Vilnius University Press

Contents lists available at Vilnius University Press

Ekonomika
2024, vol. 103(4), pp. 22–38

ISSN 1392-1258 eISSN 2424-6166
DOI: https://doi.org/10.15388/Ekon.2024.103.4.2

Unveiling the Impact Skilled Migration has on the Creative Class: Panel Data Analysis for EU Countries

Ramazan Uctu*

American University of Iraq-Sulaimani, Iraq
Email: ramazan.uctu@auis.edu.krd
ORCID ID: https://orcid.org/0000-0001-5189-5762

Şerife Koç

Necmettin Erbakan University, Türkiye
Email: serifekoc20@gmail.com
ORCID ID: https://orcid.org/0000-0002-5012-3186

Birol Mercan

Necmettin Erbakan University, Türkiye
Email: bmercan@erbakan.edu.tr
ORCID ID: https://orcid.org/0000-0002-1587-3643

Abstract. Innovation and creativity lie at the heart of countries' ability to grow and improve the living standards of their people. Specifically, innovative and creative individuals contribute to economic growth as they bring with them ideas that will produce new knowledge and new technologies. As such, countries have attempted to develop policies that will attract such individuals in order to facilitate and accelerate the growth process. This article examines the theoretical foundations of the creative class, their economic impact and investigates the role of skilled migrants in shaping the creative economy by using data for 22 European Union countries during the period 2007–2021. The study uses the dynamic panel data model with Arellano and Bover/Blundell and Bond System Generalized Moments (One Step SGMM and Two Step SGMM) estimators. The results demonstrate that skilled immigration, research and development expenditures and the exportation of high-tech products have a positive effect on a skilled labor force.
Keywords: The Creative Class Theory, Creativity Index, Skilled migration, selected EU countries

1. Introduction

The concept of the creative class, a concept coined by Richard Florida (2002a), highlights the importance of creative professionals and their contribution to the development of creative cities. According to Florida's (2002a) bestselling book, *The Rise of the Creative Class*, cities and regions should focus on attracting members of this class if they want

* Correspondent author.

Received: 25/08/2024. **Revised:** 07/10/2024. **Accepted:** 01/11/2024
Copyright © 2024 Ramazan Uctu, Şerife Koç, Birol Mercan. Published by Vilnius University Press
This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

to be successful economically. Florida is primarily concerned with individuals and their occupations, and therefore the creative class is referred to as highly skilled employees in 'creative industries' and 'other knowledge-intensive industries' (financial services, law, information and communications technology, higher education and R&D) (Marlet and Van Woerkens 2007; Bontje and Musterd, 2009; Boschma and Fritsch, 2009; Cetindamar and Gunsel, 2012). These individuals play an important role in urban regional growth. The breadth and depth of the creative class is a remarkable factor in the formation of regional and urban development differences. Doğrul et al. (2016) found that as more innovations emerge in these places, there is a surge in entrepreneurial activity, which attracts creative companies. In this context, Florida (2014) highlights the importance of focusing on the creative class's activities that contribute to economic progress, because the creative class is comprised of individuals who will generate the ideas, knowledge, and new technologies that will allow regions to develop further. Many other authors, such as Borén & Young (2013), Florida (2014), Kačerauskas (2015), Batabyal & Yoo (2018), Pavelea et al. (2021), Cui et al. (2023), and Bhavana & Sharma (2023) have also highlighted the importance of the creative class and skilled migration in their research.

Florida (2002b) emphasizes that creative individuals tend to move more spatially. The characteristics influencing location preferences include modern culture and tolerance, which suggest low obstacles to human capital entry into regions, openness, and extensive social and cultural entertainment infrastructure. Because tolerant surroundings are open to new ideas, these environments tend to attract creative people. Individuals in the creative class choose regions that are open to self-expression, as well as foreign-born populations, and free of sexual norms (Florida, 2002c, p.743; Florida et al., 2008; Vossen et al., 2019).

When the literature on the creative class was examined, it was evident that most of the studies for the United States and Western European countries were theoretical research papers. However, the results obtained differ significantly according to the data and measurements used. Moreover, a limited number of studies have been conducted to assess the applicability of the creative class's impact on economic performance in Eastern European countries and in non-Western contexts. This is a matter of concern, because many authors have questioned the applicability of Florida's proposed measures to other circumstances and have emphasized the need to adapt them to various national contexts (Pavelea et al., 2021).

Given the concerns noted above, this study includes 22 EU countries that include other non-Western European nations. The data for these countries cover the period from 2007 to 2021. Our research employs Florida's (2002a) framework on the creative class to explore how the role of skilled migration influences the creative class. The methods and variables considered in our study were developed from theoretical works Florida (2002a), Florida (2005), and Florida and Adler (2020). It's evident that the existing literature on the creative class theory is primarily conceptual in nature, highlighting a scarcity of empirical research in this area. Our study stands out for its focus on European Union countries, adaptation of Florida's (2002a) micro-level theory, which emphasizes urban areas, to a broader national context, and the application of economic analysis using data on skilled migration and the

labor force. Consequently, our study offers a unique perspective compared to previous research in terms of its scope, variables, and analytical techniques. Therefore, our study is significant in addressing the existing literature gap.

Within this framework, our research seeks to understand how skilled migration affects the creative class and to verify the hypothesis that "technology, talent, and tolerance are key factors in attracting the creative class." Additionally, we have reviewed pertinent theoretical and empirical studies to scrutinize the theoretical foundations of the creative class and the role of skilled migration in fostering a dynamic creative economy.

The structure of this article is as follows: we survey the literature and discuss the Creative Class theory in Section 2; this is followed by a discussion on the creativity index and skilled migration. In Sections 3, we include our methodology. Following these sections, we analyse the data and discuss the findings, and in the final section, we conclude the article with some recommendations.

2. Literature Review and Theoretical Background

2.1. Creative Class Theory

The creative class referred to by Florida (2012) is described as a group of individuals whose work primarily involves creating new ideas, knowledge and artistic expressions. This class encompasses professionals from diverse fields, such as technology, arts, design, media and science. These individuals possess the ability to think critically, solve complex problems and generate innovative solutions, making them indispensable in today's knowledge-based economy. The creative class theory aims to mobilize everyone's knowledge and creativity, to unleash creative energies, personal talents and skills, to rebuild a society. Creativity is constantly developing with the supply of resources. Individuals living in cities, regardless of economic and social status, are considered to be the source and contributors to the emergence of creativity. As a result, these individuals add economic value to society through their creativity. According to the creative class theory, innovation is the key competitive advantage in a globalized economy, and the most critical component is a technically, socially or artistically creative workforce. The creative class theory argues that economic growth is directly dependent on innovation and creativity (Evren, 2016; Depine et al., 2017; Cui et al., 2023; Rahimzadeh and Ghalehteimouri, 2024). The creative class assumption is based on six basic hypotheses (Depine et al., 2017; Yıldız and Acar, 2020):

- Some professions deal with the task of creativity.
- The lifestyles of the creative class display similar characteristics.
- Today, the creative class is the driving force of economic growth.
- Creative individuals tend to be concentrated in cities.
- Creative individuals usually move more geographically.
- Members of the creative class members are fascinated by tolerant zones that are open to diversity.

Florida's (2002a) identified two distinct categories of worker: the super-creative core and the creative professionals. The first category comprises individuals who specialize in creative activities, typically in the fields of science or engineering, such as computing, mathematics, architecture and engineering. These individuals are responsible for creating new content, formats, projects and products. The second category is composed of creative professionals who specialize in solving specific or intricate problems that necessitate specific training. These individuals are employed in knowledge-intensive industries such as finance, health, management and law. They may create and propose novel products or techniques, but this is not an integral part of their role (Marlet and Van Woerkens 2007; Nathan, 2007; Gabe et al., 2013; Depine et al., 2017; Esen and Atay, 2017; Florida and Adler, 2020). Individuals in this creative class have flexible working hours because they improve the quality of their work by adjusting these hours according to their own needs and routines. Since creativity is not a phenomenon that necessarily occurs during working hours, creative individuals prefer to work in the time zones in which they are more productive (Evren, 2016). According to creative class theory, these occupations are mobile and are a gravity magnet for high-tech and high-growth companies (Shah et al., 2024).

Some individuals within these two categories of the creative class are referred to as "Bohemians." These individuals are often interested in the arts and culture, such as writing, designing, painting, and photography, yet they are also more tech-savvy and digital in nature. The Bohemians are considered differently in terms of the creative class concept, which has become a particularly appealing attribute to regions and cities that prefer to attract creative class. Although they are small in number, Bohemians continue to contribute significantly to the creative class's economic prosperity. This is because Bohemians are the most important consumers of urban services, and they have distinct and possibly pioneering tastes among the creative class (Marlet and Van Woerkens 2007; Depine et al., 2017).

Members of the creative class in a community tend to be drawn to places that exhibit a high degree of diversity, including a variety of racial, ethnic, gender, economic and lifestyle characteristics in addition to a strong connection between the past and the present and also social connections (Depine et al., 2017). Furthermore, individuals who are creative tend to gravitate to cities, where they can access a wide range of job opportunities, a variety of city amenities and a large number of other creative people with whom they can interact (Montanari et al., 2018; Cui et al., 2023). Creative people come in all shapes and sizes, but they all have a desire to work and live in places where they can be creative, where their contributions are appreciated, where they have access to resources and challenges, and who display a willingness to be open to change and ideas. The most common characteristic of the creative class, however, is the desire for experiences, particularly experiences that affirm and reinforce who they are as creative people. This is because an experience can inspire more creativity than a product or a service, and this trend reflects a more dynamic and experiential lifestyle that is becoming increasingly popular in the new economy (Evren, 2016; Depine et al., 2017). Conversely, this trait of the creative class results in more unstable job situations. For instance, they often have

temporary agreements, lack assistance from groups like trade unions, and this impacts their job opportunities and earnings (Liu et al., 2024).

2.2. Creativity Index and Skilled migration

The creative class gravitates towards locations that have three appealing characteristics: talent, tolerance and technology. These were identified by Florida (2005, 2014) as the '3Ts of economic development.' The Creativity Index is accordingly built on the 3Ts principles:

- Talent is one of the key enablers for the economic growth of cities, so understanding the issues that shape talent distribution becomes crucial. Talent is not something that can easily be found. Talent – that is, human capital – needs to be produced and retained, and living spaces need to be created that can attract talented people from elsewhere. The talent index consists of human capital, which is the population with a university degree and creative class indices (Esen and Atay, 2020).
- Technology is integrated with political, cultural and economic factors. Whereas innovative activities are required to develop new technologies, they themselves need certain technologies to be available in the creative sectors. Therefore, technology and creative activities complement each other (Kačerauskas, 2015; Koç et al., 2023): R&D expenditure, a High-technology Index, an Innovation Index and a number of patent applications, and so on, are used as indicators of the presence and application of technology.
- Tolerance, which focuses on social, ethnic and cultural diversity, is influential in getting large cities to adopt high-level technologies. The diversity of human capital ensures the continuity of the high-technology sectors. Tolerance attracts talented individuals and allows high-level technology to be developed. Key indicators of tolerance are the migration, mosaic and self-expression indices. The Migration Index indicates the density of the immigrant population in an area where there are many immigrants; these are places where tolerance is high (Esen and Atay, 2020). The Self-expression Index indicates the density of homosexuals found in a place: a society that is tolerant of homosexuals is considered to welcome all people with tolerance. The Mosaic Index shows the proportion of the foreign-born population. Technology centers are more common in places where the foreign-born population is large (Esen and Atay, 2020).

Since creativity is often the product of a variety of backgrounds and communities, it requires the cultural diversity that is characteristic of large cities (Florida and Adler, 2020). Simonton (2000, cited by Florida and Adler, 2020, p.224), clearly pointed out that:

It goes without saying that an urban environment will afford a more diverse variety of potential priming stimuli than a rural environment. The former, in comparison to the latter, is more likely to provide a world rich in different languages, cultures, religions and lifestyles.

To this Simonton adds that 'the more urban the location, the more diverse and hence creative such a group is likely to be' (2000, cited by Florida and Adler, 2020, p. 224).

Furthermore, Florida added that the creative and talented individuals prefer to reside in urban areas with a varied population and a hospitable environment. He pointed out that what cities and regions should be attracted to are not the creative and knowledge-intensive companies themselves, but rather the individuals who work for those companies or who could potentially establish such companies. What is more, cultural diversity should be encouraged to appeal to the consumption preferences of the creative class. The attraction of a 'talent pool' through skilled migration is therefore a key element in Florida's creative class (Houston et al., 2008; Bontje and Musterd, 2009).

Scholars emphasize the potential for skilled migration to improve innovation through two distinct mechanisms (Labrianidis et al., 2023):

- The first is the direct involvement of migrants in research and innovation, which can expand the human capital and knowledge base of a region. In addition, skilled migrants can contribute to the growth of cities, which can in turn lead to an increase in productivity and growth. Furthermore, in many cases, migrants possess exceptional entrepreneurial and inventive abilities in specific fields, such as science and engineering, which can also contribute to innovation.
- Skilled immigrants' socio-economic variety is a significant factor. These migrants come from a variety of socio-cultural backgrounds, which can interact and result in the formation of new ideas, knowledge transfer, innovation learning, a more efficient problem-solving process, and hence increased production in the host country. This is particularly true when migrants provide talents that complement those of natives and other immigrant groups. These mechanisms are linked to migrants' self-selection of specialized talents, entrepreneurial abilities, innovation, and risk-taking behavior.

Creative cities are urban centers that have effectively developed an environment conducive to attracting and maintaining creative talent while also fostering technology and tolerance. Creative cities are distinguished by their cultural vibrancy, rich cultural legacy, and a diverse range of creative and cultural activities that foster creativity. The success of creative cities depends on creating an environment that enables creative cities to generate new ideas and contribute to the innovative economy, such as building successful businesses, stimulating regional growth, and attracting the creative class. Florida focuses on attracting talented people rather than physical infrastructure and industrial projects. The development of creative cities is based on attracting creative people and engaging them in economic activity. This contributes to the emergence of new ideas and the development of businesses and the prosperity of the region (Rahimzadeh and Ghalehteimouri, 2024). In this context, according to the study by Çentindamar and Günsel (2012), five essential factors are used to classify cities as creative:

- Creativeness: This refers to the creative class, which includes people who work in the cultural or creative sectors, talented people, and highly educated people who are capable of creating the most innovative jobs.
- Innovation: This is measured by 'input' indicators such as R&D, investment and employment, on the one hand, and, on the other, 'output' indicators, which entail an

economic activity that is based on science and other scientific indicators at a national level.

- Urbanization: The 'urbanity' level refers to the ability to provide services in a locality, such as the number of companies in a certain sector (legal advice, banking, publicity, accounting, etc.) and their location of operation inside the locality.
- Intellectual development: The concept of intellectual development encompasses the development of human capital, scientific knowledge, the productivity of active workers, the development of a cultural horizon, and education as an ongoing process.
- Connectivity: Or what is commonly referred to as the connection to a global network, is associated with the ability to make high-quality decisions that are based on long-term contemporary management and motivation techniques. Therefore, it is essential not only that the most knowledgeable scientists are present, but also that top managers are able to manage the finance, R&D, forecasting and marketing divisions effectively.

By attracting talented migrants, creative cities get access to a varied pool of ideas, viewpoints, and experiences, which drives innovation and economic success. Consequently, skilled migrants boost the local economy, create jobs, and enrich the cultural fabric of these places. The share of the creative class has grown significantly, with countries such as Singapore, the Netherlands and Switzerland indicating that it accounts for between 45% and 50% of their workforces (Florida and Adler, 2020). Furthermore, the shares of the creative class in the United States are considerably greater in the most creative places such as New York, San Francisco, Boston, Austin, Seattle and Portland. These centres were placed at the top of the US Creativity Index, delivering a blend of 'technology, talents and tolerance' (Nathan, 2007; Esen and Atay, 2017).

Politicians and city planners widely embraced Florida's theories. The concept of crafting cities to attract the creative class gained significant popularity. It was viewed as a key strategy for cities to achieve swift economic growth, particularly in areas with slow population expansion. Consequently, cities globally have begun to market themselves as centers of knowledge and innovation, aiming to attract creative talent and implement policies to support this goal (Martin-Brelot, 2010). However, while the idea of the creative class has been widely adopted as a forward-thinking approach to revitalize urban areas, it has also faced criticism for various reasons (Pavelea, 2021). For instance, Florida's approach to the creative class overlooks the challenge of accurately identifying creative activities, given that every occupational category in modern societies includes both creative and administrative tasks. In today's industrial landscape, with its complex economic structures and advanced technology, individuals in industrial jobs possess sophisticated tacit knowledge and creative problem-solving abilities to navigate these intricate production environments (Krätke, 2010). Another critique of Florida's (2002a) research on the emergence of the creative class is its failure to address the impact of outmigration from specific groups. These groups often move from suburban city outskirts, integrating into the local culture of vibrant places. The creative class, in turn, becomes a catalyst for gentrification in these areas (Peck, 2005; Silva et al., 2024). Hughes et al. (2024) challenge the creative class

in three areas: stability, mobility, and recreation. Stability suggests that the majority of creative workers are from the working class and do not view moving as a necessary part of their career. Mobility indicates that some creative workers transition from the working class to the middle class through education and work, then move to establish new lives in different social classes. Recreation points to the desire of migrant workers to return to their place of origin after starting a family, indicating a lack of support for Florida's theory of creative labor migration. Hughes et al. (2024) argue that creative workers migrate for traditional reasons such as employment, education, and family formation. The most contentious aspect of Florida's theory involves using the percentage of homosexuals as a measure of tolerance. Kačerauskas (2018) suggests that this measure is unreliable because it does not account for self-identification as homosexual, and the presence of bisexual individuals suggests that homosexuality is more about cultural and ethical aspects than physical characteristics (Pavelea, 2021). Rodrigues et al. (2024) criticize the theory of the creative class for its limited application to urban settings and its neglect of rural areas.

3. Methodology

The literature on the effect of skilled migration on the creative class generally consists of conceptual studies. In this case, the lack of empirical studies is noteworthy. In other words, empirical analyses were not conducted with the macroeconomic indicators of the countries in the previous studies on the creative class, which shows a clear gap in the literature. In this study, a quantitative research design was employed to analyze the relationship between creative class and skilled migration in EU countries. Our study findings were tested using the dynamic panel data methods: Arellano and Bover/Blundell and Bond System Generalized Moments (One Step SGMM and Two Step SGMM) estimators. The methods and variables used in this study were determined by the authors based on the conceptual studies of Florida (2002a), Florida (2005), and Florida and Adler (2020). Table 1 lists the countries used in our analysis.

Table 1. Countries Included in the Analysis

Austria	Belgium	Czech Republic	Denmark	England	Estonia
Finland	France	Germany	Greece	Hungary	Italy
Ireland	Latvia	Lithuania	Luxembourg	Netherlands	Poland
Portugal	Slovak Republic	Spain	Sweden		

Source: Authors own construction, June 2024

In the model, the sample is made up of 22 EU countries for the period 2007–2021. The reason for selecting 2007 as the starting year for this research is that from that year on, the data related to the variables can be accessed in their entirety. Econometric analysis was carried out with the help of the STATA package program. Following measures identified by Florida (2005) for his Creative Index are:

Talent: f (creative class, Human Capital Index, Scientific Talent Index and others); The Creative Class Index measures the percentage of the workforce engaged in creative work, the Human Capital Index measures the proportion of the population with a bachelor's degree, and the Scientific Talent Index measures the number of researchers in a country,

Technology: f (R&D Index, Innovation Index and others); R&D Index: R&D expenditures as percentage of GDP, Innovation Index: patent granted per million people.

Tolerance: f (Values Index, Self-expression Index, and others); Values Index: degree to which a country espouses "traditional" as opposed to "modern" or "secular" values, Self-expression Index: degree to which a nation values individuals' rights and self-expression.

We used the following variables and data sources in our analysis: A skilled labor force (talent), high-tech exports and R&D spending (technology) and skilled migration data (both talent and tolerance). Data were obtained for skilled labor (OECD), skilled migration (Eurostat), high technology exports (World Bank) and R&D spending (World Bank). Table 2 summarizes the variables and data sources used.

Table 2. Data of Variables

Variables	Abbreviation	Explanation	Source
Skilled Labor Force Ratio (Talent)	SLF	Higher Education Graduate Employment Rate	Organization for Economic Co-operation and Development (OECD)
Skilled Migration Rate (Tolerance)	SM	Proportion of Foreign Population with Higher Education Degree	European Statistical Office (Eurostat)
High-Tech Exports (USD) (Technology)	HTE	High-Tech Exports (USD)	World Bank
Research and Development Expenditure (Technology)	RDE	Research and development expenditure (% of GDP)	World Bank

Source: Authors own construction, June 2024

In Table 3, the statistics of the variables are summarized and descriptive statistics – such as the number of observations, the minimum and maximum values, and the means and standard deviations of the variables used – are included. The average value of the skilled labor force is 84.6 and the standard deviation is 3.7. In addition, the minimum value of this variable is 68.5 and the maximum value 91.26. It is observed that the maximum value is about 1.5 times greater than the minimum value. The mean value of skilled migration is 32.5 and the standard deviation is 10.8 the minimum value of skilled migration is 12.2 and the maximum value is 60.7. The mean value of high-tech exports is 3.14e+10 and the standard deviation is 4.55e+10. The minimum value of the high-tech export variable is 3.57e+08 and the maximum value is 2.16e+11. Finally, the mean value and standard deviation of R&D expenditures are 1.79 and 0.85, respectively. Also, the minimum value is 0.43 and the maximum value is 3.73.

Since the values of the skilled labor force and skilled migration variables were included in the model as percentages, it was considered inappropriate to take the logarithms of these values. As a result, all variables used in the model were analyzed at their level values.

Table 3. Summary Statistics of Variables

Variables	Number of Observations	Average	Standard deviation	Minimum	Maximum
Skilled Labor Force Ratio (SLF)	330	84.65494	3.764633	68.54	91.26
Skilled Migration Rate (SM)	328	32.55854	10.87569	12.2	60.7
High Tech Exports (HTE)	329	3.14e+10	4.55e+10	3.57e+08	2.16e+11
Research and Development Expenditure (RDE)	330	1.79322	0.8567707	0.43514	3.73402

Source: Authors own construction, June 2024

The sample discussed in this study comprises the data of 22 EU countries for the period 2007–2021. In other words, the unit size of this study is N = 22, the time dimension is T = 14 and it has a balanced panel feature. In this analysis, it was decided that the dynamic panel data method was appropriate due to the short time dimension of the panel and the possibility that a few observations in the panel could not be provided. Dynamic models are those that reflect the dynamic effects of a dependent variable over time; in such a case, the lagged values of the dependent variable are included as independent variables. The dynamic panel data model can therefore be formulated as follows:

$$SLF_{it} = \beta_0 + \beta_1 SL_{it-2} + \beta_2 SM_{it} + \beta_3 HTE_{it} + \beta_4 RDE_{it} + \mu_{it}$$

The model was created by making natural logarithmic arrangements. The dependent variable in the model is skilled labor force and the independent variables are qualified migration, high-technology exports and R&D expenditures; the 'i' index shows the cross-sectional units, that is, the 22 EU countries; the 't' index shows the time (2007–2021).

4. Research Results

4.1. Estimation Dynamic Panel Data Method and Forecast results

The economic behavior in a given period usually occurs under the influence of past experiences and patterns of behaviour. In this case, when examining economic relations, the delayed values of the variables should be examined as explanatory factors. Models to which delayed values are added are called 'dynamic panel data models.' In these models, if the delayed value of the dependent variable is added to the model as an independent variable, it is called an 'autoregressive model' (Tatoğlu, 2020, p. 115). The advantages of dynamic panel data models include having a higher number of observations, having a more homogeneous structure and reducing the connection problem between explanatory variables by increasing the degree of freedom (Binay, 2021, p. 417).

In dynamic models, the problem of internality arises because the lagged value of the dependent variable is included in the model as an independent variable. Therefore, in the analysis made with the least squares method (LS), both the unit and time effect and the internality are neglected. As a result, the findings obtained by the pooled least squares method will be biased and inconsistent (Baltagi, 2008). Since the lagged value of the dependent variable is included in the model as an independent variable in dynamic models, endogeneity problem arises. Therefore, both unit and time effects and endogeneity are neglected in the analysis conducted with the ordinary least squares method.

Another method used in estimating dynamic panel data models is the first differences estimator. The first differences estimator is preferred when the unit effect is correlated with the independent variable. In this method, the unit effect is deducted from the model with the first difference transformation. However, the lagged value of the dependent variable is not orthogonal with the error term. This situation causes the forecast results to be inaccurate. The first difference transformation is performed first to obtain consistent prediction results. Then the correlation between the lagged value of the dependent variable and the error term needs to be checked using the instrumental variable. When the error terms of the first difference model are with constant variance and no autocorrelation, the use of the Anderson and Hsiao (1982) estimator is appropriate.

However, first difference error terms are usually negative and correlated. In this case, the use of Arellano and Bond‘s (1991) generalized moment method (GMM) would lead to consistent results. In the GMM method, the first difference model is first transformed using the instrumental variable matrix. This transformed model is then estimated according to the generalized least squares method. The system GMM incorporates the lagged value of the dependent variables into the model as an instrumental variable. To solve the endogeneity problem, the lagged value of the dependent variable is used as the instrumental variable. The system GMM model is estimators designed for situations with N>T. Arellano and Bond‘s (1991) prediction that if the number of autoregressive parameters is too high, the model is weak. When working with unbalanced panel data or when T is small, the first difference transformation is weak in explaining the model. When the first difference is received in unbalanced panels, the data of some units disappears. According to Arellano and Bover (1995), it is more appropriate to use the method of forward orthogonal deviations instead of the first differences. In this method, the difference of the average of all future values of the variable is taken. Thus, data loss is minimal (Roodman, 2009). In brief, the methodology is superior to other estimators in that it addresses endogeneity issues and controls for time-invariant country-specific effects. Zobeiri et al. (2024), Mulugeta (2024), Xaisongkham and Liu (2024) have proposed the system GMM estimator as a consistent and efficient estimator. For this reason, one step GMM and two step GMM estimators are used in this study.

A Wald test was performed to test the reliability of dynamic panel data analysis. The Wald test measures the level to which independent variables explain the dependent variables (Roodman, 2009). Hypotheses of the Wald test:

H_0: Independent variables have no power to explain the dependent variable.
H_1: Independent variables have the power to explain the dependent variable.

In order to obtain consistent results in system GMM estimation, three important criteria should be considered:

1) Arellano and Bond (1991) proposed AR (1) and AR (2) tests to test autocorrelation in dynamic panel data methods. It does not matter whether there is autocorrelation (AR (1)) from the first order or not. In order to achieve effective results in the GMM model, there must be no second-order autocorrelation (AR (2)). Hypotheses established for autocorrelation testing:

   H_0: There is no autocorrelation.
   H_1: There is an autocorrelation.

   Here, the acceptance of the H_0 hypothesis means that the model is nonautocorrelated.

2) It is a test of whether the instrument variables are valid, that is, whether the over-definition constraints are valid. For this case, the Hansen test is used. The hypotheses to be established for the Hansen test are as follows:

   H_0: Over-identification restrictions apply.
   H_1: Over-identification restrictions do not apply.

   The basic hypothesis of the Hansen test is that „extreme definition constraints apply.“ According to these tests, the hypothesis should not be rejected. In addition, the probability value should not be 1.000 and should not be below 0.25.

3) To ensure that the number of instrumental variables is equal to or less than N (Tatoğlu, 2020: 133–155).

One Step SGMM and Two Step SGMM estimation results are shown in Table 4. We used the „xtabond2“ command developed by Roodman (2009) to make predictions with the system generalized moments method. With this command, more test results are obtained. Consistent results are obtained in the presence of heteroskedacity and autocorrelation. However, the standard errors obtained from the first stage GMM are biased. For this reason, we applied the robust standard errors proposed by Windmeijer (2005). In addition, in order to reduce the data loss caused by the first differences method in the analysis, „orthogonal deviations“ proposed by Arellano and Bover (1995) were used instead of the first differences. In this method, instead of the difference of the period before the current period, the difference of the average of all future values of the variable is used (Tatoğlu, 2020: 131–145).

According to the results of the One Step SGMM and Two Step SGMM tests in Table IV, the H_0 hypothesis is rejected because Wald = 0.000<0.05. The alternative hypothesis, H_1, is accepted. According to the alternative hypothesis, the independent variables are meaningful in explaining the dependent variable. It also expresses the validity of the coefficients obtained from the model.

Table 4. One Step SGMM and Two Step SGMM estimation results

	One Step SGMM	Two Step SGMM
SLF_{t-2}	0.778***	0.638***
SM	0.060***	0.066***
HTE	6.20E**	8.25E*
RDE	0.350*	0.458**
Constant	15.962***	27.421*
Wald Test ($\chi 2$)	423941.03***	206213.43***
AR(1)	1.24 (0.215)	1.15 (0.252)
AR(2)	-1.66 (0.096)	-1.33 (0.184)
Hansen	0.25 (0.614)	18.26 (0.108)
Number of Groups	22	22
Number of Instruments	6	17
Number of obs	283	283

Note: ***, ** and * denote the significance level at 1%, 5% and 10%, respectively. p-values are given in the parentheses.

Source: Authors own construction, June 2024

According to the One Step SGMM and Two Step SGMM estimation results, the lagged value of the dependent variable (SLFt-2), skilled migration (SM), high technology exports (LHTE) and R&D expenditures (RDE) were statistically significant. These variables have a positive effect on the qualified workforce. When the results of One Step SGMM are examined, the H_0 hypothesis, which suggests that there is no first-order autocorrelation (AR (1)) in the model, is rejected. The H_0 hypothesis that there is no second order autocorrelation (AR (2)) is accepted. According to the Two Step GMM estimation results, the null hypothesis stating that there is no first- and second-order autocorrelation ((AR1)) and (AR (2)) is accepted. When the Hansen over-determination test result was examined; The H_0 hypothesis is accepted. This shows that the instrumental variables are valid. The analysis revealed that skilled migration, R&D expenditures, and high-technology exports all had a positive effect on the qualified labor force.

5. Conclusion

The creative class and creative cities are integral to fostering a dynamic and innovative economy. By recognizing the significance of creative professionals and investing in the development of creative cities, governments and policymakers can create environments that attract and retain talent, drive economic growth and enhance the overall quality of life. Embracing skilled migration as a means of diversifying and strengthening the creative landscape will undoubtedly contribute to the success and vibrancy of creative cities in the future.

Florida's theories of the creative class emphasize the importance of creativity and diversity to fostering economic growth. Florida has suggested that states, which try to balance the development differences between regions and countries, should follow a strategy dominated by cultural diversity and tolerance. If these theories become state policy, it is possible to accelerate economic and social development. In other words, at the heart of the Creative Class theory is the assumption that cities and regions must attract the creative class in order to increase economic growth. Moreover, economic growth is driven by tolerance, talent and technology. Creative individuals, for their part, prefer regions or countries that are open to new ideas, are tolerant and are culturally diverse. In short, creative individuals migrate to regions that have a creative ecosystem and where differences are accepted.

This study offers a different perspective as it tests the relationship between the creative class and skilled migration empirically. In other words, the hypothesis that the increase in technology, talent and tolerance attracts the creative class is tested. We investigated the relationship between the creative class and the 3Ts of tolerance, talent and technology in 22 EU member states during the period 2007–2021. In our study, the creative class is represented by qualified workforce data and technology is represented by high-technology and R&D expenditures export data. Unlike previous studies (Doğrul and Çelikkol, 2017; Esen and Atay, 2020), we used qualified migration data to represent tolerance and talent.

Our study contributes to the literature in several ways. The current literature is mainly based on theory and conceptual studies. For this paper, we expanded the conceptual theories to an econometric model that would allow us to test whether the theory holds in reality. Moreover, the few empirical studies in this field focusses on Western Europe; our study expands on this by including other non-Western European nations. We tested our study with dynamic panel data models One Step SGMM and Two Step SGMM estimators. By One Step SGMM and Two Step SGMM estimators, we conclude that skilled migration, high-tech exports and R&D expenditures increase the skilled workforce. The results of the study's analysis were expected in theory and in other studies (Florida et al., 2008; Vossen et al., 2019), and were found to be similar to the suggested results and had a positive relationship. We also compared different dynamic panel data models to test the consistency of the study. For this reason, the study is important as it expands the research with regards to sample size, the variables used and analysis method.

As a result, it can be concluded that it is a necessary precondition to attract a high-quality skilled workforce in order to build creative places. A highly qualified workforce is attracted to places that are tolerant of different religions, cultures, freedom, diversity and broad social networks. Skilled migrant workers contribute to the development of new production techniques or new products as they transfer their ideas and experiences to the places they go. To gain a more competitive edge in the global market, therefore, EU countries need to take advantage of the knowledge and skills of the creative class. To achieve this, policymakers should offer incentives and a variety of opportunities that will appeal to creative individuals and formulate policies that will persuade them to move to creative cities.

References

Anderson, T. W., & Hsiao, C. (1982). Formulation and estimation of dynamic models using panel data. *Journal of econometrics*, *18*(1), 47-82.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, *68*(1), 29-51.

Baltagi, B. H. (2008), *Econometric analysis of panel data* (Vol. 4, pp. 135-145). Chichester: Wiley.

Batabyal, A. A., and Yoo, S. J. (2018), Schumpeterian creative class competition, innovation policy, and regional economic growth, *International Review of Economics and Finance*, *55*, 86-97 https://doi.org/10.1016/j.iref.2018.01.016

Bhardwaj, B., & Sharma, D. (2023). Migration of skilled professionals across the border: Brain drain or brain gain?. *European Management Journal*, *41*(6), 1021-1033.

Binay, M. (2021), OECD Ülkelerinde Sosyal Güvenlik Harcamalarının Ekonomik Büyümeye Etkisinin Dinamik Panel Veri Analizi ile İncelenmesi, *Sosyal Güvenlik Dergisi*, 414-422. https://doi.org/10.32331/sgd.1049488

Bontje M. and S. Musterd (2009), Creative Industries, creative class and competitiveness: Expert opinions critically appraised, *Geoforum*, Vol. 40, Issue 5, p. 843-852 https://doi.org/10.1016/j.geoforum.2009.07.001

Boschma, R. A., and Fritsch, M. (2009), Creative class and regional growth: Empirical evidence from seven European countries, *Economic Geography*, *85*(4), 391-423. https://doi.org/10.1111/j.1944-8287.2009.01048.x

Borén, T., and Young, C. (2013), The migration dynamics of the "creative class": Evidence from a study of artists in Stockholm, Sweden, *Annals of the Association of American Geographers*, *103*(1), 195-210. https://doi.org/10.1080/00045608.2011.628263

Çetindamar D. and A. Günsel (2012), Measuring the Creativity of a City: A Proposal and an Application, *European Planning Studies*, 20:8, 1301-1318, DOI:10.1080/09654313.2012.680583

Cui D., Y. Hei, P. Nijkamp, D. Wu, G. Li, S. Lv, and H. Liu. (2023), Spatial–temporal dynamics and determinants of creative class concentration—A study on urban agglomerations in China, *Population, Space and Place*, Vol. 29, Issue 2 https://doi.org/10.1002/psp.2615

Depine A., V. Eleutheriou and T. Vanzin (2017), Creative Class: How and Why to Attract It to The City?. ACTAS ICONO14 – V Congresso Internacional Cidades Criativas | 25-27 Janeiro 2017. Porto-Portugal | ASOCIACIÓN DE COMUNICACIÓN Y NUEVAS TECNOLOGÍAS https://via.ufsc.br/wp-content/uploads/2017/10/Actas-CC17-tomo2_OPT.pdf accessed on 5 September 2023

Doğrul, H. G., Çelikkol, M. M., and Murat, N. (2016), İllerin Ekonomik Gelişmişliği Üzerinde Yaratıcı Sınıfın Etkisi: Türkiye Örneği, Business *and Economics Research Journal*, *7*(4). DOI Number: 10.20409/berj.2016422340

Doğrul, H. G. and Çelikkol, M. M. (2017), Türkiye'de Yaratıcı Sınıfın Coğrafi Durumunu Etkileyen Faktörler Üzerine Bir İnceleme, *Finans Politik ve Ekonomik Yorumlar*, (623), 35-50. Retrieved from https://dergipark.org.tr/en/pub/fpeyd/issue/48022/607321

Esen, Ü. B., and Atay, Ö. (2017), Ekonominin Yeni Yüzü: Yaratıcı Ekonomi, *Sosyoekonomi*, *25*(3). DOI:10.17233/sosyoekonomi.289441

Esen, Ü. B. and Atay, Ö. (2020), Türkiye'nin Yaratıcı Şehirleri, *Bilig* , (92) , 29-54 . DOI: 10.12995/bilig.9202

European Statistics (EUROSTAT), (2023), Data Browser, https://ec.europa.eu/eurostat/databrowser/view/EDAT_LFS_9912__custom_5382610/settings_1/table?lang=en, accessed on 20.05.2023

Evren, G. O. (2016), Gelişmekte Olan Ülkelerde Yaratıcı Sınıfın Göç Eğilimlerine Etki Eden Dinamikler: İstanbul Örneği, *Journal of Life Economics*, *3*(Special), 89-102. https://doi.org/10.15637/jlecon.140

Florida, R. (2002a), The Rise of the Creative Class, Basic Books, New York.

Florida, R. (2002b), Bohemia and economic geography, *Journal of Economic Geography*, *2*(1), 55-71. https://doi.org/10.1093/jeg/2.1.55

Florida, R. (2002c), The economic geography of talent, *Annals of the Association of American Geographers*, *92*(4), 743-755. https://doi.org/10.1111/1467-8306.00314

Florida, R. (2005), The Flight of the Creative Class, https://slideplayer.com/slide/5324835/ , accessed on 29 September 2023

Florida R. (2014), The Creative Class and Economic Development, *Economic Development Quarterly* Vol. 28(3) 196–205 DOI: 10.1177/0891242414541693

Florida R. and P. Adler (2020), Creative Class and the Creative Economy, *Encyclopedia of Creativity*, 3rd edition, Volume 1 p. 222- 224. https://doi.org/10.1016/B978-0-12-809324-5.23766-8

Florida, R., Mellander, C., and Stolarick, K. (2008), Inside the black box of regional development—human capital, the creative class and tolerance, *Journal of Economic Geography*, *8*(5), 615-649. https://doi.org/10.1093/jeg/lbn023

Florida, R. (2012), The Rise of the Creative Class (Revised Paperback Edition), Basic Books, New York.

Gabe, T., Florida, R., and Mellander, C. (2013), The creative class and the crisis, *Cambridge Journal of Regions, Economy and Society*, *6*(1), 37-53. https://doi.org/10.1093/cjres/rss012

Hansen, H. K., (2007), Technology, Talent and Tolerance - The Geography of the Creative Class in Sweden, Department of Social and Economic Geography, Lund University, Report 169, 4.

Houston D., A. Findlay, R. Harrison and C. Mason (2008), Will attracting the "creative class" boost economic growth in old industrial regions? A case study of Scotland, *Geografiska Annaler: Series B, Human Geography*, 90:2, 133-149, DOI: 10.1111/j.1468-0467.2008.00283.x

Hughes, E., Webber, D. J., & Parry, G. (2024). Introduction to Migration, Mobility and the Creative Class. In *Migration, Mobility and the Creative Class* (pp. 1-13). Edward Elgar Publishing.

Kačerauskas, T. (2015), Technologies in creative economy and creative society, *Technological and Economic Development of Economy*, *21*(6), 855-868. https://doi.org/10.3846/20294913.2015.1036325

Krätke, S. 'Creative Cities' and the Rise of the Dealer Class: A Critique of Richard Florida's Approach to Urban Theory. *Int. J. Urban Reg. Res.* 2010, *34*, 835–853.

Kačerauskas, T. (2018). Indices of creative economy: Critique of R. Florida's creativity indices. *Economics and Sociology*, *11*(4), 280-288.

Koç, Ş., Mercan, B., & Gömleksiz, M. (2023). Türkiye'de bilgi taşmaları ve ekonomik büyüme ilişkisi: ARDL sınır testi yaklaşımı. *Necmettin Erbakan Üniversitesi Siyasal Bilgiler Fakültesi Dergisi,* 5(Özel Sayı), 207-221.

Labrianidis L., T. Sykas, E.Sachini and N. Karampekios (2023), Innovation as a cause of highly skilled migration: Evidence from Greece, *International Migration* Vol. 61, Issue 3, p.222-236 https://doi.org/10.1111/imig.13035

Liu, F., Dai, J., Liu, Y., Cheng, S., & He, Y. (2024). The dual organization services and governance for creative cities: A case of Hengdian World Studios. *Cities*, *149*, 105001.

Marlet, G., and Van Woerkens, C. (2007), The Dutch Creative Class and How it Fosters Urban Employment Growth, *Urban Studies*, *44*(13), 2605–2626. https://doi.org/10.1080/00420980701558434

Martin-Brelot, H., Grossetti, M., Eckert, D., Gritsai, O., & Kovacs, Z. (2010). The spatial mobility of the 'creative class': A European perspective. *International Journal of Urban and Regional Research*, *34*(4), 854-870.

Montanari, F., Scapolan, A., and Mizzau, L. (2018), Embeddedness and locational choices: A study of creative workers in a dance organization, *Urban Studies*, *55*(5), 1121-1138. https://doi.org/10.1177/0042098016677940

Mulugeta, E. T. (2024). Output growth volatility, remittances, and financial development in the common market for Eastern and Southern Africa Region: A system generalized method of moments approach. *Journal of the Knowledge Economy*, 1-17.

Nathan M., (2007), The Wrong Stuff? Creative Class Theory and Economic Performance in UK Cities, MPRA Paper No. 29486. Online at https://mpra.ub.uni-muenchen.de/29486/, accessed on 7 September 2023 DOI: 10.4018/978-1-59904-838-3.ch005

OECD, (2023), Employment by education level (indicator), (Accessed on 14 March 2023). doi: 10.1787/26f676c7-en

Pavelea Am, Neamțu B, Nijkamp P, Kourtit K. (2021), Is the Creative Class a Game Changer in Cities? A Socioeconomic Study on Romania, *Sustainability*, 2021; 13(11):5807. https://doi.org/10.3390/su13115807

Peck, J. (2005). Struggling with the creative class. *International Journal of Urban and Regional Research, 29*(4), 740–770. https://doi.org/10.1111/j.1468-2427.2005.00620.x

Rahimzadeh, A. and Ghalehteimouri, K. J. (2024). Identify successful performance of urban creativity indicators dimensions between 22 regions of Tehran Metropolitan: a comparative study. *City and Built Environment*, *2*(1), 5.

Rodrigues, M., Oliveira, C., MárioFranco, & Daniel, A. (2024). A bibliometric study about the rural creative class: Proposal of a conceptual framework and future agenda. *Journal of the Knowledge Economy*, 1-26.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, *9*(1), 86-136.

Shah, K. A., Gökçen, Ş., & Polat, B. (2024). Yaratıcı sınıfın göç eğilimlerinde yaşam kalitesinin yeri: İstanbul'dan İzmir'e yaratıcı göç. *Kent Akademisi*, 17(1), 22-42. https://doi.org/10.35674/kent.1388912

Silva, S. R., Marques, C. S., & Galvão, A. R. (2024). Where is the rural creative class? A systematic literature review about creative industries in low-density areas. Journal of the Knowledge Economy, 15(2), 6026-6056.

Vossen, D., Sternberg, R., and Alfken, C. (2019), Internal migration of the 'creative class' in Germany, *Regional Studies*, *53*(10), 1359-1370. https://doi.org/10.1080/00343404.2019.1566699

World Bank, (2023), World Development Indicators, https://databank.worldbank.org/reports.aspx?source=2and-series=TX.VAL.TECH.CD#, accessed on 12 May 2023

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of econometrics*, *126*(1), 25-51.

Xaisongkham, S., & Liu, X. (2024). Institutional quality, employment, FDI and environmental degradation in developing countries: Evidence from the balanced panel GMM estimator. *International Journal of Emerging Markets*, *19*(7), 1920-1939.

Zobeiri, H., Jafari Samimi, A., & Ehsani, M. (2024). The impact of creative industries on gross domestic product using generalized method of moments (GMM). *Iranian Economic Review*, *28*(1), 196-219.

Tatoğlu, F. Y. (2020), *İleri Panel Veri Analizi* (C. 4), Beta Basım Yayın Dağıtım

Yildiz, B., and M. Acar (2020), Yaratıcı Sınıf ve Bölgesel Kalkınma: Teorik Bir İnceleme, *Euroasia Journal of Socıal Sciences and Humanities*, *7*(11), 36-46. Retrieved from https://www.euroasiajournal.com/index.php/eurssh/article/view/235