Economic Development: Can Every City by "Austin*tacious*"? *Foundations and Trends in Entrepreneurship, 6(4)*, 239-313. http://dx.doi.org/10.1561/0300000039

Plotnikova, M., Romero, I., & Martinez-Roman, J. A. (2016). Process innovation in small business: the self-employed as entrepreneurs. *Small Business Economics, 47*, 939-954. https://doi.org/10.1007/s11187-016-9743-8

Pollard, V., & Wilson, E. (2013). The "Entrepreneurial Mindset" in Creative and Performing Arts Higher Education in Australia. *Artivate: A Journal of Entrepreneurship in the Arts, 3(1)*, 3-22. http://artivate.org

Radich, A. (2014). Arts Entrepreneurship Blogathon – Day 1. https://blog.westaf.org/2014/05/arts-entrepreneurship-blogathon-day-1.html

Rengers, M. (2002). Economic Lives of Artists: Studies into Careers and the Labour Market in the Cultural Sector. Utrecht: Utrecht University, Interunviersity Center for Social Science Theory and Methodology. https://dspace.library.uu.nl/handle/1874/815

Ricketts, M. (2005). Theories of Entrepreneurship: Historical Development and Critical Assessment. www.researchgate.net/publication/288825439_Theories_of_Entrepreneurship_Historical_Development_and_Critical_Assessment

Siepel, J., Camerani, R., Pellegrino, B., & Masucci, M. (2016). The Fusion Effect: The Economics Returns to Combining Arts and Science Skills. A Report for Nesta: 1-30. https://www.nesta.org.uk/report/the-fusion-effect-the-economic-returns-to-combining-arts-and-science-skills/#:~:text=Key%20findings,bring%20radical%20innovations%20to%20market.

Szaban, J. & Skrzek-Lubasinska, M. (2018). Self-Employment and Entrepreneurship: A Theoretical Approach. *Central European Management Journal, 26(2)*, 89-120. https://doi.org/10.7206/jmba.ce.2450-7814.230

Taylor, T. (2019). Some Snapshots and Thoughts about US Entrepreneurship. Conversable Economist. https://conversableeconomist.blogspot.com/2019/02/some-snapshots-and-thoughts-about-us.html

Teese, D. J. (2018). Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world. *Research Policy, 47*, 1367-1387. https://doi.org/10.1016/j.respol.2017.01.015

Tepper, S., & Kuh, G. D. (2011). Let's Get Serious About Cultivating Creativity. The Chronicle of Higher Education Review. https://www.chronicle.com/article/lets-get-serious-about-cultivating-creativity/

Toscher, B. (2019). Entrepreneurial Learning in Arts Entrepreneurship Education: A Conceptual Framework. *Artivate: A Journal of Entrepreneurship in the Arts, 8(1)*, 3-22. http://artivate.org

Towse, R., Handke, C., & Stepan, P. (2008). The Economics of Copyright Law: A Stockpile of the Literature. *Review of Economic Research on Copyright Issues 5(1)*, 1 -22. https://core.ac.uk/download/pdf/4897291.pdf

Wassall, G. & Alper, N. (2018). The Importance of a College Major in the Arts to Artistic Success. National Endowment for the Arts Working Paper. https://www.arts.gov/sites/default/files/Research-Art-Works-Northeastern-rev.pdf

What is Entrepreneurship? (n.d.). www.startupusa.ord/what-is-entrepreneurship/.

White, J. C. (2013). Barriers to Recognizing Arts Entrepreneurship Education as Essential to Professional Arts Training. *Artivate: A Journal of Entrepreneurship in the Arts, 2(3)*, 28-39. http://artivate.org

Woronkowicz, J. & Noonan, D. (2019). Who Goes Freelance? The Determinants of Self-Employment for Artists. *Entrepreneurship Theory and Practice, 43(4)*, 651-672. https://doi.org/10.1177/1042258717728067

Online Appendix

Table A – 1
College Major Groupings and Codes

Major Grouping	ACS Codes
Core Arts Majors	1401, 6000-6099
Extended Arts Majors	2313, 2314, 3301, 3302
Engineering Majors	2400-2499
Science Majors	3600-3699, 4003, 4006, 4008, 5000-5008, 5098
Social Science Majors	4007, 5401, 5402, 5500, 5502-5507, 5599, 6402, 6403
Business Majors	5501, 6200-6299
Computer, Math, and Statistics Majors	2001-2107, 3700-3702, 4005
Non-Art Education Majors	2300-2312, 2399
Communication Majors	1901-1904

Table A – 2
Occupational Groupings

Occupations	Full Sample	Core Arts Majors	All Arts Majors
Arts and Entertainment	3.7%	23.9%	16.7%
Building Maintenance	0.8%	0.9%	0.7%
Business Operations	4.8%	3.8%	4.2%
Community Service	3.6%	1.9%	2.6%
Computer and Math	5.7%	3.5%	3.1%
Construction	0.9%	1.3%	1.0%
Education	13.6%	13.8%	20.6%
Engineering	3.3%	1.5%	1.0%
Extraction	0.0%	0.0%	0.0%
Farming and Forestry	0.1%	0.1%	0.1%
Financial Services	4.8%	1.6%	1.8%
Food Preparation	1.5%	3.0%	2.5%
Health Care	10.3%	2.9%	3.3%
Health Care Support	0.8%	0.6%	0.6%
Installation and Repair	0.7%	0.6%	0.5%
Legal	2.5%	1.1%	2.9%
Life, Physical, and Social Sciences	1.7%	0.7%	0.6%
Management	16.7%	13.3%	13.3%
Office Administration	8.3%	8.9%	9.2%
Personal Care	1.9%	2.7%	2.4%
Production	1.3%	1.9%	1.5%
Protective Services	1.6%	0.7%	0.7%
Sales	8.9%	9.0%	8.5%
Transportation	1.6%	1.5%	1.3%
Weight Total	52.4 M	2.8 M	5.0 M

[a] The sample is restricted to those who have graduated with at least a bachelor's degree and are in the labor force. Sampling weights are used in calculations. For a detailed description of the specific occupations comprising the broad occupational categories, see https://usa.ipums.org/usa/volii/occ_acs.shtml.

Table A – 3
Industry Groupings

Industries	Full Sample	Core Arts Majors	All Arts Majors
Agriculture, Forestry, Fishing, and Hunting	0.6%	0.3%	0.3%
Mining, Quarrying, and Oil and Gas Extraction	0.4%	0.1%	0.1%
Utilities	0.8%	0.3%	0.3%
Construction	2.3%	2.9%	2.1%
Manufacturing	8.1%	6.0%	5.0%
Wholesale Trade	2.4%	2.0%	1.8%
Retail Trade	6.5%	9.6%	8.0%
Transportation and Warehousing	2.1%	1.6%	1.5%
Information	3.1%	6.1%	5.7%
Finance and Insurance	7.1%	3.4%	4.1%
Real Estate and Rental and Leasing	2.1%	2.2%	2.0%
Professional, Scientific, and Technical Services	13.7%	19.9%	16.5%
Management of Companies and Enterprises	0.2%	0.1%	0.1%
Administrative and Support and Waste Management and Remediation Services	2.5%	2.6%	2.5%
Educational Services	17.8%	16.8%	24.5%
Health Care and Social Assistance	15.9%	7.0%	7.9%
Arts, Entertainment, and Recreation	2.2%	6.9%	5.2%
Accommodation and Food Services	2.7%	4.3%	3.6%
Other Services (except Public Administration)	3.4%	4.5%	4.7%
Public Administration	6.0%	2.9%	3.5%
Weight Total	52.4 M	2.8 M	5.0 M

[a] The sample is restricted to those who have graduated with at least a bachelor's degree and are in the labor force. Sampling weights are used in calculations. For a detailed description of the specific industries that comprise the industry groupings, see https://usa.ipums.org/usa/volii/ind2013.shtml.

Table A – 4
Entrepreneurial Occupations

ACS Occupations	ACS Code	Percent Self-Employed
Managers		
Chief executives	10	29.31%
Farmers, ranchers, and other agricultural managers	205	83.50%
Construction managers	220	34.73%
Food service managers	310	22.08%
Property, real estate, and community association managers	410	28.02%
Business Operations Specialists		
Agents and business managers of artists, performers, and athletes	500	28.19%
Management analysts	710	36.36%
Financial Specialists		
Appraisers and assessors of real estate	810	41.43%
Personal financial advisors	850	23.54%
Tax preparers	940	24.14%
Computer Occupations		
Web developers	1030	22.46%
Legal		
Lawyers	2100	31.80%

Educators		
Other teachers and instructors	2340	20.61%
Artists and Entertainers		
Architects, except naval	1300	27.91%
Artists and related workers	2600	60.59%
Designers	2630	27.47%
Actors	2700	33.14%
Producers and directors	2710	23.81%
Dancers and choreographers	2740	26.13%
Musicians, singers, and related workers	2750	43.04%
Entertainers and performers, sports and related workers, all other	2760	48.52%
Announcers	2800	28.56%
Editors	2830	20.87%
Writers and authors	2850	45.98%
Miscellaneous media and communication workers	2860	27.78%
Photographers	2910	57.26%
Television, video, and movie camera ops. and editors	2920	33.51%
Medical		
Psychologists	1820	39.51%
Chiropractors	3000	71.24%
Dentists	3010	62.14%
Optometrists	3040	51.13%
Physicians and surgeons	3060	24.12%
Podiatrists	3120	57.93%
Veterinarians	3250	37.31%
Health diagnosing and treating practitioners, all other	3260	73.85%
Massage therapists	3630	48.85%
Cleaning Service Workers		
First-line supervisors of housekeeping and janitorial workers	4200	25.94%
First-line supervisors of landscaping, lawn service, and groundskeeping workers	4210	43.87%
Maids and housekeeping cleaners	4230	26.75%
Grounds maintenance workers	4250	26.30%
Personal Service Workers		
First-line supervisors of personal service workers	4320	36.96%
Animal trainers	4340	50.13%
Nonfarm animal caretakers	4350	28.75%
Morticians, undertakers, and funeral directors	4465	21.42%
Barbers	4500	58.40%
Hairdressers, hairstylists, and cosmetologists	4510	50.30%

Miscellaneous personal appearance workers	4520	32.82%
Childcare workers	4600	32.60%
Personal care and service workers, all other	4650	25.36%
Sales Workers		
First-line supervisors of non-retail sales workers	4710	21.03%
Insurance sales agents	4810	27.77%
Travel agents	4830	26.10%
Real estate brokers and sales agents	4920	57.59%
Door-to-door sales workers, news and street vendors, and related workers	4950	50.30%
Farming, Fishing and Forestry Workers		
Fishers and related fishing workers	6100	62.42%
Logging workers	6130	36.77%
Construction Workers		
First-line supervisors of construction trades and extraction workers	6200	23.84%
Brickmasons, blockmasons, and stonemasons	6220	24.88%
Carpenters	6230	36.75%
Carpet, floor, and tile installers and finishers	6240	40.53%
Construction laborers	6260	24.69%
Drywall installers, ceiling tile installers, and tapers	6330	27.62%
Painters, construction and maintenance	6420	36.39%
Plasterers and stucco masons	6460	21.90%
Fence erectors	6710	25.86%
Installers, Maintenance and Repair Workers		
Electronic home entertainment equipment installers and repairers	7120	20.03%
Automotive body and related repairers	7150	21.17%
Automotive glass installers and repairers	7160	25.78%
Automotive service technicians and mechanics	7200	20.34%
Small engine mechanics	7240	25.93%
Home appliance repairers	7320	34.92%
Precision instrument and equipment repairers	7430	21.36%
Locksmiths and safe repairers	7540	30.72%
Production Workers		
Shoe and leather workers and repairers	8330	32.63%
Tailors, dressmakers, and sewers	8350	42.80%
Upholsterers	8450	38.28%
Cabinetmakers and bench carpenters	8500	28.41%
Furniture finishers	8510	29.27%
Woodworkers, all other	8550	38.53%
Jewelers and precious stone and metal workers	8750	46.32%

Etchers and engravers	8910	25.00%
Molders, shapers, and casters, except metal and plastic	8920	23.69%
Transportation Workers		
Taxi drivers and chauffeurs	9140	30.99%
Dredge, excavating, and loading machine operators	9520	26.57%

Table A – 5
Distribution of Workers Across Copyright Intensive Industries

Copyright Industries	Number of Workers	Percent of Copyright Workers
Computer Systems Design	1,740,074	43.2%
Performing Arts Companies and Independent Artists	417,633	10.4%
Advertising	360,100	8.9%
Radio/TV Broadcast and Cable	260,168	6.5%
Other Prof./Tech. Services	234,740	5.8%
Movie and Video	230,146	5.7%
Special Design Services	228,985	5.7%
Periodicals and Books	189.298	4.7%
Software Publishers	116,269	2.9%
Newspaper Publishers	100,133	2.5%
Internet Publishing	90,201	2.2%
Other Information Services	40,295	1.0%
Sound Recording Industries	18,576	0.5%

Table A – 6
Logit Regression: Dependent Variable is Binary for Whether or Not Earnings are Above Average within Entrepreneurial Occupations or Innovative Industries

Major Grouping	Above Average Earnings – Entrerpeneuial Occupations	Above Average Earnings – Innovative Industries
Core Arts Majors	0.047***	0.007***
	(0.001)	(0.001)
Extended Arts Majors	0.009***	0.008***
	(0.001)	(0.001)
Engineering	0.056***	0.084***
	(0.001)	(0.001)
Science	0.023***	0.037***
	(0.001)	(0.001)
Social Science	-0.015***	0.042***
	(0.001)	(0.001)
Business and Economics	-0.003***	0.049***
	(0.001)	(0.001)
Computer, Math, and Stats	0.041***	0.034***
	(0.001)	(0.001)
Non-Art Education	0.014***	-0.049***
	(0.001)	(0.002)
Communication	0.013***	0.016***
	(0.001)	(0.001)
Demographic Controls	Yes	Yes
Observations	498,807	202,696

[a] The sample is restricted to those who have graduated with at least a bachelor's degree, are in the labor force, and are employed within an entrepreneurial occupation. The dependent variable is a binary variable indicating having an

above average earned income for a worker in the worker's occupational grouping or industry. Demographic controls include age and age squared, and binary variables indicating being married, white, black, Asian, Hispanic, male, working part-time, and having higher than a bachelor's degree. Additionally, a male*married interaction is included, as are regional controls. Coefficient estimates reported are marginal effects estimated at means. Standard errors are in parenthesis. Sampling weights are used in calculations. *** indicates $p < 0.01$.

Table A – 7
Logit Regression: Dependent Variable is Binary for Whether or Not Employed in an Innovative Industry

Major Grouping	**Innovative Patent**	**Innovative Trademark**
Core Arts Majors	-0.003***	0.031***
	(0.000)	(0.000)
Extended Art Majors	-0.005***	-0.002***
	(0.000)	(0.000)
Engineering	0.090***	0.087***
	(0.000)	(0.000)
Science	0.039***	0.010***
	(0.000)	(0.000)
Social Science	-0.005***	0.030***
	(0.000)	(0.000)
Business and Economics	0.015***	0.118***
	(0.000)	(0.000)
Computer, Math, and Stats	0.018***	0.049***
	(0.000)	(0.000)
Non-Art Education	-0.016***	-0.121***
	(0.000)	(0.000)
Communication	0.001***	0.154***
	(0.000)	(0.000)
Demographic Controls	Yes	Yes
Observations	2,533,410	2,533,410

[a] The sample is restricted to those who have graduated with at least a bachelor's degree, are in the labor force, and are employed. Demographic controls include age and age squared, and binary variables indicating being married, white, black, Asian, Hispanic, male, working part-time, and having higher than a bachelor's degree. Additionally, a male*married interaction is included, as are regional controls. Coefficient estimates reported are marginal effects estimated at means. Standard errors are in parenthesis. Sampling weights are used in calculations. *** indicates $p < 0.01$.