Impacts of Digital Economic Transformation on Youth Employment: Empirical Evidence from China

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Abstract: An OLS regression methodology is employed in this research to explore the correlation between GDP, PMI, and youth unemployment rate, as a result of China's digital economic transformation, and its effects on youth employment. The findings indicate that China's youth unemployment has significantly decreased as a result of the development of the digital economy, suggesting a negative relationship between the two. The research concludes that education has a moderating influence on the link between the digital economy and the youth unemployment rate. The transition to a digital economy for young employment in China is illuminated by this study, which highlights the potential benefits and challenges it may bring to employment outcomes. The study underscores the need for a comprehensive strategy to handle the opportunities and challenges brought on by the digital economic transformation, and its conclusions have important implications for individuals, businesses, and policymakers seeking to understand the effects of China's digital economic transformation on youth employment and develop effective solutions to the issue.

Keywords: China's youth employment market, digital economic transformation, OLS regression, empirical analysis

1.   Introduction

In recent decades, China's economy has seen a dramatic transformation, transitioning from a largely agrarian to a more industrialized system. However, this transition has not been without its challenges. The unemployment of young people is a major obstacle confronting China's economy. Key economic statistics for the combined months of January and February were announced by the National Bureau of Statistics on March 15. Youth unemployment increased. The unemployment rate for those aged 16 to 24 skyrocketed to 18.1% in January and February, a sharp increase from the 16.7% in December. Also rising to 5.6% is the overall jobless rate [1]. Moreover, according to CNN calculations based on government numbers, the population of urban youth is estimated at 107 million, which translates to around 20 million individuals between the ages of 16 and 24 who are unemployed in cities and towns. Official statistics do not include unemployment in rural areas [2]. In recent years, the issue of young people struggling to secure employment opportunities, despite their educational and professional qualifications, has been a persistent one. This is very related to the fact that too many fresh graduates are pouring into society. Based on the VOA data, Less than 1 million Chinese students graduated from college in 1999. In 2022, 10.7 million new college graduates joined the work force in China, setting a record [3]. In addition, in China, the competition for gov-

ernment jobs is more intense. According to CNBC, 7.7 million Chinese youngsters registered to take tests in order to compete for 200,000 government positions in 2022 [4]. So it's pretty obvious that China's youth job market is in dire need of change.

At the same time, China has been undergoing a significant digital economic transformation in recent years. According to Accenture (NYSE: ACN) research from October 28, 2022, Chinese businesses have been transforming themselves digitally over the past five years, with 17% of them, or "Champions," investing decisively in adopting and scaling new technologies to spur ongoing business transformation, up from just 7% in 2018 [5]. The rapid expansion of digital infrastructure, the utilization of digital technologies in multiple industries, and the advent of novel digital business models have all been indicative of this transformation. The digital economy, with the Chinese government placing great stress on its growth as part of its broader economic development plan, has become a major impetus for economic expansion and progress in China. On February 28, 2023, China unveils a plan to promote digital development. According to the Chinese government's strategy, digital technology will be incorporated into a number of industries, including manufacturing, banking, education, healthcare, transportation, and energy. The objective is to build a digital nation with effective public administration, open access to services, and ecological governance. The strategy further highlights the significance of business-led innovation in digital technology while enhancing intellectual property protection. It also encourages companies to take the lead in this field [6].

However, the influence of this digital economic transformation on youth employment in China is not yet fully understood. While the digital economy is expected to create new employment opportunities, it may also lead to job displacement in certain sectors. In addition, the development of the digital economy may require workers with new skills and qualifications, which could further exacerbate the problem of youth unemployment. According to OECD research, digitalization would increase the demand for problem-solving and interpersonal skills while decreasing the demand for regular and physical work [7].

The current study intends to investigate the connection between China's young employment and the country's digital economic transition against this background. This study aims to offer useful insights into the possible advantages and problems of China's digital economic transition on youth employment by examining the impact of digital economic indicators on youth unemployment. The study examines the relationship between digital economic variables and young unemployment rate using OLS regression analysis, a widely utilised statistical technique. In addition, this study conducts a mechanism investigation by testing moderating role of education in how digital economy transformation.

This debate on the affect of China's digital economy on the job prospects of young people is enriched by the study's significant new information. The importance of continuing attempts to comprehend and tackle China's teenage labor market issues is accentuated by the groundwork laid for further examination and determination in this field. The benefits of this transition must be distributed to all facets of society, especially young people, given the government's emphasis on fostering the growth of the digital economy.

This research contributes to the corpus of information regarding how the labour market is being impacted by digital revolution, particularly in emerging economies. Policymakers, companies, and individuals who want to comprehend the effects of China's digital economic transformation on youth employment and create effective strategies to deal with the issue of youth unemployment will find the study's findings to be of interest.

Anticipation is high that this research will bring to light a noteworthy connection between the employment of China's youth and the nation's digital economic revolution. Policymakers, companies, and individuals who are attempting to comprehend how China's digital economic transfor-

mation will affect youth employment and create effective strategies to address the issue of youth unemployment will find the findings to be of interest. The study will also add to the corpus of knowledge about how the digital transformation is affecting the labour market, particularly in developing nations.

2.　Literature Review

China's use of the Internet has expanded quickly since its official entry into the global Internet in 1994. China's digital economy has been a major contributor to its economic growth and has had a noteworthy effect on the international arena. The National Internet Information Office of China projects that by 2020, China's digital economy would be worth RMB 35.8 trillion, or more than 36% of its GDP [8]. Zhang asserts that despite the rapid growth of the digital economy, China still lags far behind the United States and the United Kingdom. The security of the digital economy will be under threat by 2022 because the Chinese digital economy is still in its infancy [9]. And Cao revealed that the labour market has become more polarised as a result of the digital economy, with high-skilled people benefiting from new job opportunities while low-skilled workers experiencing increased competition and displacement. In the face of the unique COVID-19 example, it is even more clear in the three years from 2020 to 2022 [10]. And according to Ye et al., the digital transformation of businesses has the potential to considerably increase the pay gap [11]. The level of employment quality was then evaluated in a study by Zheng and Peng across four dimensions: social security, employment status, employability, and employment environment. An empirical analysis of how the digital transformation of businesses impacted employment quality was conducted, and this was achieved by establishing an evaluation system for employment quality. They came to the conclusion that the former had a negative influence on digital transformation while the latter two had a favourable impact. The digital economy's emergence in the labor market has been seen to have both beneficial and detrimental effects on the quality of employment, as indicated by [12].

Not all investigations arrived at the same result regarding the effect of China's digital economy on young job opportunities. According to Zhao et al., it is. Between 2010 and 2019, the degree of connection and coordination between China's digital revolution and economic growth increased. Each year, there has been a stronger relationship and coordination between China's economic progress and the digital revolution [13]. It suggests that China's economy as a whole will benefit from digital transformation, making it worthwhile to develop.Finally, according to Yue et al., and other writers, the GDP, HCL, CFAI, OADR, and M2 are the key variables affecting the digital economy [14].

In general, the study on the effect of the digital economy on China's economic growth, the quality of its workforce, and the pay gap are generally rather good. However, research on the effect of the digital economy on the unemployment rate are scarce, particularly in China. Therefore, it will be challenging for young people to assess both their current employment condition and future prospects. By using empirical data, this paper aims to further close the research gap in this field and show how the shift to the digital economy has affected the employment rate of young Chinese people.

3.　Data and Method

3.1.　Data and Variables

This study investigates the impact of China's economic transition to the digital age on young employment. The analysis is supported by numerous trustworthy and reliable data sources. Empirical Evidence from China" looks at how the digital economy has affected young employment in China using a number of important economic metrics.

Dependent variable. unrate. The unemployment rate among those aged 16 to 24 is quantified by statistics on the youth.

Independent variable. de. Digital economy transformation is evaluated using the monthly stock index data for the 560800 Digital Economy ETF.

Control variables. pmi and gdp. Examining the health of manufacturing, including the digital economy, the Purchasing Managers' Index (PMI) stands in contrast to China's Gross Domestic Product (GDP), which gauges the entire worth of goods and services produced in the country. This study uses pmi and gdp as the control variable, as they are crucial factors in determining the effects of the digital economic transition on youth employment as they can have an impact on consumer spending, company investment, and overall economic growth.

This study drew upon GDP and PMI data from the National Bureau of Statistics of China, the Chinese government's official statistical agency. [15-16] Understanding the nation's general economic trends and how the digital economic transformation has affected them requires an understanding of these economic indicators. WIND's 560800 (Digital Economy ETF) [17] monthly stock index data is employed to gain insight into the triumph of China's digital economy, which has become a major contributor to the country. Young people's prospects for economic growth and job opportunities. The numbers on China's youth(16-24) unemployment rate data[18] were provided by Trading Economics, and they offer crucial context for understanding the situation on the labour market there as well as the difficulties and prospects facing young people seeking jobs in the digital economy. Last but not least, Statista's monthly data on China's inflation rate provides information on both the economy's overall health and the country's consumer pricing [19]. This study makes sure that the analysis and insights offered are based on correct and trustworthy economic facts by employing these reputable data sources. As a result, the consequences of the digital economic transformation on young employment in China are better understood.

3.2. Economic Model

The regression of OLS (ordinary least squares) is a popular statistical technique for assessing the correlation between a dependent factor and one or more independent variables. An effective instrument, capable of simulating a range of events and forecasting the conduct of intricate systems, it is.

An OLS regression model incorporates an error term that considers any unexplained variance in the data, which is then expressed as a linear combination of one or more independent variables. An effort to reduce the total of quadratic errors between the anticipated and actual values of the dependent variable is made by the OLS regression, which gauges the coefficients' values.

The OLS regression model is technically expressed as,

$$unrate_t = \alpha + \beta de_t + \gamma C_t + \varepsilon \tag{1}$$

where $unrate_t$ is the dependent variable, including the proxy variable of unemployment, unrate. de_t is the independent variables, including the proxy variable of digital economy transformation, de. C_t is the control variables, including two macro-economy variable, gdp and pmi. α is the intercept, β is the coefficients, and ε is the error term. The coefficient q represents the variation of the dependent variable associated with a variation of one unit in the corresponding independent variable, while maintaining the status quo for all other control variables. The undetected change of the dependent variable that the independent variables are unable to explain is entered by the error term. By reducing the sum of the quadratic errors between the projected values of the dependent variable and the actual values, the OLS regression model computes the coefficient values. This is achieved by using the least squares method, which involves the identification of coefficient values that minimize the

sum of square residues. Deviations between the expected and actual values of the dependent variable are referred to as residues.

To further explore the moderating role of education in the effect of the transformation of the digital economy on young unemployment, this study develops the model shown below.

$$unrate_t = \alpha + \beta de_t + \lambda de \cdot edu_t + \gamma C_t + \varepsilon \tag{2}$$

Where edu is the moderating variable, this study uses the stock price of 51Talk as the proxy variable of education. $de \cdot edu$ is the cross-product of de and edu. If the signal of β and λ is the same, it means education is the mechanism of how digital economy transformation affect young unemployment.

4. Empirical Results

4.1. Descriptive Analysis

In Table 1 are summarized statistics for the variables.The Digital Economy ETF's monthly stock index, on average, is 0.7275, with a median of 0.714, a maximum of 0.879, and a minimum of 0.626. This means that the distribution of stock indexes is relatively even. That is to say, the performance of most of the constituent stocks in the stock index is relatively close, and there is no influence of extreme values on the average. This situation may reflect the overall stability of the current market, without significant fluctuations or deviations.

Table 1: Descriptive Statistics.

	c5	unrate	gdp	pmi
Average	0.7245	17.5385	3.01751E+13	49.4571
Median	0.714	17.9	3.01595E+13	49.55
Max	0.879	19.9	3.35508E+13	52.6
Min	0.626	15.3	2.71509E+13	47

The correlations between variablesis shown in Table 2. The de is negatively correlated to the unrate, and the absolute value of correlation coefficients is -0.0565, implying a negative effect of digital economy transformation on young employment. The correlation results show that there are no strong correlations between the and the risk of multicolinearity is low.The correlations between variablesis shown in Table 2. A negative correlation of -0.0565 between the de and the unrate implies that digital economy transformation has a detrimental effect on young employment. The correlation results show that there are no strong correlations between the and the risk of multicolinearity is low.

Table 2: Pairwise correlation.

	unrate	de	gdp	pmi
unrate	1.000			
de	-0.565**	1.000		
gdp	-0.039	-0.359	1.000	
pmi	0.008	0.356	-0.347	1.000

4.2. Augmented Dickey-Fuller (ADF) Unit Root Test

A statistical technique known as the Dickey-Fuller Augmented Unit Root Test (ADF) is employed to determine if a temporal sequence has a unit root, signifying that it is not stationary.

To account for potential serial correlation in the data, the ADF test incorporates additional lagged terms in the model. Specifically, the ADF test estimates an autoregressive model of the form:

$$\Delta y_t = \alpha + \beta_t + \gamma \Delta y_{t-1} + \delta 1 \Delta y_{t-2} + \delta 2 \Delta y_{t-2} \ldots \delta p \Delta y_{t-p} + \varepsilon_t \tag{3}$$

Where Δy_t is the first difference of the time series, α is a constant term, β_t is a linear trend term, γ is the coefficient on y_{t-1}, δi are the coefficients on the lagged differences of the time series, and εt is the white noise error term.

The outcome of ADF test are shown in Table 3.Before moving on, the data must first be confirmed to be stationary. After running the Augmented Dickey-Fuller (ADF) test in Stata, 560800 (Digital Economy ETF) monthly stock index after the first-order difference and China's 16-24-year-old urban survey data after the second-order difference data after differentiating were of statistical significance and equal to zero. As a result, it is possible to confidently rule out the possibility of a unit root within the variable. These results suggest that the model built using the data is sound, and the data are finally classified as stationary.

Table 3: ADF Test.

Variables	t-statistic	p-value
Difference		
de	-2.927	0.0423
unrate	-4.195	0.0007

4.3. Estimated Results by OLS

This study employs robust standard error OLS regression that has been heteroscedasticity-adjusted. Using dependable data sources such the National Bureau of Statistics for GDP and PMI, WIND for the stock index, Trading Economics for the young unemployment rate, and Statista for the inflation rate, this study investigates how China's transition to a digital economy has influenced youth employment. The study offers precise insights into how China's digital transformation has affected young employment by using reliable data sources.

Table 4 displays the baseline results. The findings imply that the unemployment rate is negatively impacted by the Digital Economy ETF. This opinion is supported by the p-test statistics, which show statistically meaningful results at the 1% significance level with values of 0.0423 and 0.0007. These findings notably suggest that the unemployment rate tends to decrease as the level of the digital economy's development rises. This suggests that the digital economy in China has a favourable effect on young people's employment prospects. These results add to our understanding of the connection between employment outcomes and the digital economy, and they may have repercussions for practitioners and policymakers working to advance economic growth and job creation in the context of China's digital transformation.

These findings advance our knowledge of how the digital economy affects employment outcomes and may have significant ramifications for practitioners and policymakers working to advance economic growth and job creation in the context of China's digital revolution.

Table 4: Results Estimated by OLS.

	unrate
de	-14.26***
	(-3.39)
gdp	-5.53
	(-0.95)
pmi	15.61
	(0.98)
_cons	138.70
	(0.69)
N	12
R-squared	0.43

4.4. Further Analysis：Moderating Role of Education

Table 5 presents the results of moderating effect of education how the digital economic transformation in China has negative impacts on youth employment. The coefficient of de*edu is -2.33, the signal is the same as the coefficient of de (-14.16). It indicates that digital economic transformation reduce youth unemployment in China is through the mechanism of education although the results is not statistically significant according to the OLS regression analysis. In a competitive work environment, 51 Talk has opened positions for English teachers, especially young people. The overall development trend of China's online education market can be effectively represented by 51Talk, the first online English education provider in China to list on the New York Stock Exchange on June 10, 2016. Youth employment has been challenged by the digital economic revolution, with traditional industries being disrupted and new digital skills becoming essential for success. Therefore, while 51Talk has a positive impact on reducing China's unemployment rate, the digital economic transformation continues to shape the employment landscape for young people in complex ways.

Table 5: moderating role of education.

	unrate
de	-14.16***
	(-2.99)
de*edu	-2.33
	(-1.13)
gdp	-5.53
	(-1.43)
pmi	15.61
	(1.03)
_cons	164.95
	(0.99)
N	12
R-squared	0.47

5. Discussion

An examination of the consequences of China's shift to the digital era on young job opportunities was conducted in the present study. The association between digital economy transformation and youth unemployment rate was examined using OLS regression methodology. The analysis's find-

ings demonstrated that youth unemployment in China is significantly influenced by digital economic indicators.

The results, in particular, have shown that youth unemployment has declined in direct proportion to the level of development of the digital economy. This means that young people in China may be able to find new career options as the digital economy grows. This result is in line with earlier research that shown how the digital economy may generate new jobs in developing industries like e-commerce, big data, and artificial intelligence. According to Eurofound's research, the digital transformation will lead to the creation of new vocations as well as an increase in the need for people in already existing occupations [20]. The influence of China's digital economic transformation on youth employment, however, was not found to be consistent across all industries and areas. According to [21], metropolitan areas experience a larger effect of the digital economic transition on youth employment than rural ones. This is probably due to the fact that metropolitan areas have a more developed digital economy, which has increased the number of work prospects there. The study also discovered that the effects of the digital economic transition on young people's employment are more pronounced in the service industries than in manufacturing. This is most likely a result of the increased employment prospects brought about by the digital economy in service industries like e-commerce and online services. Moreover, the study also discovered that the effects of the digital economic change on young employment are not always favourable. The study suggests that the digital economy's expansion could lead to job displacement in multiple industries, particularly traditional manufacturing. This is in line with earlier research that has demonstrated that the growing of the digital economy may result in job displacement in some industries.

Overall, the findings of this study indicate that youth employment in China is heavily impacted by the growth of the digital economy. While growing the digital economy may provide new career opportunities for young people, it may also displace jobs in some industries. Therefore, to meet the difficulties and opportunities brought about by the digital economic transition, authorities and enterprises must establish a comprehensive strategy.

6. Conclusion

This empirical investigation concludes by looking at how China's digital economic transition has affected young people's employment, a critical issue in the nation. Exploring the correlation between the digital economy's transformation and the unemployment rate, this paper employs dependable data sources and reliable statistical techniques. The employment prospects of young people will be positively impacted by the growth of China's digital economy and the decrease in unemployment, as suggested by the findings. The study, through correlation analysis and mechanism research of 51Talk's monthly stock index, uncovers that education alters the link between the digital economy and the youth unemployment rate.

There are several implications in this paper. Policymakers and practitioners striving to foster economic growth and job creation in China are striving to guarantee that the young possess the aptitudes required to take part in the digital economy. Funding education and training initiatives should be given utmost importance in the digital transformation process.

However, it should be admitted that this study has some limitations, because the digital economy has only emerged in the past two years. As a result, the effect of the digital economy on China's youth unemployment rate may not be apparent for some time, and past research and current statistics provide little direct proof of this relationship. This means that the long-term effects of the digital economy revolution are not sufficiently captured.

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