

Scientific Bulletin of Mukachevo State University

Series

Economics

Volume 11, No. 1, 83-91

Journal homepage: <https://economics-msu.com.ua/en>

UDC 332

Doi: 10.52566/msu-econ1.2024.83

Based on data: Assessing the impact of the “double reduction” policy on the local economy

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Abstract. The policy of “double reduction” has been applied by the Chinese government, and therefore, an assessment of its impact on various components of economic and social development in this and other countries is relevant. The purpose of this paper was to determine how the outflow of students abroad (due to the use of the “double reduction” policy) affects the economic development of local economies. The main methods used in the study were analysis, abstraction and forecasting. The article presents a survey of Chinese students studying abroad, which shows differences in satisfaction, cost of living and employment rates in different countries. The essence of the “double reduction” policy, which was aimed at solving various problems in the education system, was also considered. It describes the purpose of the policy and the actual impact it had on students and teachers. In addition, it was noted how the policy was related to the out-migration of students, and the negative and positive effects of the policy on the country were also discussed in detail. The correlation between these factors and the gross domestic product was also explored, highlighting the

Received: 04.12.2023, Revised: 12.02.2024, Accepted: 27.03.2024

Suggested Citation: She, B., Ramasamy, S.S., & Loahavilai, P. (2024). Based on data: Assessing the impact of the “double reduction” policy on the local economy. *Scientific Bulletin of Mukachevo State University. Series “Economics”*, 11(1), 83-91. doi: 10.52566/msu-econ1.2024.83.



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potential interaction between these indicators. In particular, it was shown that the level of satisfaction with education was diverse and did not have a significant correlation with other factors, such as unemployment and living costs. In turn, other indicators that did influence the level of study satisfaction were noted. This paper brings new knowledge to the assessment of the development of China's economy and its education sector. It also provides a better understanding of how the trends in student out-migration affect the economic development of other countries

Keywords: regionalism; socio-economic consequences; economic consequences; education; sustainability

Introduction

The education sector in China has always been characterized by certain peculiarities. For example, the educational process within the country was very rigorous, and mathematics and engineering were very popular (Cheng *et al.*, 2020; Li & Eryong, 2021). In addition, opportunities to study abroad in countries such as the United Kingdom and the United States of America have become widespread (Cheng & Agyeiwaah, 2022). Schools have also placed a lot of emphasis on learning languages, particularly Chinese and English, as well as cultural texts and values. All of this combined to make the learning process in the country too difficult for students in some places, causing psychological and physical health problems (Huang, 2020). In response to this challenge, China's government officials introduced the "double reduction" policy. China's "double reduction" policy is a multifaceted education reform policy introduced by the Chinese government in 2021 (Wang *et al.*, 2022; Dai, 2023). It aims to address several key issues in China's education system, mainly focusing on reducing the burden of excessive academic work and private tutoring for students. However, the implementation of this policy has also led to other changes, including the impact on trends in student out-migration. Therefore, it is important to investigate what exactly they will be and how they will affect the development of the local and Chinese economies.

A significant number of scholars have studied the state of education in China. Thus, C. Zhang (2023) assessed the current factors influencing the development of education in China. He showed that an important role is played by a large population of the country, and therefore numerous individuals of different personalities. He also assessed the difference in the level of education in rural and urban areas. Nevertheless, he did not offer clear advice in terms of formulating public policy in this area. L. Guo *et al.* (2019) also studied the development of education in China, in particular, paying attention to equality in education. The scientists noted that everyone should have equal access to quality education, regardless of their background. This is important not only from a moral and ethical point of view, but also for more efficient future economic development. B. Xu (2021) wrote about the transformational changes in the country's higher education system. He notes that the education sector has made significant progress in terms of increasing competition and solving many of the problems that existed before. The researcher also mentions reforms and describes their role and importance. However, he does not offer any advice on how to further improve the efficiency of the system.

B. Wu (2021) also studied China's regulatory changes in the after-school tutoring industry. Such a policy has led to rapid changes in the industry, which have not always had a positive effect, according to the scientist. J. Li *et al.* (2022) evaluated in their study the analysis of public opinion on the implementation of the "double reduction" policy in education. Their monitoring has shown that public opinion can vary greatly depending on where it is collected, in which segments of the population. According to the researchers, the reform was generally perceived positively, although some negative components were also described. A study on the impact of the double reduction policy on the Three Children policy was conducted by Q. Liu (2022). The researchers pointed out that there are contradictions between the two policies, given that one of them is aimed at increasing the birth rate, while the other is aimed at reducing it. They also pointed to the possibility of synergies between them in the future. Some changes in the context of music school education were studied by S. Wen & H. Jianmin (2023). They considered this policy as a means of promoting the development of aesthetic education among students. The researchers noted that it had a positive impact on the rural population and helped bridge the gap with urban schools in terms of music education.

Thus, the purpose of the study was to analyse the impact of Chinese students who went abroad due to the implementation of the "double reduction" strategy on the development of the local economy.

Materials and Methods

As part of the study, 175 Chinese students were surveyed online, studying in selected countries abroad. They were asked specific questions about their satisfaction with their studies (from 0 to 10), tuition fees, and employment status. As part of this survey, students had to answer 4 questions: the country in which they are currently studying, satisfaction with their studies (from 0 to 10), cost of living (in dollars per month) and employment status (whether they have a job or not (note that this includes both formal and informal methods of earning money, such as part-time jobs)). This information was aggregated and analysed from different angles, which was the basis for the conclusions drawn in the paper. Different students responded quite differently to questions about the level of study within their universities, as well as their expenditure and employment status. The survey was anonymous, all participants were informed about the purpose of using the information and gave their consent to the survey and information processing.

The selected data were evaluated using statistical data analysis. Firstly, a correlation matrix was built for these indicators to assess the interaction between them. Subsequently, for the indicators with a sufficient level of correlation (above 0.5), a regression equation was built to build a relationship between the number of students studying in the country, the average cost of living and the level of employment. The resulting formula can be seen below (1):

$$y = -32 + 0.02x_1 + 49.93x_2, \quad (1)$$

where y – number of Chinese students studying in a particular country; x_1 – the average cost of living in the country; x_2 – the level of employability of students.

Other characteristics of the model are as follows:

1. Adjusted R^2 is 0.3775.
2. The value of the F indicator is 0.03756.
3. The corresponding p-values for each value (y , x_1 and x_2): 0.11, 0.07 and 0.08.

Based on the data obtained, the relevant conclusions were drawn about how the number of students studying in a country depends on the relevant indicators of living standards in that country. The main approach used in the study was a systematic one. It made it possible to assess the factors that influence the development of the local economy and the situation of students in certain territories by understanding the interaction between these factors, which helped to improve the accuracy of the models.

The main method, in turn, was the analysis, which allowed drawing important conclusions within the study on the impact of the “double reduction” policy on the economy, which was experiencing an influx of students from China. The historical method allowed evaluating the available data on the development of the country’s education sector in retrospect. Abstraction was also used, which made it possible to disregard certain factors that did not have a significant impact on the development of education and the impact on local economies, which also improved the quality of the model. Forecasting was also used to assess the future prospects for the development of this concept and its comprehensive impact.

Results

China’s “double reduction” policy is generally aimed at addressing a variety of educational and societal issues, especially in the context of primary and secondary education. It has many goals, including reducing the burden of homework and after-school tutoring for students in China, reducing the financial pressure on families due to expensive tutoring services, and improving the overall quality of compulsory education in China. It was introduced primarily due to the fact that Chinese students spend a significant amount of time studying, which leads to long hours of on-campus study and extracurricular activities. The competitive nature of the education system, driven by high exam rates, has led to a greater reliance on extracurricular tutoring. The introduction of the “double reduction” policy

results in strict regulations on private tutoring services, especially those offering core subjects such as maths, Chinese and English. This also applies to extracurricular activities, preventing schools from offering excessive extracurricular activities and encouraging the creation of a more balanced schedule for students. In addition to reducing academic pressure, the policy promotes a more holistic approach to education, paying much more attention to students’ physical and mental health, fostering creativity, critical thinking and overall personal development. The Chinese government has introduced strict monitoring and enforcement mechanisms, and schools and other educational institutions face fines in case of violation. To compensate for the decline in private tutoring, the Chinese government is also seeking to strengthen the public education system, which includes increasing funding for public schools, improving the quality of education, and expanding access to educational resources. The aim is to make public education more attractive to students and parents, and to increase access to education and reduce the financial burden of education for families (The General Office..., 2023).

The survey found that sleep deprivation and obesity have become pressing issues among Chinese students, and that studying for high-pressure exams leads to mental health problems, which can lead to anxiety and suicidal thoughts. Thus, the policy itself aims to alleviate the pressures associated with education that also arise in the context of the one-child policy and some cultural characteristics. The policy promotes a student-centred approach to learning, respecting the individual and their interests. It allows for a balanced workday for these students and does not allow for ranking them by academic performance. In general, public sentiment varies regarding these changes. Some politicians support the initiative because of its potential to ensure equity in education; however, there are also negative sentiments, especially regarding the impact on the tutoring industry, which could lead to bankruptcy of some companies and loss of jobs or earnings for such employees (Aliyeva, 2023). It is possible to already see the first effects of its introduction. Thus, the tutoring industry has undergone significant changes, with many institutions becoming non-profit and staff reductions. Mental health problems among students have become less pronounced, with students having more time to balance their personal lives and their studies. However, in order to draw clearer conclusions, it is worth testing these theories over longer periods of time.

And although such policies are aimed at improving the situation of students, paradoxically, they can also lead to an outflow of students, as was observed in China. There are several reasons for this. For example, for some students, the reduced availability of private tutors, which many Chinese students and their families used to seek, has led them to go abroad to seek better education. In addition, economic considerations for moving abroad, including employment opportunities and relatively higher salaries for work performed, remain relevant. In addition, government policy it-

self encourages a more diversified approach to education, and students' study abroad and subsequent return (and thus their experience) can improve the internal training system and the functioning of enterprises and government institutions. In other words, the main reasons for students to go abroad remained relevant, and some may have even intensified, which did not lead to a decrease in outflows but only contributed to the continuation of the trend. In general, the question of how beneficial such an outflow of students is for the country is debatable, given

that this phenomenon has both positive (strengthening international cooperation, improving education standards, attracting new financial flows) and negative components (possible loss of human resources, innovation, demographic outflow as such). In any case, if any of the phenomena becomes too widespread, its negative aspects tend to outweigh the positive ones. Therefore, they should be kept under control. As part of the study, a survey among the target group of students about their study abroad experience was conducted (Table 1).

Table 1. Average survey results by Chinese students abroad in individual countries

Country of study	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment, %
Canada	19	8.2	1,854.9	15.79%
Japan	9	5.8	1,491.3	22.22%
Great Britain	36	8.3	2,126.4	16.67%
United States	41	6.3	2,504.8	21.95%
Sweden	5	7.4	2,465.2	0%
Hong Kong	13	7	2,102.3	23.08%
Australia	17	7.7	2,267.7	17.65%
New Zealand	6	8.2	1,764.5	16.67%
Singapore	10	7.2	2,135.1	20%
France	6	5.8	1,947.7	16.67%
Germany	9	7.5	1,777.9	11.11%
Italy	2	6.9	1,800	0%
Spain	2	6.4	1,597.5	0%

Source: compiled by the authors based on a survey

As can be seen from Table 1, in different countries, the selected list of students assessed the level of education in different countries quite differently, spent, on average, different amounts of money for living, and had different levels of employment. In order to find the relationships between these values, it was initially decided to build a correlation matrix shown in Table 2. Table 2 shows that the main correlation is observed between the number of students in a particular country, the average cost of living in that country

and the level of employment, while satisfaction with studies does not play such a high role. It is interesting that the higher the number of students in a country, the higher the average cost of living: perhaps students pay more attention to employment prospects in the country and the possibility of receiving relatively higher salaries, which they see in countries with a higher cost of living. It is also likely that this is due to other indicators that also characterize the standard of living in countries with higher prices.

Table 2. Correlation matrix between various indicators characterizing the study of Chinese students abroad

	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment rate, %
Amount of students	1			
Satisfaction with learning	0.193	1		
Average cost of living (\$ per month)	0.53726	0.17398	1	
Employment rate, %	0.51658	-0.03559	0.1371	1

Source: compiled by the authors

Based on the two selected indicators, a regression equation was constructed, which can be depicted as shown in Formula 1 in the methodology. In general, the model can be characterized as explaining a relatively small amount of variation in the dependent variable, but it is adequate, and the variables, although not reaching the recommended

values below 0.05, still describe the variables with relatively high accuracy. Although this model cannot be considered completely satisfactory, it does allow drawing some conclusions. First, it suggests that students do not always evaluate only the quality of education, but also other indicators when applying to a foreign higher education institution.

Secondly, in future studies, it is worth conducting a similar survey, but with a much wider list of questions and students from more countries to make the model even more clear

and adequate. It was also decided to try to find a correlation between the country's gross domestic product (GDP) and the values shown above. This data is shown in Table 3.

Table 3. Indicators of GDP change in selected countries at different time intervals

Country	Change in GDP level for 2022, %	Average (over 49 years) GDP change rates, %
Australia	7.9	6.9
Canada	6.9	5.9
France	-5.9	4.9
Germany	-4.4	4.9
Hong Kong	-2.5	8.1
Italy	-4.9	5.1
Japan	-15.5	4.8
New Zealand	-3.3	6.2
Singapore	10.1	10.4
Spain	-2.1	6
Sweden	-8	4.8
Great Britain	-1.7	5.8
United States	9.2	6.1

Source: compiled by the authors based on the data from The World Bank (2023)

Table 3 shows the average GDP growth rate and its change in 2022, calculated on the basis of World Bank data. A correlation value was calculated between the

obtained data and the indicators obtained as a result of the student survey. The new correlation matrix can be seen in Table 4.

Table 4. Correlation matrix with new values of GDP levels

	Amount of students	Satisfaction with learning	Average cost of living (\$ per month)	Employment rate, %	For the year 2022	In average
Amount of students	1					
Satisfaction with learning	0.193	1				
Average cost of living (\$ per month)	0.537	0.174	1			
Employment rate, %	0.517	-0.036	0.137	1		
Change in GDP level for 2022	0.496	0.335	0.511	0.281	1	
Average (over 49 years) rates of GDP change	0.088	0.161	0.263	0.414	0.636	1

Source: compiled by the authors based on the data from The World Bank (2023)

As can be seen from Table 4, GDP growth for 2022 and over a significant historical period correlates with some indicators obtained in the survey. However, they cannot be used to validate the model, as adding them to the model makes it less adequate, and the p-value for all indicators increases (i.e., their quality deteriorates). Nevertheless, the level of change in GDP for 2022 has a certain correlation with the number of students studying in the selected countries, which may indicate some existing interaction between these indicators.

The above information suggests that it is highly likely that more Chinese students will be willing to move to countries with employment opportunities and better living standards. Their influx may have a different impact on the country's economy, including local consumption, which will increase and thus boost business revenues (Ziberi et

al., 2022). In addition, they can bring in new labour in certain professions, often in jobs that are often filled only by students (e.g. waiters). There may also be a cultural impact on the areas where these students will live. Nevertheless, all such trends are long-term and will not be immediately noticeable for the country. Moreover, in order for this to have a truly significant effect, the number of students who move must be really large, which is likely to happen only in a few years. The impact on China's domestic economy has already been partially described. Such a policy will lead to a reduction in the burden on students, and thus ensure their psychological and physical development is more sustainable. However, there is also a negative impact, which leads to an outflow of students and thus all the corresponding negative effects. As a result, China may lose a large amount of talent; such trends may lead to human capital depletion,

with potentially highly skilled people leaving the country in search of better opportunities. This, like a decrease in consumption, will cause economic losses for the country. The consequences can also be seen from a demographic point of view, leading to an ageing population. The impact of such phenomena is so multifaceted that it is often difficult to assess whether they are more beneficial or harmful. In any case, China should be interested in returning students from abroad to create added value within their home country.

Discussion

The role of education development for the economy was noted by I. Ozturk (2008). He noted that education is necessary for economic development, and that its balance contributes not only to economic development but also to productivity and creates individual income per capita, which is confirmed by the conclusions in the paper above. This is why Chinese policymakers pay so much attention to this area. Research in the context of assessing education as a basis for economic development was conducted by D.M. Neamtu (2014). The assessment itself was based on the example of Romania. He emphasizes the negative impact of austerity measures on human capital and stresses the need to invest in education. Japan was mentioned as an example, which prioritized education and human resource development. Thus, the scholar notes the importance of aligning the educational system with labour market demands, increasing investment in education, and promoting participation and success in school; he also wrote about the role of political stability and economic growth in increasing human capital. He considers this to be a key part of Romania's future economic development. In China, the introduction of the "double reduction" policy has slightly different reasons, namely to ensure a healthier student population. Nevertheless, actions in the same direction as in Romania, from the point of view of public policy, should also be taken by the state.

The Chinese policy of "double reduction" was studied by Q. Wang *et al.* (2021). They noted that in the context of the intelligent education industry, this policy aims to increase equality in education by developing and promoting high-quality online educational resources; it should encourage the creation of networks of high-quality schools that use national and local educational platforms to offer free high-quality educational resources and courses to students from different grades and subjects. Thus, its use has far-reaching implications for China's education system and economy, reducing family spending on education and allowing for student-centred learning. The policy underscores the importance of government control over the private tutoring industry for overall prosperity. It is expected that the process of implementation will be long and complex, which will improve the quality of education and make it more equitable. These components of the "double reduction" policy have been discussed above. The final economic impact of this policy is difficult to predict, but in the long run it should be positive due to the increased efficiency of such workers.

J. Yang (2022) assessed the impact of COVID-19 on students studying abroad, with a focus on Chinese international students. He showed that Chinese international students faced significant levels of anxiety in the early stages of the COVID-19 pandemic, which was primarily caused by preconceived fear of COVID-19 and contradictory information often received from different sources. In addition, Chinese students studying abroad were often forced to resort to cheating and plagiarism due to academic pressure and pressure from their families. These trends ultimately have a negative impact on the quality of education of such students, as well as their future success in finding a profession. The study also examined the impact of social support on reducing loneliness among international students: It was found that national ties between Chinese students and a close-knit Chinese student community reduced their loneliness, as did relationships with partners in the host country. Therefore, the provision of such national groups in the host country is an important component of the country's psychological health. The paper above did not investigate how social groups influence students' willingness to continue studying in a particular country, or their level of success in it. Nevertheless, it should be acknowledged that this approach is worthy of attention and should be evaluated in the future with a focus on the "double reduction" policy.

Some problems of the "double reduction" system were described by J. Li *et al.* (2021). They noted that tutoring outside the university has lost momentum and needs to adapt to survive, while reforms in schools have changed student learning. In other words, the previous tutoring system has significant problems and needs to adapt to the new conditions, especially given that changes in this area should continue in the future. Researchers have also noted the increasing role of parents in the upbringing process. Nevertheless, as shown in the paper above, it is worth mainly expecting positive changes in the long term from such implementations in the country. An assessment of the impact of China's "double reduction" policy on Chinese students studying in European countries was conducted in work by B. She *et al.* (2023). As noted by scientists, the "double reduction" policy has both positive and negative aspects. For example, the ban on private educational centres and tutoring classes due to this policy has prompted students and parents to seek educational opportunities in Europe, the United States, and Australia. These policy changes are likely to boost the foreign education market for Chinese students as younger students show interest in studying abroad. In general, these trends are dangerous for China in their own way if they lead to a significant outflow of highly intelligent people. But on the other hand, it also makes it possible to achieve better teaching conditions at universities for students who cannot afford to study on their own, as shown in the paper above, based on student surveys. These trends can indeed be harmful to the country's development, both economically and socially, especially if they become more widespread than they are today. Therefore, the state author-

ities should pay attention to how they can ensure the return of students from abroad after they complete their studies.

X. Zhang *et al.* (2022) investigated public views on education under China's "double reduction" policy using questionnaires and data analysis. Public perceptions varied according to their knowledge of the policy and their role (whether they were parents or teachers). The consensus among the public is that the policy aims to reform the education and training industry to ensure equitable distribution of resources, improve the quality of school education, diversify teaching and learning methods, and promote fairness and equity in the national public education system. Based on these findings, the authors offer the following policy recommendations: to promote understanding of the "double reduction" policy among the public, especially targeting older and less educated people to improve their perception of the education system; to address the problem of excessive number of additional courses in education and training to ensure equitable distribution of domestic educational resources, improve the quality of school education, and create a fair education system with diverse teaching and learning methods. It is worth noting that similar recommendations have been made earlier in the paper, and they make sense. Nevertheless, it is also worth remembering that education, both at school and university, should still provide students with the knowledge they need for their future profession. Therefore, making existing education systems too easy can also be harmful.

Given the above information, some recommendations can be made in terms of China's education policy. Thus, it is important to continue to study the impact of the "double reduction" policy on the education system and student well-being, which may include ongoing regular data collection on student satisfaction, academic performance, and mental health. Teachers should also be supported to improve their condition in the face of increased workloads and uncertainty about their roles due to policy changes. It may be effective to allocate additional funds to support mental health services in educational institutions to provide counselling, stress management programmes and health awareness initiatives to address the psychological problems students may face during their studies. In addition, it would be effective to improve the level of public education, making it more attractive, which could be manifested in increased funding, improved quality of education and easier access to educational resources. The formation of such actions within the country can improve the situation in terms of the development of the educational sphere, the psychological and physical condition of students.

Conclusions

Thus, China's "double reduction" policy is a multifaceted approach to addressing educational and social problems.

Its goals include alleviating excessive academic workloads for students, reducing financial pressure on families due to expensive tutoring services, and improving the overall quality of compulsory education in China. The main components of the "double reduction" policy include stricter regulations on private tutoring services, especially in important subjects such as maths, Chinese and English. Beyond simply reducing academic pressure, the policy emphasizes holistic education with a focus on students' physical and mental well-being, fostering creativity, critical thinking and overall personal development.

One of the most important outcomes of this policy is its impact on students' mental and physical health. By adopting a student-centred approach to learning and respecting individuals and interests, the policy creates a more balanced and less competitive environment where students are not judged solely on the basis of their academic performance. Nevertheless, the public has had a mixed reception to the policy introduced by the country's political elite.

As part of this work, a survey of Chinese students abroad was conducted to assess their situation. It was shown that their level of satisfaction with their studies is generally heterogeneous. This variable also did not show a significant correlation with other variables, such as unemployment and living costs. Nevertheless, it was possible to establish that the latter two variables have a certain relationship with the number of students enrolled in higher education institutions in different countries. Although the model presented in this paper is not perfect, it provides good knowledge and opportunities to improve understanding of the logic of Chinese students' choice of countries for future education. The influx of Chinese students can stimulate local consumption and increase the income of enterprises in host countries, providing a new workforce in various specialities. In addition, the cultural influence of these students can promote intercultural understanding and knowledge exchange. Domestically, however, such policies lead to an outflow of students, potentially causing a loss of talent and human capital. This can have economic consequences, including reduced consumption and potential demographic problems such as an ageing population.

It is important for further research to find ways to improve the existing "double reduction" system for China's development. In addition, providing new methods to improve the efficiency of the country's educational system as a whole remains an important component.

Acknowledgements

None.

Conflict of Interest

None.

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На основі даних: оцінка впливу політики «подвійного скорочення» на місцеву економіку

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Анотація. Політика «подвійного скорочення» застосовується урядом Китаю, а тому оцінка її впливу на різні складові економічного та соціального розвитку в цій та інших країнах є актуальною. Метою даної роботи було визначити, як відтік студентів за кордон (внаслідок застосування політики «подвійного скорочення») впливає на економічний розвиток місцевих економік. Основними методами дослідження були аналіз, абстрагування та прогнозування. У статті представлено опитування китайських студентів, які навчаються за кордоном, яке показує відмінності у задоволеності, вартості життя та рівнях зайнятості в різних країнах. Також розглянуто сутність політики «подвійного скорочення», яка була спрямована на вирішення різних проблем в системі освіти. Описано мету політики та фактичний вплив, який вона мала на студентів та викладачів. Крім того, зазначено, як політика була пов'язана з еміграцією студентів, а також детально обговорено негативні та позитивні наслідки політики для країни. Також було досліджено кореляцію між цими факторами та валовим внутрішнім продуктом, що дозволило виявити потенційну взаємодію між цими показниками. Зокрема, було показано, що рівень задоволеності освітою був різноманітним і не мав значної кореляції з іншими факторами, такими як безробіття та вартість життя. У свою чергу, були виділені інші показники, які дійсно впливали на рівень задоволеності навчанням. Ця робота привносить нові знання в оцінку розвитку економіки Китаю та його освітнього сектору. Вона також забезпечує краще розуміння того, як тенденції еміграції студентів впливають на економічний розвиток інших країн

Ключові слова: регіоналізм; соціально-економічні наслідки; економічні наслідки; освіта; сталість
