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Assessing the Magnitude of Creative Employment: A Comprehensive Mapping and Estimation of Existing Methodologies

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ABSTRACT *The present study surveys and maps the existing methodological approaches for measuring creative employment. Based on a unique matched employer–employee data-set which encompasses over three million Portuguese workers, we found that the magnitude of the creative class varies considerably between approaches, ranging from 2.5%, using the conventional industry-based taxonomy and 30.8%, using Florida’s occupational proposal. The disparities are justified on the basis of the departure definition of what creative employment is and operationalization issues regarding which industries and occupations should be included. Interestingly, when we focus on “core” creative employment, the figures conveyed by the distinct approaches are strikingly similar (around 6%), suggesting that, at least where core creative employment is concerned, the distinct approaches converge. The diversity of approaches and measurements are not necessarily a bad thing in itself, but has to be adequately acknowledged in order to accomplish adequate public-policy guidance.*

If there is no agreement on how to define and measure the creative class, there is little prospect that it will provide useful public policy guidance. If no one knows how the creative class is constituted ... there are likely to be no effective policy levers. (Sands & Reese, 2008, p. 6)

1. Introduction

The literature on the creative class and industries is relatively recent and consists of an array of publications which range from theoretical and policy-based articles (Pratt

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et al., 2009; Heinze & Hoose, 2013) to empirical studies on the estimation of creative employment in national and regional economies (Florida *et al.*, 2008; Asheim & Hansen, 2009; Mellander *et al.*, 2010).

Since Florida's (2002) seminal contribution, several studies and government reports have been published worldwide on the analysis of creative workers, their dimension (KEA European Affairs, 2006; Cunningham & Higgs, 2009), spatial, sector and knowledge-based distribution (Gabe, 2006; Clifton, 2008; Mellander, 2009), the determinants of their location preferences (Hansen & Niedomysl, 2009), and their effect on economic growth (Florida *et al.*, 2008).

Despite the reasonable amount of literature produced on the topic, several challenges remain for anyone undertaking empirical and quantitative analyses of creative activities (Çetindamar & Günsel, 2012; Lazzarretti *et al.*, 2012; Lysgård, 2012). Fuzzy and all-embracing definitions of which occupations should be included in the creative class (McGranahan & Wojan, 2007; Markusen *et al.*, 2008), lack of objectivity in the criteria to select who is creative or not (Boschma & Fritsch, 2009; Clark, 2009), limitations of data used and problems of highly aggregated occupational code categories (Higgs *et al.*, 2008) seem to jeopardize an accurate analysis.

Hornidge (2011) suggests that it is useful to frame “creative industries” as a boundary concept, defined by the different actors who use it in varying ways, and underlines that a common identity and common structure uniting these different definitions are still in the process of being constructed.

Intrinsically a theoretical construct, “creative industries” must be operationalized before it can be used to direct and evaluate local policies (Reese *et al.*, 2010). However, the diversity of methodological proposals for estimating creative employment and the use of distinct data sets tend to hamper a rigorous analysis and account of the magnitude of that creative employment. Based on distinct data-sets, existing estimates of the weight of creative industry/class range from a meagre 2.1%, for the UK, in 2008 (Clark, 2009), to a stunning 52.4%, for the Netherlands, in 2001 (Clifton & Cooke, 2009).

We aim at assessing the magnitude of creative employment by estimating its weight for all relevant existing methodologies—conventional approaches (Department for Culture, Media and Sport (DCMS) traditional industry-based); occupation-based approaches (Florida's approach, occupation-based approaches following Florida's and the refinements of Florida's taxonomy); and the combined industry and occupation-based approaches (the creative trident approach and the 2010 DCMS methodology)—using a unique and comparable micro data set (including over three million workers) from the official employment data-sets of Portugal (reference year: 2009). This allows a comparable quantification and proper discussion of the distinct figures provided by each methodology.

In the next sections (2 and 3), we describe and map the most relevant existing measurement approaches. In Section 4 we estimate the size of creative employment according to each approach, using Portugal data for the year 2009 as the reference case. Finally, in Section 5, we outline the most relevant contributions and policy implications of the present study.

2. Measuring the Creative Employment: A Review of the Main Methodologies

The empirical literature on the measurement analysis of creative employment can be distinguished into two main conceptual perspectives: one, more economic and industrial based, centred on “(creative) industries” and the other, more sociological based, on “(creative) people”.

The first conventional measures employed in empirical studies on the creative economy have been developed with an “industrial perspective”, based on the conception of creativity as a productive process which generates wealth by the exploitation of intellectual property rights. In parallel with the industrial methodologies, a “sociological occupational perspective” on creative employment—focused on what people do and their professional occupation—has emerged, associated with the concept of “creative class” (see Florida, 2002, 2004).

The following sections describe the approaches developed within each perspective (Sections 2.1 and 2.2), as well as the approaches which combine industries and occupations (Section 3.3).

2.1 *The Industrial Perspective: Conventional Industry-Based Approaches*

In terms of measurement, these approaches make use of the Standard Industrial Classification (SIC) system in order to estimate the size of creative industries. Here, creative employment is computed “by allocating all jobs in earmarked creative establishments—actual physical locations of production and service—into nested industries defined by major product” (Markusen *et al.*, 2008, p. 29), and summing up of all the workers in all the creative industries.

This first generation of methods emerged with the UK Creative Industries Mapping Document (DCMS, 1998, 2001), focused on capturing empirical information about specialized industries in each sector of the creative economy, for governmental purposes. Creative employment, in this case, is simply measured by the existing employment in each “creative” sector, considering both direct and indirect/support activities in the process (DCMS, 1998, 2001).

Despite the relevance of the approach, drawbacks in delimiting the creative sectors led to difficulties in the measurement of creative activities, restricting the potential dimension of these industries. Indeed, the industry-based approach has been criticized by several authors (e.g. Pratt, 2004; Markusen *et al.*, 2008; Granger & Hamilton, 2010). It has been stated that the results provided lead to an underestimation of creative employment, since they include the total number of employees working within those considered as creative industries, but overlook the creative employment outside those industries. Besides, there are limitations of the SIC systems in use. Even the most recent SIC codes seem to be inadequate when it comes to capturing information on creative industries. The SIC classification mostly relies on narrow coding, which does not provide detailed information on each sector, even when codes are disaggregated at their maximum levels. This limits a refined analysis of each activity sector and does not provide a sufficient detail for an accurate treatment of creative activities, tending to mitigate or aggregate them into broad categories (Granger & Hamilton, 2010).

Moreover, creative processes are being developed across all the sectors of the economy, but SIC codes hardly capture those activities. This is particularly true for the Design and Digital Media sectors, which are often intertwined with other activity sectors, some of them outside the creative core, such as the categories of product development, industrial design and fashion design, which mostly operate within the manufacturing sectors. This is also the case of Architecture, Crafts, Visual and Performing arts, whose activities often take place outside the creative core, within the manufacturing and services sectors.

2.2 *The Sociological Perspective: Occupational-Based Approaches*

Here, the Standard Occupational Classification (SOC) codes are used for the empirical estimation of creative “employment [which] is divided into nested occupational groups based on skill content and work process”, giving particular emphasis to what “workers do rather than what they make” (Markusen *et al.*, 2008, p. 29).

This line of research went beyond the industrial approaches by focusing on occupations instead of the aggregate employment of specialized industry sectors (Higgs & Cunningham, 2007). Unlike industry-based methodologies (e.g. DCMS, 1998, 2001), mostly centred on a restricted number of creative industries, occupational approaches broadened the dimension of creative employment by accounting for the occupations considered as creative in all economic activities.

This type of measurement methodology allows for a detailed analysis of the creative workforce and the occupational structure over time, across regions and countries. For instance, Gabe (2006) used a shift-share model to study the evolution of the creative workforce in urban areas of the US between 1990 and 2000, whereas McGranahan and Wojan (2007) developed a detailed analysis of creative categories in order to assess the occupational structure of US nonmetropolitan counties (cf. Table 1).

One frequent drawback pointed at occupational-based approaches is that activities considered as creative are often associated with those involving higher educational levels (Markusen *et al.*, 2008) to the detriment of others (e.g. craft work) that are also creative but associated with less formal education. In particular, as stressed by Glaeser (2005), by using census occupational data and grouping creative workers into high-skilled categories, Florida’s (2002) criteria led to biases in the measurement of creative occupations. It was further uncovered that each occupational category code covered a diversity of detailed professions with their categorization as “creative”, involving a high degree of arbitrariness (McGranahan & Wojan, 2007). On this issue, McGranahan and Wojan (2007) proposed a refinement of Florida’s occupational groups based on a ranking of the creativity required by each given activity. This procedure conferred greater objectivity on the scrutiny of creative occupations, producing more robust estimations of creative employment than Florida’s (2002) study. Occupational approaches also overlook or neglect self-employed workers; since official source data mostly contain information on firms employing creative workers, they do not account for the self-employed, while their contribution to the creative economy appears to be significant (Van Steen & Pellenbarg, 2012). This problem is particularly relevant in the case of “bohemians”, for whom freelance works represent a significant part of their activity (Fritsch & Stuetzer, 2009). Finally, occupational-based approaches fail to permit the discrimination between the type of industries where creative workers operate and their industrial affiliation, since here, SIC codes are not taken into account.

2.3 *The Combined Industry- and Occupation-Based Approaches*

Limitations of the two above approaches called for the development of a methodology making a combined use of the SIC/SOC codes. The type of information gathered in this combined approach provides data on industries where creative workers are operating,

Table 1. Creative employment—a synthesis of empirical results in literature

Methodological approach	Characteristics	Author(s)/study	Methodology followed	Empirical results—relative weight of creative employment in total workforce
<i>Industrial perspective:</i> Conventional, industry-based approach	Under these approaches, mostly drawn from the <i>DCMS framework, estimates of creative employment are restricted to core specialized creative sectors</i> . This leads to more modest estimations of creative employment than found with other approaches, particularly those following Florida's (2002, 2004) definition. (Use of SIC codes)	DCMS (1998, 2001), <i>UK Creative Industries Mapping Document</i>	Creative employment is measured by the <i>total employment in each of the 13 core creative sectors</i> , considering both direct and indirect or supporting/non-creative activities in the process	UK (1998): 5%
		DCMS (2001), <i>Creative Industries Mapping Document 2001</i>	Creative employment is measured using a method closely following the DCMS (2001) framework— <i>industry-based approach</i>	UK (2001): 7%
		Boix <i>et al.</i> (2010), "The geography of creative industries in Europe: Comparing France, Great Britain, Italy and Spain"		France: 4.5%; Great Britain: 5.7%; Italy: 5.6%; Spain: 4.1%
		Curran and Van Egeraat (2010), "Defining and Valuing Dublin's Creative Industries"		Ireland (2006): 6.8%
		White (2010), "Creative industries in a rural region: Creative West. The creative sector in the Western Region of Ireland"		Western Region of Ireland (2008): 3%
<i>Sociological perspective:</i> occupational-based approach	Under these approaches, estimates of creative employment cover <i>all the creative occupations across all the industry sectors</i> of the economy. This leads to a much <i>broader perspective of the creative class</i> , particularly because it includes all the creative professionals, a vast category that is present in almost all activity sectors (use of SOC codes)	Florida (2002), <i>The rise of the Creative Class—and How it's Transforming Work, Leisure, Community and Everyday Life</i>		US (1999): 30.0%, of which: <i>Super Creative Core</i> : 11.7%; <i>Creative Class</i> : 18.3%
		Florida (2005), <i>The Flight of the Creative Class: The New Global Competition for Talent</i>	Creative employment is determined on the basis of Florida's (2002, 2004) definition of creative class: <i>Super Creative Core</i> ; <i>Creative Professionals</i> ; and <i>Bohemians</i> (see Section 2)	<i>BROAD definition (including technicians)</i> (2002): UK: 33.8%; Germany: 40.2%; Norway: 41.6%; Denmark: 41.8%; Finland: 41.0%; Sweden: 42.4%; the Netherlands: 47.0%; US: 27.3%; Canada: 38.1% <i>NARROW definition (excluding technicians)</i> (2002): UK: 20.1%; Germany: 20.1%; Norway: 18.8%; Denmark: 21.3%; Finland: 24.7%; Sweden: 22.9%; the Netherlands: 29.5%; US: 23.6%; Canada: 25.0%
		Clifton (2008), "The 'creative class' in the UK: an initial analysis"	Estimation of Creative Employment in England and Wales (2001), following Florida's (2002, 2004) definition of creative class	England and Wales Total (2001): 37.3%

	Clifton and Cooke (2009), “Creative knowledge workers and location in Europe and North America: a comparative review”	Estimation of Creative Employment in Europe, following Florida’s (2004) <i>creative class</i> concept, <i>although considering a “small number of occupations”</i> in the “creative professionals” category (Clifton & Cooke, 2009, p. 79)	(2001): UK: 36.3%; Germany: 33.3%, Norway: 18.6%; Denmark: 27.6%; Finland: 33.4%; Sweden: 29.8%; the Netherlands: 52.4%
	Boschma and Fritsch (2009), “Creative Class and Regional Growth: Empirical Evidence from Seven European Countries”	Estimation of Creative Employment in 7 European countries (<i>Denmark, England and Wales, Finland, Germany, the Netherlands, Norway and Sweden</i>), following Florida’s (2002, 2004) definition of creative class	Seven developed European countries (2002): 37.7%, of which: Creative Core: 26%, Creative Professionals: 70%; Bohemians: 4%
	Fritsch and Stuetzer (2009), “The geography of creative people in Germany”	Estimation of Creative Employment in West Germany, following Florida’s (2002) definition of creative class	West Germany (2004): 36.8%
	Mellander (2009), “Creative and Knowledge Industries: An Occupational Distribution Approach”	Estimation of Creative employment, by studying the occupational structure within industries (private sector) in Sweden, and following Florida’s (2002) definition of creative class	Sweden (2001): 36.8%
	Mellander <i>et al.</i> (2010), “Occupational and Industrial Distribution in Denmark: A comparison study with the US, Canada and Sweden”	Estimation of Creative employment, by studying the occupational structure within industries in Denmark, in comparison with the US, Canada and Sweden, and closely following Florida’s (2002) definition of creative class	Denmark(2007): 39.5%; USA (2005): 35.1%; Canada (2006): 30.9%; Sweden (2005): 43%
<i>Sociological perspective:</i> occupational-based approach	<i>Refinements of Florida</i> Here, <i>refinements of Florida’s (2002) taxonomy</i> are developed to restrict creative occupations to those that the authors believe are actually creative (use of SOC codes)	Gabe (2006), “Growth of Creative Occupations in US Metropolitan Areas: A Shift- Share Analysis”	USA urban (1999): 18.1%
	McGranahan and Wojan (2007), “Recasting the Creative Class to Examine Growth Processes in Rural and Urban Counties”	Recasting of Florida’s (2002) measure, by the <i>exclusion of occupational categories</i> from the summary groups of “Business”, “Educational” and “Legal” occupations and by excluding the whole summary category of “Healthcare” occupations	Urban USA (2003): 30.9% Rural USA (2003): 19.4%

(Continued)

Table 1. Continued

Methodological approach	Characteristics	Author(s)/study	Methodology followed	Empirical results—relative weight of <i>creative employment</i> in total workforce
<i>Combined industry and occupation-based approaches</i> (Mostly drawn upon the <i>DCMS framework</i>)	Under these approaches, estimates of creative employment are calculated by <i>all the occupations (creative occupations + non-creative/support occupations) in core creative sectors</i> (specialist and support mode) + <i>All the creative occupations in non-creative sectors</i> of activity (embedded creative employment) (Use of SIC and SOC codes)	Higgs <i>et al.</i> (2008), <i>Beyond creative industries: Mapping the creative economy in the UK</i> (coord. Higgs, P., Cunningham, S. and Bakhshi, H.)	– The selection of “core creative sectors” is mostly drawn from the <i>DCMS framework</i> ; – For creative employment, the authors develop the <i>Creative Trident</i> approach: <i>CREATIVE employment</i> = <i>specialist</i> and <i>support</i> creative occupations in the “specialized creative sectors” –the <i>Core Creative industries</i> , or those dedicated to the “pre-creation” and “creation” stages of the process + All the <i>creative occupations in non-creative sectors of activity (embedded creative employment)</i> , namely, in sectors such as “manufacturing”, “real estate”, “business activities”, “wholesale and retail trade”, and “financial intermediation”	UK (2001): 7.1%
		Clark (2009), “Crunching creativity: an attempt to measure creative employment”	Use of original DCMS framework with 2003 SIC codes (less specified industry categories) Use of a <i>SIC-SOC matrix</i> with UK 2007 SIC codes formulation, which provide a more detailed specification of each industry’s grouping category	UK (2008): 5.5% UK (2008): 2.1%
		DCMS (2010a), <i>Creative Industries Economic Estimates (Experimental Statistics)</i> — <i>December 2010</i>	DCMS framework combined with occupational data based on SOC system – Use of <i>combined industry and occupational approach</i> to measure the creative employment in the industry sectors of the UK Creative employment is measured by: “Employment in the Creative Industries” + “Employment in creative occupations in businesses outside the Creative Industries” (DCMS, 2010a)	UK (2010): 7.8%

and allows the identification of creative individuals working in non-creative sectors of activity, as well as of non-creative/ support labour existing in creative industries.

Higgs *et al.* (2008) proposed the “creative trident” approach to map the creative economy, employing both industry and occupational codes (see Table 1). More recently, studies drawing on the DCMS industry-based approach (DCMS, 2006, 2010a, 2010b) have enlarged their analysis of core creative sectors by using both industry and occupational codes. According to these studies and some other authors (e.g. Barbour & Markusen, 2007), combined industry and occupational-based approaches provide a richer account of the occupational distribution within industries.

Industries’ employment structures diverge significantly from region to region and changes in regional labour structures and the economic dynamics of industries may gain from a combined industry and occupational approach for a better interpretation of occupational mobility across sectors, over time (Barbour & Markusen, 2007; Currid & Stolarick, 2010). In this vein, such an approach is useful for regional policy implementation and management.

Despite the advantages of using these approaches, they are not free from limitations. Restrictions of source information and of nomenclatures in use, such as highly aggregated data particularly on industries, long time intervals between each data upgrading process, limited knowledge on self-employment, as well as difficulties in matching SIC with SOC codes and in capturing the creative component, are some of the major shortcomings reported by authors using combined industry and occupational-based approaches (Higgs & Cunningham, 2007; Higgs *et al.*, 2008).

Summing up, extant empirical studies on the measurement of creative employment show that the methodologies based in the “industrial perspective”, such as the DCMS traditional approach, generally lead to more restricted figures of creative employment, as they only consider the number of workers in the core of creative industries. In contrast, the “sociological perspective”, including the occupational-based approaches of Florida and those following Florida’s taxonomy, produces broadened results since they envisage the “creative class” as a wide group of professional categories considered as “creative”, regardless of the economic activity sector. The empirical studies based on combined industry and occupational-based approaches evidence larger figures than those based on the industry perspective, as they also take into account creative employment in the non-creative activity sectors, but inferior to that obtained by exclusively occupational-based approaches (see Table 1 and Figure 1).

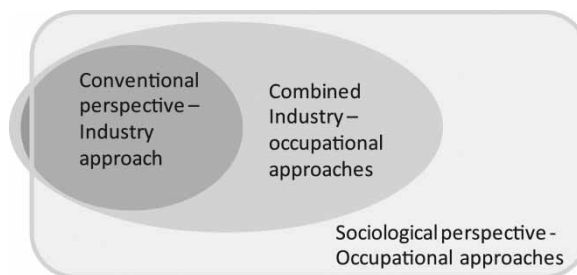


Figure 1. The boundaries of the creative employment according to the main measurement perspectives.

3. Mapping the Distinct Methodologies Used in Literature

3.1 *Industrial Perspective: Conventional Approach*

The methodological details regarding the selection of the sectors and the industry codes included corresponded to the taxonomy on creative sectors inspired by the original DCMS (1998, 2001) reports.¹

In order to guarantee that this mapping would be as accurate as possible, we used detailed four- and five-digit industry codes, the maximum resolution of the latest Portuguese classification on economic activities (CAE—Rev. 3). We also used the International SIC (ISIC)—Rev. 3.1 codes, compatible with the UK SIC 2003 codes presented in the DCMS (2010b) technical note. To make an adequate correspondence between these codes and our nomenclature on industries, we converted all the ISIC—Rev. 3.1 into the latest ISIC—Rev. 4 codes, which have an appropriate compatibility with the structure of the Portuguese SIC system, CAE—Rev. 3 (see Table 2 for a summary description).²

The industry sectors mapped are grouped into the following segments (cf. DCMS, 2010b): “Advertising”; “Architecture”; “Arts and Antiques”, “Crafts”; “Design”; “Designer Fashion”; “Video, Film and Photography”; “Music and the Visual and Performing Arts”; “Publishing”; “Software, Computer Games & Electronic Publishing”; and “Radio and TV”.

Following this approach, in the segments of “Architecture”, “Arts and Antiques”, “Designer Fashion”, “Video, Film and Photography”, “Music and the Visual and Performing Arts”, and “Publishing”, only a portion of the total employment the relevant industry codes was taken, as these sectors also incorporate a large number of technical, administrative or functional activities, that is, non-creative employment.

In the “Crafts” segment, no SIC codes were included by the DCMS report on the grounds that “the majority of businesses was too small to be picked up in business surveys” (DCMS, 2010b, p. 2). By the same token, it was argued that “handicraft activities” could be more accurately described by using industry classification systems and business surveys, so the information on these activities was absent from the DCMS report. But given that these activities are listed as core creative, we included the industrial codes that best represented craftwork and traditional trades, namely: “ceramics”, “glass products manufacture”, “production of wooden articles” and “jewellery”, considering, in terms of creative employment, a small proportion of each code (5%).³

The mere use of industrial (SIC) codes, the inclusion of a restricted number of industry sectors in the creative core and the degree of arbitrariness in the portions attributed to each industrial code have been generally criticized in the literature (Markusen *et al.*, 2008; Clark, 2009). Furthermore, the basic consideration of creative employment as the number of workers operating inside a core of creative sectors, overlooking the creative employment that exists outside that established core, was found, as earlier referred, to be a major limitation of the DCMS approach, in particular, and of conventional industry-based approaches, in general.

The application of this approach to map and estimate the figures for creative employment in Portugal, provided quite small figures of creative employment, which might in part be explained by the limitations of the SIC system used (despite the use of a very detailed five-digit codes) and the application, according to the DCMS proposal, of the somehow arbitrary portions of the industries’ employment considered.

Table 2. The mapping of DCMS industry-based approach

Core creative sectors	UK 2003 SIC codes	Proportion of code taken	ISIC Rev. 4 codes	Portuguese SIC codes -CAE—Rev. 3–5 digits
(1) Advertising	74.40	100%	7310; 7320	73,110; 73,120; 73,200
(2) Architecture	74.20	25%	7110; 7120	71,110; 71,120; 71,200
(3) Arts and antiques	52.48/9; 52.50	5%	4774; 4791	47,790
(4) Crafts ^a	“Majority of businesses too small to be picked up in business surveys” (Source: DCMS, 2010b, p. 2)	–	–	23,411; 23,412; 23,413; 23,414; 23,110; 23,120; 23,131; 23,132; 23,140; 23,190; 16,291; 16,292; 32,110; 32,121; 32,122; 32,123; 32,130
(5) Design	“No codes match this sector” (source: DCMS, 2010b, p. 2)	–	–	74,100
(6) Designer fashion	17.71; 17.72; 18.10; 18.22; 18.23; 18.24; 18.30; 19.30	0.5%	1410; 1420; 1430; 1512; 1520;	14,110; 14,120; 14,131; 14,132; 14,133; 14,140; 14,190; 14,200; 14,310; 14,390; 15,120; 15,201; 15,202
	74.87	2.5%	7410	74,100
(7) Video, film and photography	92.11; 92.12; 92.13;	100%	5911; 5912;	59,110; 59,120; 59,130
	22.32	100%	5913	59,140
	74.81	25%	5914	18,200
		25%	1820	74,200
			7420	

(Continued)

Table 2. Continued

Core creative sectors	UK 2003 SIC codes	Proportion of code taken	ISIC Rev. 4 codes	Portuguese SIC codes -CAE—Rev. 3–5 digits
(9 and 10) Music and the visual and performing arts	22.14; 22.31	25%	5920	59,200
	92.31; 92.32; 92.34	100%	9000; 7990	90,010; 90,020; 90,030; 90,040; 79,900
	92.72	25%	9321; 9329	9321; 9329
(11) Publishing	22.11; 22.12; 22.13	100%	5811; 5813	58,110; 58,130; 58,140
	22.15	50%	5819	58,190
	92.40	100%	6391; 6399	63,910; 63,990
(8 and 12) Software, computer games and electronic publishing	22.33	25%	1820	18,200
	72.21	100%	5820	58,210; 58,290
	72.22	100%	6201; 6202	62,010; 62,020
(13) Radio and TV	92.20	100%	6010; 6020	60,100; 60,200

Sources: The selection of codes was based on DCMS (2010b) Correspondence tables between ISIC Rev. 3.1 and ISIC Rev. 4 available at <http://unstats.un.org/unsd/cr/registry/rego.asp?Ci=60> (accessed February 2013). The Portuguese nomenclature CAE (*Classificação das Actividades Económicas*) has direct correspondence with ISIC Rev. 4.

^aIt was considered here some codes representing traditional manufacturing related with crafts activities (ceramics design and decoration, glass, wooden articles and jewellery); the proportion used was 5%.

3.2 Sociological Perspective: Occupation-Based Approaches

3.2.1 *Florida's Original Proposal.* The second wave of methodologies to analyse the creative employment resorts to a sociological perspective of creative employment (the creative class) and focuses on occupations rather than on industrial sectors. The most influential occupation-based approach was developed by Florida (2002, 2004). In it, all the creative occupations throughout the activity sectors of the economy were extensively scrutinized and categorized into two major groups: the "Super Creative Core" and the "Creative Professionals".

In the "Super Creative Core", which comprises all the occupations in artistic fields (e.g. performing arts, media, entertainment or design activities), and scientific domains (namely, science, engineering, architecture and education), we included all the professions that, according to Florida (2002), are directly engaged in the creative process. Hence, all the occupational categories relative to "Computer and mathematical occupations"; "Architecture and engineering occupations"; "Life, physical and social science occupations"; "Education, training and library occupations"; and "Arts, design, entertainment, sports and media occupations" have been selected (see Table 3).

Although Florida (2002) uses broad summary occupational categories in his definition, we mapped his approach using ISCO-08 codes with their maximum detail and occupational nomenclature CPP2010 at a five-digit level to assure greater precision and detailed information on this scrutiny. All the codes were considered in their whole proportion (100%), corresponding to the total number of workers in each occupational category considered, in all the activity sectors of the economy.

The broader group of "Creative Professionals", a class of technicians whose main purpose is to deal with daily problem resolution in a variety of knowledge-based segments such as "high-tech sectors, financial services, the legal and healthcare professions, and business management" (Florida, 2002, p. 69), was also comprehensively mapped. During this exercise, it was evident that these professionals generally have a high academic background and were highly skilled workers in their occupational category. Here, a vast group of professionals and their occupational codes were considered for a wide variety of fields: "Management occupations"; "Business and financial operations occupations"; "Legal professionals"; "Health professionals (except nursing)"; "Nursing and midwifery professionals"; "Life science and health associate professionals"; "Physical, chemical, construction and engineering sciences associate professionals"; and "Finance and sales associate professionals" (cf. Table 3).

Despite the practical simplicity of this approach and the interesting focus on studying occupations instead of industry sectors, certain shortcomings were detected. When mapping Florida's (2002) proposal, we found three limitations that corroborated critiques already levelled before (see Glaeser, 2005; Markusen, 2006): (i) the use of vast, wide-ranging and summary category groups, which often overlooked the detail of each occupation present in the broad categories included; (ii) the correlation between occupations considered as creative and highly skilled, educated professions; (iii) the absence of handicraft workers, crafts occupations and skilled labourers related to traditional, artisanal or handmade activities (which Florida does not consider in his definition).

3.2.2 *Proposals Following Florida's.* Closely following Florida's (2002, 2004) approach, Boschma and Fritsch (2009) present a taxonomy for delimiting the creative

Table 3. Florida's definition of "Creative Class"—Occupational categories

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 codes (summary categories)/Portuguese Standard Occupational codes CPP—2010 (summary categories) ^a
<i>Super Creative Core</i>	<ul style="list-style-type: none"> • Computer and mathematical occupations; <ul style="list-style-type: none"> • Architecture and engineering occupations; • Life, physical and social science occupations; • Education, training and library occupations; • Arts, design, entertainment, sports and media occupations 	<ul style="list-style-type: none"> • Computing professionals (25); <ul style="list-style-type: none"> • Mathematicians, Statisticians and related professionals (212); • Architects, Engineers and related professionals (214; 215; 216); • Life Science professionals (213); • Physicists, Chemists and related professionals (211); • Social Science and related professionals (263); • University and higher education teachers (231); • Vocational, technological and artistic education teachers (232); • Secondary and basic education teachers (233); • Primary school and early childhood teachers (234); • Other teaching professionals (235); • Archivists, museum curators and related information professionals (262) + <i>Bohemians</i> <ul style="list-style-type: none"> • Authors, journalists and linguists (264); • Creative and performing artists (265); • Product and garment designers (2163); • Graphic and multimedia designers (2166); • Musicians, singers and composers (2652); • Dancers and choreographers (2653); • Film, stage and related directors and producers (2654); • Actors (2655); • Announcers on radio, television and other media (2656); • Creative and performing artists not elsewhere classified (2659); • Advertising and marketing professionals (2431); • Public relations professionals (2432); • Artistic, Entertainment and Sports associate professionals (342; 343); • Telecommunications and broadcasting technicians (352); • Fashion and other models (5241)

Creative Professionals

- Management occupations;
 - Business and financial operations occupations;
 - Legal occupations;
 - Healthcare practitioners and technical occupations;
 - High-end sales and sales management
- Legislators, senior officials and managers (1);
 - Finance professionals (241);
 - Administration professionals (242);
 - Financial and mathematical associate professionals (331);
 - Sales and purchasing agents and brokers (332);
 - Business services agents (333);
 - Legal professionals (261);
 - Health professionals (except nursing) (221; 223; 224; 225; 226);
 - Nursing and midwifery professionals (222);
 - Nursing and midwifery associate professionals (322);
 - Life science technicians and related associate professionals (314);
 - Medical and pharmaceutical technicians and health associate professionals (321; 323; 324; 325);
 - Physical and engineering sciences technicians (311; 312; 313; 315);
 - Information and communications technology operations and user support technicians (351);
 - Regulatory government associate professionals not elsewhere classified (3359);
 - Finance and sales associate professionals (2433; 2434)

Sources: Florida (2002, 2004), Fritsch and Stuetzer (2009). The selection of codes is from the responsibility of this article's authors as a result of their interpretation on Florida's category groups and respective descriptions.

^aThe detailed mapping at a five-digit level can be provided upon request to the authors.

class. Accordingly, when mapping these latter authors' approach, we considered all the occupations in categories related to "Computing", "Science", "Architecture and Engineering", "Health (except nursing)" and "Education", as being part of the "Super Creative Core". "Creative Professionals" included all categories in the fields of "Management and Legislation", "Nursing", "Business and Administration", "Legal services", "Administrative work", and "Personal and Social services". Finally, in "Bohemians", we considered all the occupational categories related to "Arts, Design, Entertainment, Sports and Media" (see Table A1).

The mapping of this approach was quite similar in structure to that presented in the case of Florida's (2002), leading to a comprehensive categorization of the creative occupations. In addition to the categories that were presented by Florida *et al.* (2008) categories also included the "Administrative Associate professionals" in the segment of "Creative Professionals". In Florida (2002), these occupations appeared in the non-creative service class. This obviously led to more inflated results when compared to those obtained by using Florida's approach.⁴

The approaches which closely follow Florida's taxonomy share the same characteristics and the limitations of the original proposal, especially those related to the use of broad summary category groups in their definition of the creative class.

3.2.3 Refinements of Florida's Proposal. McGranahan and Wojan (2007) undertook a detailed analysis of all the summary occupational groups in Florida's taxonomy and proposed a refinement approach on the basis of the creativity required by each professional activity. The recasting was based on the information from a publicly available database—the US O*NET database—which features the creativity level involved in each occupation, described by the proxy "[d]eveloping, designing or creating new applications, ideas, relationships, systems or products, including artistic contributions"⁵ (McGranahan & Wojan, 2007, p. 201).

We mapped this refinement approach of McGranahan and Wojan (2007) by excluding all those that were regarded by the authors as less-creative occupations in the summary categories fully accounted by Florida (2002). Hence, in "Management occupations", we removed all the occupations related to "farmers and farm managers" (see Table A2). From "Healthcare practitioners and technical occupations", all the categories were excluded. In "Education, training and library occupations", only "post-secondary teachers" and "librarians, curators and archivists" were included. In "Business and financial operations", only "accountants and auditors" were considered. In "Legal occupations", only "lawyers" were included. From "Life, physical and social science occupations", we excluded all the associated technicians. The summary category of "Computer and mathematical occupations" was taken into account in full. The summary group of "Architecture and engineering occupations" was also fully included in the recast measure. All the occupations related to "Arts, design, entertainment, sports and media" activities were wholly accounted. And finally, in "High-end Sales", all the occupational codes related with "sales representatives" and with the residual category of "other sales and related occupations, including supervisors" were included.

Since the code descriptions used by the authors on their recasting—US SOC 2000—and the occupational nomenclatures that we used—ISCO-08 and CPP2010—did not match exactly, the codes to be considered in our mapping were selected according to our interpretation of McGranahan and Wojan's (2007) refinement criteria, based on the

O*NET database of occupations.⁶ By the same token, the descriptions of major category groups considered may differ slightly from those presented in McGranahan and Wojan (2007), but all the codes included properly describe the refined measure developed by these authors.

Another refining approach of Florida's original proposal was developed by Gabe (2006), who focused on Florida's "Super Creative Core", adding up to this latter category all the management occupations. Thus, on mapping this approach, we included all the detailed occupational codes which make up the summary categories of "Computer and mathematical occupations", "Architecture and engineering occupations", "Life, physical and social science occupations", "Education, training and library occupations", "Arts, design, entertainment, sports and media occupations", "Media and communication equipment workers", and all "Management occupations" (see Table A3). All the categories excluding the latter ("Management occupations") coincide with Florida's (2002) "Super Creative Core".

Although relying upon more objective criteria in the selection of creative occupations, based on the O*Net occupational database, given that they only suggest a recasting of the summary categories present in Florida's definition, these refinement proposals continue to conflate human capital with creativity. The occupational groups considered in these proposals had already been subject to criticism (see Glaeser, 2005) and the authors did not go beyond those categories in their refinement approaches. Indeed, "Jewellers", "hand sewers and seamstresses", "fabric and apparel patternmakers", "precious metal workers", "painting, coating and decorating workers", "potters", "pre-press technicians", and other skilled workers in a vast array of manufacturing sectors (e.g. printing sector, wood, glass, ceramics, furniture, textiles), including occupations that also require creative thinking, continue to be absent from these refinement proposals.⁷

3.3 *The Combined Industry and Occupation-Based Approach*

3.3.1 *The Creative Trident.* The creative trident method, presented by Higgs *et al.* (2008), proposes to measure creative employment by taking into account three types of creative workers: (i) "Specialist creative workers", employed in the creative occupations operating in the creative industrial sectors; (ii) "Support workers", non-creative occupations engaged in support activities, such as management, administrative, technical, in the creative sectors; and (iii) "Embedded creative workers", comprising individuals in creative occupations in non-creative sectors. According to this methodology, the sum of these three types of employment, in the selected creative occupations and industry sectors, gives the total creative employment in the economy.

This methodological proposal was mapped using the details provided by Higgs *et al.* (2008) in the technical appendix of their report. To achieve the best possible accuracy in this mapping, we used the most recent industry codes—CAE—Rev. 3—with the maximum detail, compatible with the latest international ISIC—Rev. 4 codes, in order to describe all the industry sectors that best correspond to the creative industries defined by Higgs *et al.* (2008). To define the core creative sectors, Higgs *et al.* (2008, p. 27) took as a departure point the Frontier Economics (2007) framework and selected all those industries directly involved in "the pre-creation and creation stages of the value chain", which they called the "creative core".

Although the creative trident approach differs from the recent industry and occupational-based approach of DCMS basically at the level of improvements included,⁸ the selected creative sectors were aligned “with the 13 sectors that make up the official DCMS measure of the creative industries” (Higgs *et al.*, 2008, p. 19), which permits direct comparisons between these two approaches. The core creative sectors covered the following segments: “Advertising and Marketing”; “Architecture”, “Visual Arts and Design”; “Film, TV, Radio and Photography”; “Music and Performing Arts”; “Publishing”; and “Computer Software” (cf. Table 4).

The set of creative occupations has been mapped as corresponding to all workers whose primary purpose was engagement in creative functions and who were directly involved in the production and creation stages. In their definition, Higgs *et al.* (2008, p. 28) included: (i) “those engaged in producing primary creative output—for example, writers, musicians, visual artists, film, television and video makers, sculptors and craftspeople”; (ii) “those engaged in interpretive activity—for example, performers interpreting works of drama, dance, music, etc. in a wide variety of media from live performance to digital transmission via the Internet”; and (iii) “those supplying creative services in support of artistic and cultural production—for example, book editors, lighting designers, music producers, etc.”

We mapped all the occupational codes according to the nomenclature UK SOC 2000, followed by Higgs *et al.* (2008, p. 60) in their technical appendix, and using the corresponding codes of the latest international ISCO-08 system and of Portuguese most recent occupational nomenclature CPP 2010.

During the mapping exercise, even though a suitable correspondence was found between the different industrial nomenclatures used, it was difficult to thoroughly describe the creative activities in some of the codes, particularly those related to all-inclusive or residual categories such as “Other entertainment activities” or “Recreational, cultural and sporting activities not otherwise specified”.

The estimations of this SIC–SOC approach were carried out by considering the whole proportion (100%) of employment in each industry and occupational code. The procedure for estimating creative employment encompassed the inclusion of all “Specialist” and “Support” workers in each defined creative sector, plus the “Embedded creative workers”, i.e. those in the selected creative occupations, but operating in all the non-creative sectors of the economy.

3.3.2 The 2010 DCMS Proposal. In a similar way to the creative trident approach, besides the total employment in the selected creative industries, all the creative workers operating outside the defined core creative sectors are taken into account in the 2010 DCMS methodological proposal (DCMS, 2010a).

The selection of creative sectors followed the original DCMS framework, which lists the following segments: “Advertising and Marketing”; “Architecture”; “Arts and Antiques”; “Crafts”; “Design”; “Designer Fashion”; “Video, Film and Photography”; “Radio and TV”; “Music and the Visual and Performing Arts”; “Publishing”; and “Software and Electronic Publishing” (Table 5).

In this mapping, we use the latest international ISIC—Rev. 4 codes and the corresponding national industry codes CAE—Rev to describe all the industry sectors that best match the core creative industries defined by DCMS (2010a).

According to DCMS (2010a), when industry sectors that were considered as creative also comprised non-creative activities, only a portion of the code is accounted in the esti-

Table 4. Combined industry- and occupational-based approach—the Creative Trident

Creative sectors	UK 2003 SIC codes	ISIC Rev. 4 codes	Portuguese CAE—Rev 3 codes—4 digits	SOC2000—occupational UK codes	ISCO—08 codes—4 digits	Portuguese Occupational Codes (Portuguese CPP 2010)—4 digits
(1) Advertising	Advertising (744)	7310; 7320	7311; 7312; 7320	Advertising and public relations managers (1134); Marketing associate professionals (3543)	1221; 1222; 2431; 4227	1221; 1222; 2431; 4227
(2) Visual arts, design and architecture	Manufacture of jewellery and related articles (362)	3211; 3212	3211; 3212; 3213	Artists (3411); Goldsmiths (5495); Hand craft occupations (5499); Glass and ceramics makers, decorators and finishers (5491); Furniture makers/craft woodworkers (5492)	2651; 7311; 7313; 7314; 7315; 7316; 7317; 7521; 7522; 7318; 7319; 7531	2651; 7311; 7313; 7314; 7315; 7316; 7317; 7521; 7522; 7318; 7319; 7531
	Design (no UK SIC code)	7410	7410	Graphic designers (3421); Product, clothing designers (3422)	2163; 2166; 3432	2163; 2166; 3432
	Architecture (74,201)	7110	7111	Architects (2431); Town planners (2432); Architectural technologists and town planning technicians (3121); Design and development engineers (2126); Draughts persons (3122)	2161; 2162; 2164; 2165; 3118	2161; 2162; 2164; 2165; 3118

(Continued)

Table 4. Continued

Creative sectors	UK 2003 SIC codes	ISIC Rev. 4 codes	Portuguese CAE—Rev 3 codes—4 digits	SOC2000—occupational UK codes	ISCO—08 codes—4 digits	Portuguese Occupational Codes (Portuguese CPP 2010)—4 digits
(3) Film, TV, radio and photography	Motion Picture and Video activities (921); Radio and TV activities (922)	5911; 5912; 6010; 6020; 7420	5911; 5912; 6010; 6020; 7420	Arts officers, producers and directors (3416); Broadcasting associate professionals (3432); Photographers and audio-visual equipment operators (3434)	2654; 2656; 3521; 3435; 3431	2654; 2656; 3521; 3435; 3431
(4) Music and the performing arts	Recreational, cultural and sporting activities n.o.s. (920); Other entertainment activities (923)	5920; 9000; 9321; 9329	5920; 9001; 9002; 9003; 9004; 9321; 9329	Musicians (3415); Actors, entertainers (3413); Dancers and choreographers (3414)	2652; 2653; 2655	2652; 2653; 2655
(5) Publishing	Publishing (221); News agencies (924); Library, archives, museums and other cultural activities (925)	5811; 5812; 5813; 5819; 7490; 9101; 9102; 9103; 6391; 6399	5811; 5812; 5813; 5814; 5819; 7430; 9101; 9102; 9103; 9104; 6391; 6399	Authors, writers (3412); Journalists, newspaper and periodical editors (3431); Originators, composers and print preparers (5421); Librarians (2451); Library assistants/clerks (4135); Archivists and curators (2452)	2641; 2642; 2643; 7321; 2621; 2622; 3433	2641; 2642; 2643; 7321; 2621; 2622; 3433
(6) Computer software	7220 Computer Software consultancy (disaggregated from the records of “72 Computer and related activities”)	6201; 6202; 6209	6201; 6202; 6203; 6209	Software professionals (2132); IT strategy and planning professionals (2131)	2511; 2512; 2513; 2514; 2519; 2521; 2522; 2523; 2529; 3511; 3512; 3513; 3514	2511; 2512; 2513; 2514; 2519; 2521; 2522; 2523; 2529; 3511; 3512; 3513; 3514

Note: The selection of codes is of the responsibility of the present paper's authors, according to their interpretation of Higgs *et al.* (2008, pp. 59–61) selection of industrial (UK SIC, 2003) and occupational (UK SOC, 2000) codes. The respective occupational codes were converted into the recent versions of ISCO-08 and the Portuguese CPP2010.

Table 5. The 2010 DCMS proposal: combined industry–occupational approach

Core creative sectors	UK 2007 SIC codes	Portion of SIC codes	ISIC Rev.4 codes	Portuguese CAE—Rev 3 codes	SOC2000—occupational UK codes	ISCO—08 codes—4 digits	Portuguese Occupational Codes (Portuguese CPP 2010)—4 digits
(1) Advertising and marketing	Advertising (73.11); Media Representation (73.12)	100%	7310; 7320	7311; 7312; 7320	Advertising and public relations managers (1134); Marketing associate professionals (3543); Public Relations Officers (3433)	1221; 1222; 2431; 2432; 4227	1221; 1222; 2431; 2432; 4227
(2) Architecture	Architectural activities (71.11); Design activities (74.10)	100% 4.5%	7110; 7410	7111; 7410	Architects (2431); Town planners (2432); Architectural technologists and town planning technicians (3121)	2161; 2162; 2164; 2165	2161; 2162; 2164; 2165
(3) Arts and antiques	Retail sale in commercial art galleries (47.78/1); Retail sale of antiques including antique books, in stores (47.79/1);	100%	4774	47,790	“No SOC codes match this sector” (DCMS, 2010a, p. 23).		

(Continued)

Table 5. Continued

Core creative sectors	UK 2007 SIC codes	Portion of SIC codes	ISIC Rev.4 codes	Portuguese CAE—Rev 3 codes	SOC2000—occupational UK codes	ISCO—08 codes—4 digits	Portuguese Occupational Codes (Portuguese CPP 2010)—4 digits
(4) Crafts	“Majority of businesses too small to be picked up in business surveys” (DCMS, 2010a, p. 20).				Floral arrangers/florists (5496); Hand craft occupations n.e.c. (5499); Musical instrument makers and tuners (5494); Goldsmiths (5495); Glass and ceramics makers, decorators (5491); Glass and Ceramics process operatives (8112); Furniture makers, other craft woodworkers (5492); Labourers in Building and Woodworking trades (9121) (5% of SOC); Pattern makers (5493)	6113; 7311; 7312; 7313; 7314; 7315; 7316; 7317; 7521; 7522; 7523 (5% of SOC); 7318; 7319; 7531; 7532	6113; 7311; 7312; 7313; 7314; 7315; 7316; 7317; 7521; 7522; 7523 (5% of SOC); 7318; 7319; 7531; 7532
(5) Design	Design activities (74.10)	89.7%	7410	7410	Artists (3411); Product, Clothing and related designers (3422) (93.9% of SOC); Graphic designers (3421); Design and Development engineers (2126)	2651; 2163 (93.9% of SOC); 2166; 3432	2651; 2163 (93.9% of); 2166; 3432
(6) Designer fashion	Clothing manufacturing UK SIC 2007 codes (14.11, 14.12, 14.13, 14.14, 14.19, 14.20, 14.31, 14.39, 15.12, 15.20)	0.5%	1410; 1420; 1430; 1512; 1520	1411; 1412; 1413; 1414; 1419; 1420; 1431; 1439; 1512; 1520	Product, Clothing and related designers (3422) (6.1% of SOC); Weavers and Knitters (5411)	2163 (6.1% of SOC); 7533	2163 (6.1% of SOC); 7533
	74.10	5.8%	7410	7410			

(7) Video, film and photography	Motion picture and video production activities (59.11; 59.12); Motion picture and video distribution activities (59.13); Motion picture projection activities (59.14)	100%	5911; 5912; 5913; 5914	5911; 5912; 5913; 5914	Photographers and audio-visual equipment operators (3434)	3431; 3521; 3435	3431; 3521; 3435
	Photographic activities (74.20);	25%	7420	7420			
	Reproduction of video recording (18.20)	10%	1820	1820			
(13) TV and radio	Radio broadcasting (60.10); Television programming/ broadcasting activities (60.20)	100%	6010; 6020	6010; 6020	Broadcasting associate professionals (3432); TV, Video and Audio engineers (5244)	3522; 3521	3522; 3521
(9 and 10) Music and the visual and performing arts	Sound recording and music publishing activities (59.20);	100%	5920	5920	Musicians (3415); Actors, entertainers (3413); Dancers and choreographers (3414); Authors, writers (3412); Arts officers, producers and directors (3416)	2652; 2655; 2653; 2641; 2654; 2656	2652; 2655; 2653; 2641; 2654; 2656
	Reproduction of sound recording (18.20);	10%					
	Performing arts (90.01); Support activities to performing arts (90.02); Artistic creation (90.03); Operation of arts facilities (90.04)	100%	9000	9001; 9002; 9003; 9004			

(Continued)

Table 5. Continued

Core creative sectors	UK 2007 SIC codes	Portion of SIC codes	ISIC Rev.4 codes	Portuguese CAE—Rev 3 codes	SOC2000—occupational UK codes	ISCO—08 codes—4 digits	Portuguese Occupational Codes (Portuguese CPP 2010)—4 digits
(11) Publishing	Book Publishing (58.11); Publishing of newspapers (58.13); Publishing of journals and periodicals (58.14); Other publishing activities (58.19); News agency activities (63.91)	100%	5811; 5812; 5813; 5819; 6391; 6399	5811; 5812; 5813; 5814; 5819; 7430; 6391; 6399	Journalists, newspaper and periodical editors (3431); Originators, compositors and print preparers (5421); Printers (5422); Bookbinders and Print finishers (5423); Screen Printers (5424)	2642; 2643; 7321; 7322; 7323	2642; 2643; 7321; 7322; 7323
(8 and 12) Software and electronic publishing (8 and 12) Digital and entertainment media	Business and domestic software development (62.01/2); Computer consultancy activities (62.02); Other software publishing (58.29); Publishing of computer games (58.21); Ready-made interactive leisure and entertainment software development (62.01/1)	100%	5820; 6201; 6202; 6209	5821; 5829; 6201; 6202; 6203; 6209	Information and Communication Technology managers (1136); IT strategy and planning professionals (2131)	2511; 2512; 2513; 2514; 2519; 2521; 2522; 2523; 2529; 1330	2511; 2512; 2513; 2514; 2519; 2521; 2522; 2523; 2529; 1330

Note: The selection of codes is of the responsibility of the present paper's authors, according to their interpretation of DCMS (2010a, pp. 18, 24) selection of industrial (UK SIC, 2007) and occupational (UK SOC, 2000) codes.

mations. This was the case of “Photographic activities”, where only 25% of the code was considered, and the case of the vast number of manufacturing codes on “Textiles and apparel”, where a portion of only 0.5% was taken to describe Fashion Design activities. The proportion considered represents an attempt to extract the share of creative employment in those economic sectors.

The industry code describing design activities was, in accordance with DCMS (2010a), divided in three major segments: 4.5% of the code was included in the “Architecture” segment, 89.7% was integrated in the “Design” segment and the remaining 5.8% was incorporated into “Designer Fashion”. This partition allowed for a better differentiation of the design activities and did not affect the overall result since the code as a whole is considered in the total calculation of the creative employment in all the creative industries. Worthy of note is the “Crafts” sector, where, according to DCMS (2010a), no industry codes were considered on the basis that the SIC system could hardly describe handicraft and craftwork activities. Here, using the SOC nomenclature, a set of creative occupations was defined to extract the number of handicraft workers across the sectors of the economy (see Table 5). Then the estimation for the total employment in creative industries was given by the sum of all the workers operating in the defined creative sectors.

In order to estimate the number of creative workers outside the core creative sectors, DCMS (2010a) presented a selection of creative occupations using the UK SOC 2000 codes that best fitted those professional activities, in each creative sector. On mapping these occupations, we used the latest international ISCO-08 codes and the corresponding national occupational codes of the CPP 2010. Following DCMS (2010a), in the cases of skilled workers operating in the manufacturing sectors, such as “labourers in building and woodworking trades”, a portion of 5% of the respective occupational codes was included in the estimations. This portion is intended to capture the share of creative workers inside those vast occupational categories. In the case of “Product, clothing and related designers”, a portion of 93.9% of the respective occupational codes was considered in the segment of “Design” and the other 6.1% was included in “Designer fashion”. In the overall estimate of total creative employment, product and garment designers were fully accounted.

The DCMS (2010a) approach has brought some necessary updates and adjustments to its original framework. By making use of occupational codes, this approach provided a broadened account of creative employment since it now takes into account the creative workers operating inside and outside the creative core industries. Moreover, it considers crafts occupations in the analysis and also presents a clearer differentiation between the creative sectors (e.g. Design vs. Designer Fashion) through the partition of industry and occupational codes.

The estimation of creative employment through this approach, considering its details on codes, partitions and portions taken (which are somehow ad hoc and do not account for changes in the industrial and occupational structure), turned out to be anything but simple during the programming task for the extraction of data by code.

Despite the challenges that the combination of data on industries and occupations brought to the mapping exercise and the respective estimations, this approach proposes a richer perspective of the creative employment by extending the analysis beyond the core creative sectors to include the creative employment existing across all the non-creative sectors of the economy.

4. Computing the Magnitude of the Creative Employment According to the Existing Methodological Approaches

The data were extracted from “Quadros de Pessoal”, the “Matched Employer–Employee Databases” of the GEP/MSSS (Gabinete de Estratégia e Planeamento/Ministério da Solidariedade e da Segurança Social [Office for Strategy and Planning at Ministry of Solidarity and Social Security, Portugal])⁹ of the Ministry of Solidarity and Social Security of Portugal for 2009 (the latest available). It covers all the employment in industries and establishments operating in the national territory with at least one employee. It excludes Public Administration and Domestic services and does not account for self-employment. According to the latest information available (2009), the total employment in the private, structured sector (i.e. firms that responded to “Quadros de Pessoal”) was 3.128.126 workers.

Before proceeding with the estimations, two points are worth mentioning regarding the exclusion from the analysis of self-employed and public servants (government employees who work in any of the departments of a state or territory government).

Some studies report (e.g. Van Steen & Pellenbarg, 2012) that self-employment contributes significantly to creative employment, most notably in the most developed countries, as many of the self-employed are freelance workers in sectors such as construction, consultancy and culture, sports and recreation. In these latter countries, however, the share of self-employed workers in the total is much lower than in less-developed countries. According to OECD, in 2010, that share ranged from under 8% in the US, and Norway to well over 30% in Greece, Mexico and Turkey. In Portugal, that figure was 20%, with more than 80% of self-employed concentrated in the primary and tertiary sectors.¹⁰ Noticeable, according to this data, is the trend, since 1990, for a decrease in the share of self-employed workers in the generality of countries regardless of their development level.

The exclusion of self-employment from the analysis is regrettable and important. However, as we are estimating the magnitude of creative employment for one single country (Portugal), this exclusion does not substantially bias the analysis. That would not be the case if the analysis involved cross-country comparisons.

Some bias has also to be acknowledged by the fact that we are excluding from the analysis public servants. Such exclusion is likely to substantially (and negatively) impact on the magnitude of creative employment, particularly when we use Florida’s original proposal, which encompasses a large amount of occupations (e.g. Legislators, Administration professionals, Health professionals, Regulatory government associate professionals), which in some countries, namely in Portugal, are performed within the public sector sphere. However, when we focus the analysis of the magnitude of the creative employment on the (super) creative core, this bias is negligible.

All the estimated figures have been extracted through an intensive programming task using STATA 11® statistical analysis software. The stage at which we proceed to the estimates was also a challenge to this research work, given the limitations of the SOC system that was used to extract the data available for the year 2009 from the employment datasets.¹¹ The conversion of all the CPP2010 occupational codes into the previous version of CNP94 was based on the instructions in the official report by Statistics Portugal (INE) (2010, pp. 460–474) on the Portuguese Classification of Occupations 2010. The codes and descriptions using the previous nomenclature—CNP94, at 6-digit level, were extracted, code by code, from the Statistics Portugal (INE) official website.

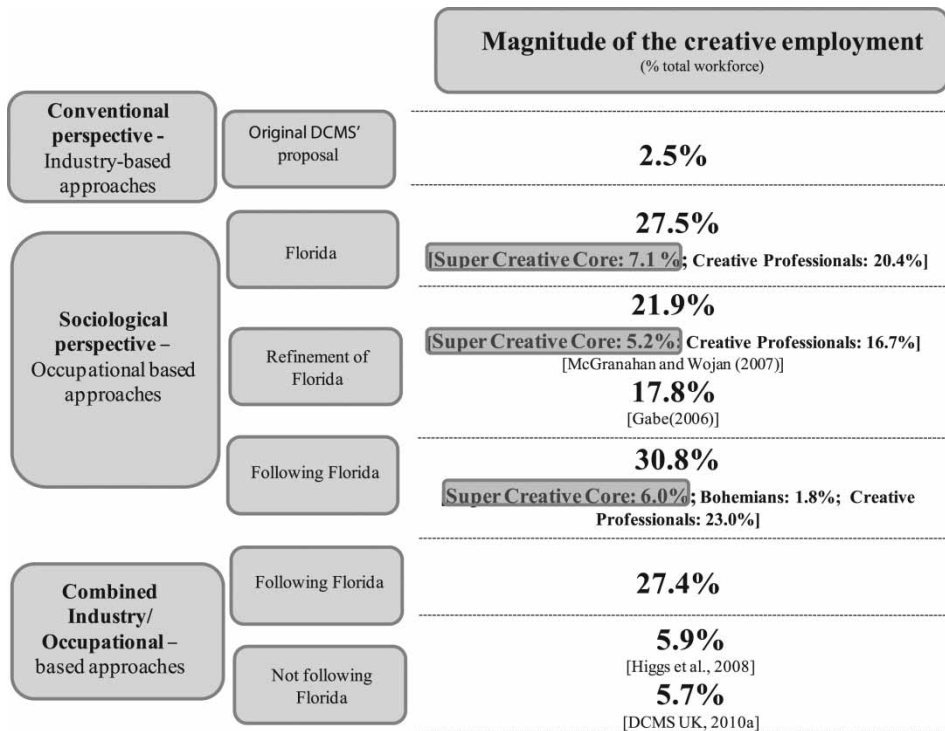


Figure 2. The magnitude of the creative employment in Portugal according to the main measurement perspectives and approaches.

The estimates of the Portuguese creative employment, using each approach described and mapped in Section 3, are summarized in Figure 2.

Occupational approaches based purely on the analysis of occupational/SOC categories and following Florida's (2002) taxonomy, led to more inflated results than those obtained by using simple industry-based/SIC or combined industry-occupational/SIC-SOC approaches. Accordingly, the Portuguese creative employment ranges between 17.8% and 30.8% of the total employment in the first case, and between 2.5% and 5.9% in the second. Specifically, using the industry-based/SIC approach associated with the traditional DCMS model, the estimates for the Portuguese creative class amount to a fairly small figure of 2.5% of the total employment. Recall that this approach only takes into account the employment within the selective core of creative sectors, and with the application of portions of codes to extract the creative labour in those sectors.

The two of the most recent approaches that combine industry and occupational data in terms of a SIC-SOC matrix—Higgs *et al.* (2008) and DCMS (2010a)—consider the creative workers operating inside the creative industry sectors, the support workers in those creative industries and the creative employment that can be detected across all the non-creative industry sectors of the economy. Using these two approaches we reach similar figures for Portuguese creative employment, approximately 6% (creative trident—5.9% and DCMS—5.7%). These estimates are higher than those of the purely industry-based/SIC approaches since, as referred earlier, these combined methodologies take account

of all the creative workers working outside the creative industries, in addition to those operating in these sectors.¹²

At the other extreme, under the sociological perspective, when we use Florida's original proposal, the estimate for the Portuguese creative employment reaches 27.5% of total employment (with the "Super Creative Core" accounting for 7.1% and the broad group of "Creative professionals" 20.4%). The proposals that closely follow that of Florida's (Boschma & Fritsch, 2009; Fritsch & Stuetzer, 2009; Mellander *et al.*, 2010), also provide rather inflated estimates for creative employment. According to these proposals, creative employment in Portugal represented, in 2009, about one-third of total employment. This figure exceeds that obtained using Florida's (2002) original proposal since the authors included the "Administrative associate professionals" in their broad category of "Creative professionals", whereas for Florida these occupations appear in the non-creative "Service class".

Considering the estimates associated with the proposals refining Florida's original contribution (Gabe, 2006; McGranahan & Wojan, 2007), the figure for the creative employment in Portugal comes smaller (respectively 17.8% and 21.9%). In their refined measure, McGranahan and Wojan (2007) excluded the vast categories of "Health professions", "Legal workers" and "Teaching occupations" that were considered by Florida (2002) and which they considered to be less creative. The result obtained using Gabe's (2006) approach evidence, nevertheless, that if we exclude all the "Management occupations" from the global estimate this would lead to a share of 7.6%, is not very far from the one obtained for the "Super Creative Core" (7.1%) using Florida's (2002) original approach or the figures (around 6%) for the creative employment generated by the combined industry-occupation approaches.

5. Concluding Remarks

Albeit creative class and industries encompassing key portions of many national economies, the size of this portion varies depending upon whether one defines the creative industries/ occupations and resulting creative economy widely or narrowly. These definitions, in turn, determine which industries within systems of statistical nomenclature are included, and which are not. Similar to systems of statistical nomenclature, when the definitions of creative industries and creative class are closely scrutinized, they often emerge as inconsistent. All are built upon typologies of similarities and differences, and rely on rules that when pushed to their limit, become arbitrary means of delineating boundaries. Indeed, reducing any complex system (e.g. the economy) to a few key concepts makes it tractable but the price of this simplification is the loss of detail, and the magnification of fairly obscure differences. Notwithstanding these pitfalls, the creative industries and creative class are useful even if imprecise concepts because, as emphasized by Boggs (2009), they help researchers understand the dynamic system that is the contemporary economy.

Besides resorting to distinct measurement methodologies, estimations and comparisons of the creative employment are often undertaken using disparate databases, information on distinct countries or regions, and covering different periods of reference. This opacity and vagueness are likely to undermine the provision of useful public-policy guidance (Reese *et al.*, 2010).

The present article presented a comprehensive mapping of the existing methodological approaches, developed to measure and quantify the creative employment. Based on a

unique data source, encompassing more than three million Portuguese employees from the private sector, the weight of creative employment was estimated, it being possible to assess the differences in the magnitude of the creative employment conveyed by each of the existing methodologies.

Due to the conception on what creative employment is and what industries and occupational groups to consider in creative industries and/or classes, the distinct perspectives and approaches for measuring creative employment generate, as expected, distinct figures. These ranged from a quite low figure (2.5%) when using the conventional DCMS industry-based approach to rather inflated values (from 17.8% to 30.8%) when applying the sociological perspective and the associated occupational-based approaches.

It is, however, interesting to note that if we consider the (super) creative core instead of overall creative employment as the reference concept, the differences between the mapped methodological approaches become much less pronounced, with a mean value of 6%. This reflects the fact that at both theoretical and operational levels, much more agreement exists among the distinct measurement approaches on what stands at the “core” of creative employment. Based on this outcome, and as a way to mitigate the potential bias and inconsistencies in international and regional comparisons of the creative employment, we suggest that such comparisons would benefit from using the (super) creative core employment as reference concept instead of that of overall creative employment.

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Notes

1. Since the recent DCMS (2010b) report is an updated version of the official industry-based framework, and to the best of our knowledge there are no publicly available methodological notes on the first DCMS (1998, 2001) industry-based reports, we used the technical note of the DCMS (2010b) report, mapping only the part corresponding to the core creative industries/sectors—where the DCMS used UK SIC 2003 codes—in order to analyse the traditional DCMS industry-based approach.
2. Sources: CPP2010—the Portuguese Classification of Occupations of 2010, is compatible with ISCO-08, and is available at <http://metaweb.ine.pt/sine/> (accessed September 2012); ISCO—08 codes are available at <http://www.ilo.org/public/english/bureau/stat/isco/> (accessed September 2012); CAE (Rev. 3)—Portuguese Classification of Economic Activities, the most recent revision is available at <http://metaweb.ine.pt/sine/> (accessed September 2012).
3. The average portion of 5% was in line with figures already reported in existing empirical literature, such as the *World Intellectual Property Organization* studies, available at http://www.wipo.int/ip-development/en/creativeindustry/economic_contribution.html (accessed February 2013).
4. Another recent study closely following Florida’s approach is that by Mellander *et al.* (2010), who used Florida’s definition of the creative class to study the occupational structure by type of industry. The mapping procedure is, nevertheless, rather similar to Florida’s approach so we opted to not present it here.
5. Despite the use of more objective criteria on the selection of creative occupations, McGranahan and Wojan (2007, p. 200) recognize that the “creativity measure provides [an] arguably imperfect, reference for assessing the creativity requirements among summary occupations”.
6. Available at <http://www.onetonline.org/find/descriptor/browse> (accessed February 2013).

7. In this assessment, we undertook a detailed analysis on the categories that were recast by McGranahan and Wojan (2007, p. 201) and the structure of the US SOC 2000 codes of the U.S. Bureau of Labour Statistics, using the information available at <http://www.bls.gov/soc/2000/socstruc.pdf> (accessed February 2013).
8. Higgs *et al.* (2008) excluded some industry sectors and some occupations considered by the DCMS industry and occupational approach as being creative. They also added other industries and professions to their definition of Creative Core that were not considered by the DCMS industry and occupational-based approach. For further details, see Higgs *et al.* (2008, pp. 27–30).
9. Courtesy of the GEP/MSSS—*Gabinete de Estratégia e Planeamento* of the Ministry of Solidarity and Social Security of Portugal, October–December 2011. The GEP/MSSS is not responsible for the results and interpretation contained in this study. These are of the authors' full responsibility.
10. Data gathered from available at <http://www.oecd-ilibrary.org/sites/factbook-2011-en/07/01/04/index.html?itemId=/content/chapter/factbook-2011-61-en>, <http://www.eurofound.europa.eu/comparative/tn0801018s/pt0801019q.htm> (accessed June 2013).
11. At the time the estimations were undertaken—from October to December 2011—the nomenclature in use to extract 2009 data was still the previous version of occupational codes corresponding to the *CNP94 (Classificação Nacional de Profissões—1994)*. Besides facing the already known difficulties related to more obsolete classification systems—the lack of information/SOC codes on the different categories of *Designers*, or the unavailability of occupational codes which were non-existent or not relevant at the time of that previous revision (e.g. Graphic designer, Interior designer, Survey and market research interviewer)—this constraint also required the exhaustive and time-consuming task of converting all the CPP2010 codes at five digits that were used in the mapping into the previous CNP94 codes at the maximum detail level of six digits, in order to capture the most precise information possible. Indeed, in order to achieve the best correspondence possible between the latest occupational revision CPP2010 and the previous nomenclature for occupations CNP94, it was necessary to look into the detail of six-digit codes, in every single case.
12. It is worth mentioning that in the microeconomic data-set we are using workers that are linked with more than one employer and workers with multiple records represent less than 3% of the whole data-set. When using combined industry and occupational-based approaches using this type of microeconomic data at a rather disaggregated level on the occupational codes, only those considered as creative occupations are taken into account in the calculation. In this case, we are dealing with about 7% of the whole data-set (which encompasses 3,128,126 workers), corresponding to the measure of the creative employment for the combined approaches. Thus, the number of potential multiple records for each worker is even more negligible, below 0.5%.

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Appendix.

Table A1. Taxonomy following Florida's "Creative Class"—Occupational categories

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/Portuguese Standard Occupational codes CPP—2010 (summary categories) ^a
<i>Super Creative Core</i>	<ul style="list-style-type: none"> • Computer and mathematical occupations; <ul style="list-style-type: none"> • Architecture and engineering occupations; • Life, physical and social science occupations; • Education, training and library occupations; • Arts, design, entertainment, sports and media occupations 	<ul style="list-style-type: none"> • Computing professionals (25); <ul style="list-style-type: none"> • Mathematicians, Statisticians and related professionals (212); • Architects, Engineers and related professionals (214; 215; 216); • Life Science professionals (213); • Physicists, Chemists and related professionals (211); • Social Science and related professionals (263); • University and higher education teachers (231); • Vocational, technological and artistic education teachers (232); • Secondary and basic education teachers (233); • Primary school and early childhood teachers (234); • Other teaching professionals (235); • Archivists, museum curators and related information professionals (262) + <i>Bohemians</i> <ul style="list-style-type: none"> • Authors, journalists and linguists (264); • Creative and performing artists (265); • Product and garment designers (2163); • Graphic and multimedia designers (2166); • Musicians, singers and composers (2652); • Dancers and choreographers (2653); • Film, stage and related directors and producers (2654); • Actors (2655); • Announcers on radio, television and other media (2656); • Creative and performing artists not elsewhere classified (2659); • Advertising and marketing professionals (2431); • Public relations professionals (2432); • Artistic, Entertainment and Sports associate professionals (342; 343); • Telecommunications and broadcasting technicians (352); • Fashion and other models (5241)

(Continued)

Table A1. Continued

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/Portuguese Standard Occupational codes CPP—2010 (summary categories) ^a
<i>Creative Professionals</i>	<ul style="list-style-type: none"> • Management occupations; <ul style="list-style-type: none"> • Business and financial operations occupations; • Legal occupations; • Healthcare practitioners and technical occupations; • High-end sales and sales management; • Administrative associate professionals 	<ul style="list-style-type: none"> • Legislators, senior officials and managers (1); <ul style="list-style-type: none"> • Finance professionals (241); • Administration professionals (242); • Financial and mathematical associate professionals (331); • Sales and purchasing agents and brokers (332); • Business services agents (333); • Legal professionals (261); • Health professionals (except nursing) (221; 223; 224; 225; 226); • Nursing and midwifery professionals (222); • Nursing and midwifery associate professionals (322); • Life science technicians and related associate professionals (314); • Medical and pharmaceutical technicians and health associate professionals(321; 323; 324; 325); • Physical and engineering sciences technicians (311; 312; 313; 315); • Information and communications technology operations and user support technicians (351); • Regulatory government associate professionals (335); • Finance and sales associate professionals (2433; 2434); • Administrative, legal, social and specialized secretaries and related professionals (334; 3411; 3412)

Source: Adapted from Boschma and Fritsch (2009). The selection of codes is from the responsibility of this article's authors as a result of their interpretation on the category groups and respective descriptions.

^aThe detailed mapping at a five-digit level can be provided upon request to the authors.

Table A2. Refinements of Florida's proposal by McGranahan and Wojan?

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/Portuguese Standard Occupational codes CPP—2010 (summary categories)
<i>Super Creative Core</i>	<ul style="list-style-type: none"> • Computer and mathematical occupations; <ul style="list-style-type: none"> • Architecture and engineering occupations; • Life, physical and social science occupations; • Higher education and library occupations; • Arts, design, entertainment, sports and media occupations 	<ul style="list-style-type: none"> • Computing professionals (25); <ul style="list-style-type: none"> • Mathematicians, Statisticians and related professionals (212); • Architects, Engineers and related professionals (216; 214; 215); • Life Science professionals (213); • Physicists, Chemists and related professionals (211); • Social Science and related professionals (263); • University and higher education teachers (231); • <i>Vocational, technological and artistic education teachers (232—ELIMINATED</i> • <i>Secondary and basic education teachers (233)—ELIMINATED</i> • <i>Primary school and early childhood teachers (234)—ELIMINATED</i> • <i>Other teaching professionals (235)—ELIMINATED</i> • Archivists, museum curators and related information professionals (262). + <i>Bohemians</i> <ul style="list-style-type: none"> • Authors, journalists and linguists (264); • Creative and performing artists (265); • Product and garment designers (2163); • Graphic and multimedia designers (2166); • Musicians, singers and composers (2652); • Dancers and choreographers (2653); • Film, stage and related directors and producers (2654); • Actors (2655); • Announcers on radio, television and other media (2656); • Creative and performing artists not elsewhere classified (2659); • Advertising and marketing professionals (2431); • Public relations professionals (2432); • Artistic, Entertainment and Sports associate professionals (342; 343); • Telecommunications and broadcasting technicians (352); • Fashion and other models (5241)

(Continued)

Table A2. Continued

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/Portuguese Standard Occupational codes CPP—2010 (summary categories)
<i>Creative Professionals</i>	<ul style="list-style-type: none"> • Management occupations; <ul style="list-style-type: none"> • Business and financial operations occupations; • Legal occupations; • Drafters, engineering and mapping associate professionals; • Supervising managers and process control technicians; • Finance and sales associate professionals 	<ul style="list-style-type: none"> • Legislators, senior officials and managers (1); <ul style="list-style-type: none"> • Finance professionals (241); • <i>Administration professionals (242)—ELIMINATED</i> • <i>Financial and mathematical associate professionals (331)—ELIMINATED</i> • Sales and purchasing agents and brokers (332); • <i>Business services agents (333)—ELIMINATED</i> • Legal professionals (261); • Physical, engineering and mapping technicians and drafters (311); • Supervising managers and process control technicians (312; 313; 315); • Information and communications technology operations and user support technicians (351); <ul style="list-style-type: none"> • <i>Health professionals (except nursing) (221; 223; 224; 225; 226)—ELIMINATED</i> • <i>Nursing and midwifery professionals (222)—ELIMINATED</i> • <i>Nursing and midwifery associate professionals (322)—ELIMINATED</i> • <i>Life science technicians and related associate professionals (314)—ELIMINATED</i> • <i>Medical and pharmaceutical technicians and health associate professionals (321; 323; 324; 325)—ELIMINATED</i> • <i>Regulatory government associate professionals (3359)—ELIMINATED</i> • Finance and sales associate professionals (2433; 2434)

Note: The selection of codes is of the responsibility of the present paper's authors, according to their interpretation of McGranahan and Wojan's (2007, p. 205) refinement approach, based on the USA O*NET database of occupations (available at <http://www.onetcodeconnector.org/find/family/code?s=11> (accessed February 2013)).

Table A3. Refinements of Florida's proposal by Gabe

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/ Portuguese Standard Occupational codes CPP—2010 (summary categories)
<i>Creative Core</i>	<ul style="list-style-type: none"> • Computer specialists and mathematical science occupations • Architects, surveyors and cartographers; Engineers • Life, Physical, Social scientists and related workers • Post-secondary teachers <ul style="list-style-type: none"> • Primary, secondary and special education school teachers • Other teachers and instructors • Librarians, curators and archivists 	<ul style="list-style-type: none"> • Computing professionals (25); <ul style="list-style-type: none"> • Mathematicians, Statisticians and related professionals (212) • Architects, Engineers and related professionals (216; 214; 215) • Life Science professionals (213); <ul style="list-style-type: none"> • Physicists, Chemists and related professionals (211); • Social Science and related professionals (263) • University and higher education teachers (231); <ul style="list-style-type: none"> • Vocational, technological and artistic education teachers (232) • Secondary and basic education teachers (233); • Primary school and early childhood teachers (234); • Other teaching professionals (235); • Archivists, museum curators and related information professionals (262)

(Continued)

Table A3. Continued

<i>Creative Class</i> category groups	Occupational categories descriptions	Occupational ISCO-08 Codes (summary categories)/ Portuguese Standard Occupational codes CPP—2010 (summary categories)
<ul style="list-style-type: none"> • Art and design workers <ul style="list-style-type: none"> • Entertainers and performers, sports and related workers; Media and communication workers 	<ul style="list-style-type: none"> • Media and communication equipment workers 	<p>Authors, journalists and linguists (264);</p> <ul style="list-style-type: none"> • Creative and performing artists (265); • Product and garment designers (2163); • Graphic and multimedia designers (2166); • Musicians, singers and composers (2652); • Dancers and choreographers (2653); • Film, stage and related directors and producers (2654); • Actors (2655); • Announcers on radio, television and other media (2656); • Creative and performing artists not elsewhere classified (2659); • Advertising and marketing professionals (2431); • Public relations professionals (2432); • Artistic, Entertainment and Sports associate professionals (342; 343); • Fashion and other models (5241). <ul style="list-style-type: none"> • Information and communications technology operations and user support technicians (351); <ul style="list-style-type: none"> • Telecommunications and broadcasting technicians (352)

- Top Executives/Advertising, marketing, promotions, public relations and sales managers/Operations specialties managers/Other management occupations
- Legislators, senior officials and managers (1);
 - *Finance professionals (241)—ELIMINATED*
 - *Administration professionals (242)—ELIMINATED*
 - *Financial and mathematical associate professionals (331)—ELIMINATED*
 - *Sales and purchasing agents and brokers (332)—ELIMINATED*
 - *Business services agents (333)—ELIMINATED*
 - *Legal professionals (261)—ELIMINATED*
 - *Physical, engineering and mapping technicians and drafters (311)—ELIMINATED*
 - *Supervising managers and process control technicians (312; 313; 315)—ELIMINATED*
 - *Health professionals (except nursing) (221; 223; 224; 225; 226)—ELIMINATED*
 - *Nursing and midwifery professionals (222)—ELIMINATED*
 - *Nursing and midwifery associate professionals (322)—ELIMINATED*
 - *Life science technicians and related associate professionals (314)—ELIMINATED*
 - *Medical and pharmaceutical technicians and health associate professionals (321; 323; 324; 325)—ELIMINATED*
 - *Regulatory government associate professionals (3359)—ELIMINATED*
 - *Finance and sales associate professionals (2433; 2434)—ELIMINATED*

Note: The selection of codes is of the responsibility of the present paper's authors, according to their interpretation of Gabe's (2006, pp. 398, 400–401) refinement approach, based on the US O*NET database of occupations (available at <http://www.onetcodeconnector.org/find/family/code?s=11> (accessed February 2013)).