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RESEARCH ARTICLE

Analyzing the Contribution of Small and Medium Enterprises to Total Employment in Developed Countries: A Panel Data Regression Model Approach

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Abstract: The primary goal of the study is to determine if small- and medium-sized company (SMEs) employment influences total employability. The sample for this study is developed countries like China, the United States, the United Kingdom, France, and Russia We have used panel data models in this study. The time period for this study is from 2005 till 2021. When dealing with panel data sets, one of the modern econometric approaches employed in this work is panel data regression modelling. The fixed effects model (FE) and the random effects model (RE) are the two primary panel data models that will be explored. Additionally, we have tried additional Fixed effect model approaches to assess the results' robustness. This is a quantitative study using positivism philosophy and deductive approach. We have used mono method for this study as data is collected from previously observed observations. In most of our test we have seen that SME service sector employment have significant effect on total employability while SME industry sector does not have significant effect on total employability. This is mainly due to the reason that in seventeen years under consideration industrial growth has somewhat hampered and service industry has seen boom. This study is crucial for addressing targeted structural policies that help SMEs take advantage of new opportunities in a globalised, digital economy, with implications for employment, investment, and growth.

Keywords: Total employability, SME service sector, SME Industry Sector
JEL Classification Codes:

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1. Introduction

Small and medium enterprises development are the key to success for any economy. However, it is yet to measure what are the areas in which small and medium enterprises contribute more. Do they contribute more towards GDP or do they play a role in economic growth through their contribution in total employability of the country. Secondly it is further required to assess what should be the sample to support the validity of the study and what should be the time period. In previous studies research was conducted in either continent or specific country measuring SME contribution in total employability. In this study we have taken five developed economies China, Russia, UK, US and France as sample for study. We have broken SME into two part, that is SME industry sector and SME service sector and measured their contribution in total employability using various panel data techniques. SMEs account for a significant proportion of businesses and employment in developed countries. Understanding their role can help policymakers design better support mechanisms. In many developed economies, SMEs contribute substantially to job creation, and studying their impact quantitatively provides valuable insights into labor market dynamics. Governments and financial institutions implement various policies to foster

SME growth. A deeper understanding of the factors influencing SME-driven employment can aid in shaping effective policies. While there is extensive literature on the role of SMEs in economic development, fewer studies apply panel data regression techniques to analyze their contribution to employment across multiple developed countries. The use of a panel data regression model allows for a robust examination of how SMEs impact employment over time, controlling for country-specific variations and macroeconomic factors.

This study will help researchers to explore more countries like emerging economies, developing economies, underdeveloped economies etc. In addition to this it will help policy makers to design economic policies keeping in view SME role in total employability. In this study we will try to answer following research question:

- What effect does SME industry sector willhave on Total employability of developed countries.
- What effect does SME service sector will have on total employability of developed countries.

The objective of this study to measure the role of SME, both industry sector and service sector on total employability of developed countries (China, US, UK, Russia and France) for the period between 2005 and 2021. We want to have a look that whether SME industry sector contributes more towards total employability or SME service sector contribute more towards the total employability of the developed countries. This study will help underdeveloped countries to make their policy decisions on increasing employability while keeping in view developed countries trends of SME sector contribution in it.

2. Literature Review & Hypotheses Development

The contributions of SMEs to employment, innovation, and economic growth have been the subject of several studies. According to a 2017 OECD research, SMEs are the most common type of business and the main employer. Andersson and Noseleit (2011) use longitudinal data for Swedish areas to examine how start-ups affect job growth. According to them, the sector in which start-ups function is important, and it is also the sector in which the advantages of start-ups on job transformation are most apparent. The employment effect may be either good or negative when comparing different sectors. Additionally, research by Andersson and Noseleit (2019) shows that service and high-tech start-ups negatively affect other businesses.

Globally, small and medium-sized businesses (SMEs) make up the great majority of private sector businesses. In industrialised countries, they make up 55% of GDP, 70% of private sector jobs, and over 90% of all businesses (WTO, 2016). SMEs are also responsible for a significant amount of the economy in developing nations. According to UNIDO (2006), most developing countries are plagued by the "missing middle syndrome," where the bulk of private businesses are micro and minuscule, there are few large firms, most of which are focused on manufacturing, and there are few medium-sized startups. Numerous studies have demonstrated that mid-sized businesses are under-represented in a number of developing markets (e.g., Parida et al., 2021; Bank of Industry, 2020).

The gaps identified in this study were methodological gaps as this study has also used GMM while previous studies had only used panel data regression. In addition to this, the time period for selected sample was not studied before

Economic advancement is impeded by market failures that lead to the missing middle syndrome, which inhibits intermediate-scale manufacturing and lowers total factor productivity. According to one theory, small businesses are unable to grow because they do not have access to outside funding (Levy, 1991; Tybout, 2000). According to another idea, regulatory restrictions that prevent expansion are the root cause of the missing middle syndrome (Kaplinsky, 1997; Onji, 2009). Because their owners set them up for self-employment and work only for the survival of their businesses, without regard for growth, many micro and small firms in developing countries have limited growth opportunities, according to several studies in the literature (e.g., Coad & Tamvada, 2012; Nafziger & Terrell, 1996).

SMEs contribute less to the global GDP than their share of total employment because they are less productive than larger businesses (Maksimovic & Phillips, 2002). Because they cannot take advantage of economies of scale, operate in labour-intensive industries, employ less skilled workforce, and have trouble obtaining outside funding, small and medium-sized businesses (SMEs) are less productive than large firms (Alvarez & Crespi, 2003). For SMEs, growth is a crucial goal since it increases employment.

Since the SME sector is crucial to any economy's growth, it has received a lot of attention in the literature (Grguri-Rashiti et al., 2017). According to Rezaei et al. (2013), certain industries are often better suited than others, particularly when it comes to fully understanding a particular event (Ahmad,

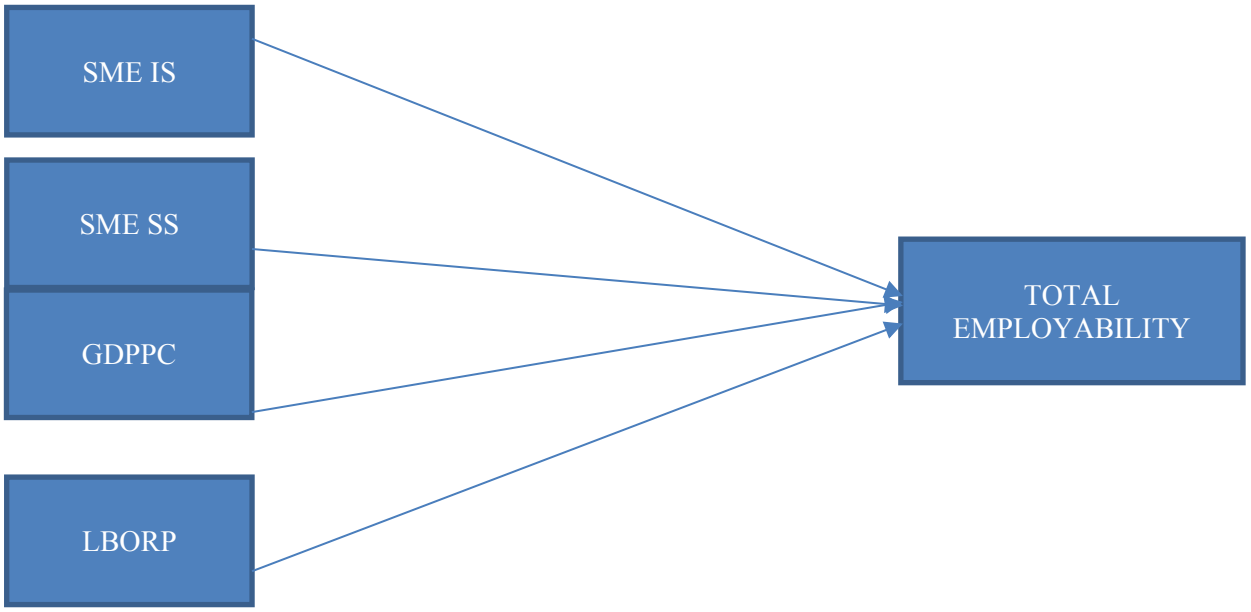
2007). Therefore, this study looked at the idea of economic success from the perspective of jobs created by SMEs in industrialised nations. It has been highlighted as a means of advancing both countries' economy. According to Liao et al. (2018) and Ramadani et al. (2014), it is the practice of looking for new opportunities while facing difficulties in order to successfully and efficiently combine several factors to achieve SME performance.

Therefore, facts and popular opinions should be compared (Schauer and Hoy, 2001). Since it has been widely acknowledged that context-specific perspectives are essential to comprehending entrepreneurship, this can only be achieved by concentrating on particular contexts in any phenomenon (Welter and Gartner, 2016). By giving them the chance to comprehend the dynamics of SMEs' growth—that is, how SMEs have contributed to the overall employment of established nations—this effort aims to help underdeveloped and developing nations see SMEs more positively.

Therefore, it is essential to comprehend the idea of business success from the perspective of small business owners. Profitable SMEs are the foundation of a nation's economy, boosting GDP, employment, exports, and productivity. However, failing SMEs are unable to make a significant contribution to the nation's economic development, which leads to persistent unemployment. The importance of SMEs to the nation's GDP, social advancement, employment, exports, and productivity has also been acknowledged by numerous research (Dutta, 2017; Cravo et al., 2012; Radam et al., 2008; Karides, 2005; Amini, 2004; Tehseen et al., 2020a, b).

Neumark, Wall, and Zhang (2018) assert that SMEs generate net employment, but that business size has a negative impact on employment contribution in the manufacturing and services sectors. This assertion is supported by the National Establishment Time Series data. Lawless (2014) examines whether age or size are significant factors in SMEs' employment contribution. A study by Dogan, Qamarul Islam, and Yazici (2017) found that the majority of jobs are created by smaller businesses. Conversely, Lawless (2014) finds that younger businesses are more dynamic than older ones and that there are clear differences in employment contribution based on an organization's size. Similar results were obtained in another study.

2.1.Theoretical Framework



According to above given framework total employability is our dependent variable where as SMESS and SMEIS are our independent variables. GDPCC and LBORP are control variables.

Total Employability (TEit), measured in thousands, encompasses individuals aged 15 to 64 who are either employed, self-employed, or working as family labor. This includes:

1. Those who, during the reference week, engaged in work for payment, profit, or family benefit for at least one hour.

2. Those who, while not actively working, held a job or operated a business from which they were temporarily absent.

To analyze which sector of SME employment contributes most significantly to overall employability in developed economies, we divided SME employment into two distinct categories: **SME Industry Sector Employment (SMEISit)** and **SME Service Sector Employment (SMESSit)**. These categories serve as the independent variables in our study.

SMEs, as defined by structural business statistics, include entities performing economic activities in line with international SME employment standards. Examples of these sectors include transportation, accommodation, information and communication, real estate, professional and technical services, and administrative support. **SMEISit**, on the other hand, specifically pertains to employment in SMEs operating within industries such as manufacturing, mining, utilities, and waste management, adhering to globally accepted employment criteria.

Labor productivity (LPRODit) measures the output of goods and services relative to either the workforce size or the total hours worked. For this study, we employed an output-per-hour-worked approach to account for differences between part-time and full-time employment, offering a more accurate representation of productivity trends in the economy.

To incorporate broader economic factors, we included **GDP per capita (GDPPCit)**, expressed in US dollars (USD) and adjusted for Purchasing Power Parity (PPP). GDP reflects total economic activity, defined as the value of all produced goods and services minus the value of those consumed during production. GDP per capita (GDPPCit), however, acts as an indicator of economic development, as highlighted in studies by Dornbusch, Fischer, and Startz (2010); Blanchard, Amighini, and Giavazzi (2010); and Mankiw (2016).

Our dataset spans from 2005 to 2021 and includes data from five countries: China, the United States, the United Kingdom, France, and Russia. This combination of time-series and cross-sectional data provides a substantial number of observations, enhancing the reliability and precision of econometric analyses.

2.2.Research Hypotheses

H1: SMEIS significantly influences total employment.
H2: SMESS has a notable effect on total employment.

3. Methodology

The data used for this study includes total employment (TEit), SME service sector employment (SMESSit), SME industry sector employment (SMEISit), labour productivity (LPRODit), and GDP per capita (GDPPCit). These were sourced from the Eurostat database and the World Bank database for developed countries (China, the US, the UK, Russia, and France). Table 1 provides a detailed overview of the data sources.

Table 1

Variable	Data Source
TE	Euro stat, World bank Data Base
SMEIS	Euro stat, World bank Data Base
SMESS	Euro stat, World bank Data Base
GDP	World Bank Data Base
LPROD	World Bank Data Base

3.1.Panel data approach

When dealing with panel data sets, one of the contemporary econometric methodologies used in this study is panel data regression modelling. The fixed effects model (FE) and the random effects model (RE) are the two primary panel data models that will be explored.

The basic equation for our model is given below:

$$TEit = a + \beta_1 SME\,(IS)\,it + \beta_2 SME\,(SS)\,it + \beta_3 LPRODTit + \beta_4 GDPit + \mu it$$

Equation for Random effect (Model 2)

$$TEit = a + \beta_1 SME\,(IS)\,it + \beta_2 SME\,(SS)\,it + \beta_3 LPRODTit + \beta_4 GDPit + \mu it$$

Equation for Fixed effect (Model 1, Model 4, Model 5, Model 6)

$$TEit = ai + \beta_1 SME\,(IS)\,it + \beta_2 SME\,(SS)\,it + \beta_3 LPRODTit + \beta_4 GDPit + \mu it$$

Equation for POOLED OLS (Model 3)

$$TEit = a + \beta_1 SME\,(IS)\,it + \beta_2 SME\,(SS)\,it + \beta_3 LPRODTit + \beta_4 GDPit + \mu it$$

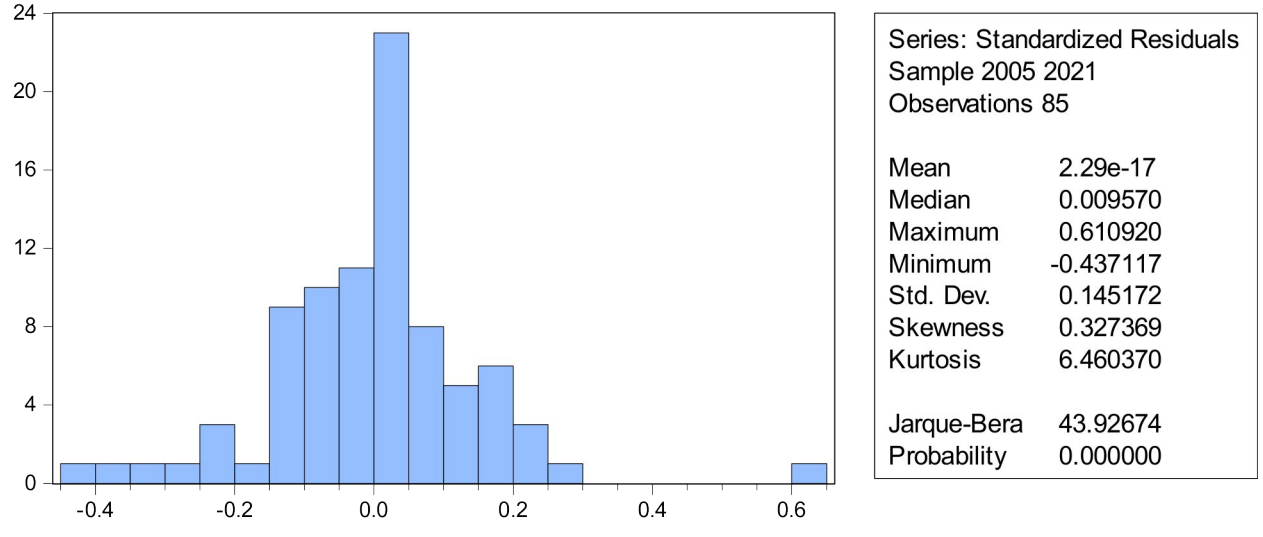
TEi represents dependent variable, alpha is a constant and represents intercept, B is for coefficient, it for time period and cross section SME(SS), SME(IS), LPRODT, GDP are dependent and control variables ,μit for error term across sections and time. To normalize the data, log of independent variables have been taken.

The Random Effects (RE) model assumes that all individual differences are accounted for through the intercept terms. However, since the individuals in the dataset are selected randomly, these differences can be treated as random factors. The error term in the RE model (eite_{it}eit) represents random individual differences and is comprised of the standard regression error (eite_{it}eit) and a random individual effect (uiu_iui). This structure has led to the RE model being commonly referred to as an error components model (see Baltagi, 2009; Hill, Griffiths, & Lim, 2012; Wooldridge, 2010).

4. Results and Discussion

Both Fixed Effects (FE) and Random Effects (RE) models were utilized to evaluate the relationships between total employability and employment in the SME service and industry sectors, while controlling for additional variables. Wooldridge (2010) emphasizes that this approach mitigates biases associated with different estimation methods. The analysis focused on panel data from China, the United States, the United Kingdom, France, and Russia over the period 2005–2021. The estimation results are detailed in Table 2.

Graph 1:



The above graph tells us about the normality of data. We can see that standard deviation, which is the measurement of dispersion from the mean is 0.14 which falls in the limit of +-2 standard deviation. Similarly, Skewness also falls in the prescribed limit of +- 3. The skewness is 0.32. Kurtosis though on the higher side but still not too much and settles at 6.46. For kurtosis there are different schools of thought, for some + - 7 is acceptable. This result falls in this category. All the normality tests show that the data is normally distributed. This can also be seen from the shape of the histogram.

Table 2

Estimation Results of the fixed effects and random effects panel regression model

	Fixed (within group)effects Model1			Random effect (within Group) Model 2		
	Coeff	**T stats**	**P-Val**	**Coeff**	**T stats**	**P-Val**
Constant	1.154	0.658	0.513	16.825	19.221	0.000
SMESS	2.226	6.108	0.000	-1.241	-6.567	0.000
SMEIS	1.794	1.621	0.109	-10.460	-34.904	0.000
LPROD	0.007	0.045	0.965	0.827	9.850	0.000
GDPPC	-1.148	-2.133	0.036	2.299	12.393	0.000
Rsquare	0.986			0.572		
F-Statistics	658.687			26.738		
P Value	0.000			0.000		
No of Observations	85			85		

According to Table 2, Fixed effect within group SMESS and GDPPC have significant results, and SME SS also has a positive coefficient, demonstrating that when SMESS increases, overall employability also rises. SMEIS, however, does not have a significant result, coefficient do have a positive sign, but we have to ignore it since results are not significant. This suggests that SME SS does affect total employability positively. All of the results from the RE model are significant, however the coefficients for SME IS and SME SS indicate a negative connection, GDPPP and LPROD have a favourable impact on employability overall, while SME IS and SMESS may effect total employability negatively. Additionally, the Hausman test was used to compare FEs with REs, with the null hypothesis being that FEs are preferable to REs as alternatives (see, for instance, Greene, 2012). FE models are favoured, according to Hausman test estimates (see Table 4). As a result, we employ FE models for additional analysis. With the help of one-way FE and pooled OLS regression estimation, we conducted our empirical investigation.

A residual graph shows the difference between the observed response and the fitted response values. The ideal residual graph shows a scattered dotes in the graph, which can be seen in the below graph:

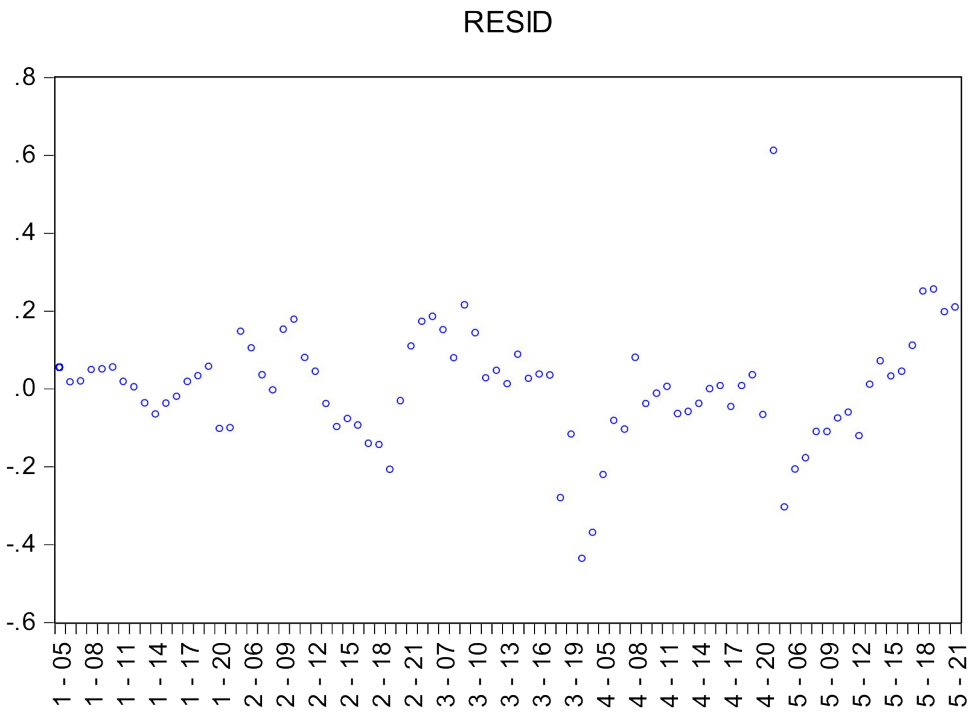


Table 3 :Estimation Results for Robustness Test

	Pooled OLS (Model 3)			**One Way FE with Cross Section Effects (Model 4)**			**One Way FE with Period Effects (Model 5)**		
	Coeff	**T stats**	**P-Value**	**Coeff**	**T Stats**	**P-Value**	**Coeff**	**T stats**	**P-Value**
Constant	16.825	3.595	0.001	1.154	0.826	0.412	1.154	0.560	0.577
SMESS	-1.241	-1.228	0.223	2.226	6.113	0.000	2.226	5.023	0.000
SMEIS	-10.460	-6.527	0.000	1.794	2.017	0.047	1.794	1.421	0.159
LPROD	0.827	1.842	0.069	0.007	0.040	0.968	0.007	0.049	0.961
GDPPC	2.299	2.318	0.023	-1.148	-2.266	0.026	-1.148	-1.886	0.063
Rsquare	0.572			0.986			0.986		
F-Statistics	26.738			658.687			658.68		
P-Value	0.000			0.000			0.000		
No of Observations	85			85			85		

Choosing the best model from a variety of panel data models requires evaluation of a number of factors, including estimates of model fit statistics and others. Although estimating a pooled regression model is a straightforward process, it has some serious drawbacks. Most crucially, this method of data pooling implicitly presupposes that the intercepts are constant across all nations and all years. With a panel data set at hand, pooling the data would be a less-than-ideal course of action because it would ignore any common variation existing in the series across time (see, for instance, Brooks, 2014). As a result, we draw the conclusion that the pooled regression model should not be used going forward. Instead, we concentrate on FE models that the previous Hausman test revealed were the best ones (see Table 2). The combined OLS indicates that SME IS has results that are significant but have negative coefficient. The remainder had negligible findings and a negative coefficient. Our model has also been tested on a one-way fixed effect with cross section, which entails taking dummies for each country. The outcome for SMESS in this instance is significant and also has a positive coefficient, indicating that SMESS have a favorable link with overall employability. While SME IS though showing positive coefficient but have insignificant result so we have to ignore it. We also tested our model using a two-way fixed effect with cross section weights and cross section effect to further validate it.

Table 4

Two way fixed effect with cross section weights

	Coefficient	T Stats	P-Value
Constant	1.785421	1.429288	0.1570
SMESS	2.214642	7.921635	0.0000
SMEIS	1.884577	3.660227	0.0005
LPROD	-0.020338	-0.149838	0.8813
GDPPC	-1.211588	-3.670174	0.0004
Rsquare	0.991821		
F_Statistics	1152.016		
P Value	0.000000		
No of Observations	85		

In table 4 which is two way fixed effect model with cross sections and cross section effects, regression estimates suggest positive association between SME service sector employment, SME industrial sector employment and total employability. The significance level is less than 0.05 and coefficient for SME service sector is 2.25 and SME industry sector is 1.885. This suggests and supports our alternative hypothesis that SME industry sector and SME service sector have a positive relationship with total employability as one increases the other also increases. Regression estimates are statistically significant for all mentioned parameters.

Table 5

Generalized Methods of Moments (Model 6)

	Coefficient	T Stats	P-Value
Constant	13.40171	6.752120	0.0000
SMESS	-0.133833	-7.885188	0.0000
SMEIS	-0.168734	-2.886637	0.0050
LPROD	-2.21	-1.018292	0.3116
GDPPC	4.18	3.213875	0.0019
Rsquare	0.483263		
No of Observations	85		

In order to further revalidate our result we have chosen Generalized Methods of Moments (GMM), results of which can be seen in table 5. The results of GMM though significant i.e. less than 0.05 but does not support our previous findings, in which SME service sector had positive and significant relationship with total employability. Here we can see that coefficient of all the variables is negative except GDP per capita, this suggests that when SME SS and SME IS along with labor productivity increases total employability decreases. However, when GDP per capital increases total employability also increases. The results might not be appropriate for the reason that GMM is used for large number of observations and small time periods, however in our case we have five countries and seventeen years. Since we have

proven the robustness of our result through one way fixed effect with cross section and one way fixed effect with period effect and two way fixed effect with cross section and cross section effect. In most of our test we have seen that SME service sector employment have positive coefficient and significant results while SME industry sector have negative coefficient and non significant results which we ignore. This shows that SME Service sector is affecting total employability of the developed countries. These results can be explained by the fact that SMEs make up the majority of all businesses and are the main source of employment. Additionally, they are crucial for generating values because they can influence GDP and the growth of SME's can aid in economic diversification (OECD, 2017).

Firm Life Cycle Theory Suggests that businesses go through different stages (startup, growth, maturity, and decline), and employment contributions vary accordingly. SMEs in the growth phase contribute significantly to job creation. Resource-Based View (RBV) of SMEsEmphasizes that SMEs with unique resources and capabilities (e.g., skilled labor, technological advancements) can generate sustainable employment and competitive advantages.

5. Conclusion and Policy Implication

This research employs panel data models to examine the impact of SME employment on total employment in developing nations, including China, the United States, the United Kingdom, Russia, and France. SME employment is categorized into two sectors—service and industry—to determine which sector contributes most significantly to total employment in these countries. In the panel data regression analysis, total employability serves as the dependent variable, while GDP per capita, labour productivity, and SME employment in both service and industry sectors are included as independent control variables. Notably, the recovery of employment in SMEs was particularly evident within the service sectors. Reports from 2016 highlight job growth in areas such as wholesale and retail trade, accommodation and food services, and business services (European Commission, 2017).

According to regression estimations, there is a positive correlation between total employability and GDP per capita as well as a positive correlation between employment in the SME service sector, however due to economic conditions in understudy years that is 2005 to 2021SME industry sector does not affect overall employment. All of the aforementioned parameters have statistically significant regression estimates.

Our findings suggest that on a national level, policy should be focused on boosting the SME sector by creating a macroeconomic climate that is more conducive to SME development, involving all important stakeholders in the process, and emphasising the service sector, which produced the best outcomes. Simplifying the regulatory structure should help SMEs develop more than other sectors. In conclusion, increasing SME employment potential would benefit both the economic and social aspects of society. Greater employment prospects may result from SMEs developing more quickly. SMEs have a significant role in realising innovation potential, improving employment rates, and adding value, all of which have an impact on the growth and development of nations.

Small and medium enterprises can contribute to the economy in various ways. It can help the household to generate income for their livelihood simultaneously contributing to the country’s GDP. It can further reduce the burden on the central and provincial governments of creating jobs as people involve n this type of businesses create jobs not for themselves but for masses contributing in the overall wellbeing of the society.

In industrialised nations, SMEs face less financial and economic barriers to expansion. Economic barriers include a poor economy, a heavy tax burden, a high exchange rate, a reduction in consumer purchasing power, and a high rate of inflation. According to Doan et al. (2020), increasing economic uncertainty has a detrimental influence on the performance of entrepreneurial SMEs. Compared to underdeveloped countries, industrialised nations perceive less financial and economic impediments to the development of entrepreneurial SMEs since they have a better developed financial system and a higher GDP per capita (Moder and Bonifai, 2017). The rate of inflation in a nation affects the purchasing power of the consumer. Customers steer clear of buying goods and services during a recession. The operations of enterprising SMEs are impacted as a result of the decline in demand for goods and services.

Governments in developing nations have an obligation to emulate affluent nations in order to accomplish the growth of small businesses. Every action developed nations take to lower business costs encourages SMEs.

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