

Impact of International Student Enrollment on US Gross Domestic Product

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ABSTRACT

The goal of this paper is to analyze the impact of international student enrollments on the US real gross domestic product. It is hypothesized that an increase in international student enrollment tends to have a positive impact on US real gross domestic product. It is also hypothesized that an increase in economic impact of international students has a positive impact on the US real gross domestic product. A regression model is formulated that consists of percentage increase in real gross domestic product (economic growth rate) as the dependent variable. The independent variables used in the regression model are annual percentage increase in international student enrollments in the US and the annual percentage increase in economic impact of the international students in the US. Data is collected from 2009 to 2015 from the Bureau of Economic Analysis and NAFSA. It is important to analyze the rationale as to why highly skilled immigration is vital for promotion of entrepreneurship and innovation in the US economy. The current administration is trying to undermine the positive impact of highly skilled immigration on the US economy. The issue is critically important in the prevailing political climate in the US economy. An attempt is also made to formulate strategies that would help in mitigating negative outcomes such as potential declines in revenues for US universities as well as decline in research and grant funding that would arise due to decrease in international student enrolments.

Keywords— Brain Drain, Economic Impact, Real Gross Domestic Product

contributed nearly \$37 billion to the US economy. International students only make up 5 percent of the overall US enrollments and yet have a very significant contribution to the US economy.

US is gradually losing its market share of international students and international scholars. This can cause a drastic shift of international students from the US to countries such as Canada and Australia. This will have an adverse impact on the revenues of the US universities. Countries such as Australia and Canada are formulating national policies and marketing strategies for attracting international students. In Australia, students can work up to 18 months after graduation. International students graduating from high need occupations in Australia are allowed to work longer for a time frame up to 4 years. In Canada, international students upon graduation can work for a period equal to the time frame that they studied in Canada. This maximum time frame is 3 years. Having a degree from Canada as well as skilled work experience in Canada qualifies the international students for legal residency/permanent residency in Canada.

It is important for the US government to allow international students to gain experiential learning opportunities. It is important for Congress to allow more Green Cards (permanent residency status) especially for those international students who graduate from US universities with STEM degrees. US should try to attract the best and brightest international students from around the world if it wants to remain the leader in scientific discovery. In 2016, all the six American winners of Nobel Prizes in Economics and Scientific fields were immigrants. Another interesting fact is that since 2000; 40 percent of all the Nobel Prizes won by Americans in Physics, Chemistry and Medicine have been immigrants. International students have a very significant role to play in STEM degrees as well as in securing research grants for American universities. A number of factors have contributed to a substantial decrease in international enrolments at US universities. There is a going uncertainty about student visa policies and future availability of post study work opportunities. US is perceived to be a less welcoming place for foreign nationals under Trump Presidency. US universities have been experiencing increasing competition from universities based in Canada,

I. INTRODUCTION

The political and social environment in the US as well as the perceptions of the US as a less welcoming place for foreign nationals has led to the US gradually losing its market share of international students and international scholars. The Trump administration has made it very difficult for international students to secure H-1 B work visas after graduating from US universities. Efforts are being made by the US government to reduce highly skilled immigration into the US and not just illegal immigration. In 2017, US universities had experienced a 2.2% drop in undergraduate and a 5.5% drop in graduate international enrollments. In 2017, international students

Australia and United Kingdom. Rising costs of higher education in the US are also playing a very important role in discouraging international students from applying to US universities. International students are facing increasing levels of student visa denials as well as delays. There has been a drastic reduction in scholarship programs sponsored by foreign governments. International students have a lot of concerns regarding physical safety in the US. New restrictions have been placed on the duration of visas for Chinese graduate students in certain high tech fields.

The brain drain refers to the phenomenon where the students from the developing countries immigrate to the rich countries for the purpose of higher education and eventually settle down in the rich countries. This leads to the creation of human capital for the rich country. However, it does lead to loss of talent for the developing economies. The host country benefits from the significant, tangible, economic contributions of the highly technically skilled immigrant. The economic benefits for the sending countries are the increased productivity of their students. Some of the students might return back to their home countries and set up entrepreneurial ventures. This helps in increasing trade and commerce between the host country and the sending country. Factors such as difficulty in securing work visas (H1 B work visas), better economic opportunities in the emerging economies and increased times to residency are causing some of the students who have been educated abroad to return back to their home countries. This is known as the concept of “reverse brain drain”.

The higher education institutions around the world vie for the best and the brightest minds from different countries of the world. In 2015, around 5 million students went abroad to study (UNESCO). This represents 1.8% of all tertiary enrolments in the world (UNESCO). It has been observed that since 1980, the aggregate growth in foreign student enrollments at major host countries has been around 4% on an annual basis (UNESCO). Since the past 40 years, the rates of growth in foreign student enrollments have been rising at a faster pace as compared to expansion of higher education enrollments as a whole. There is intense competition amongst nation states over the recruitment of international students. This has a profound impact on the states these students are leaving. In 2015, the number of students studying abroad was around 5 million (UNESCO).

Factors such as decreasing costs of air travel, improved international communications, and increased globalization of labor markets have helped in reducing obstacles, and enabled students to pursue post-secondary education in a foreign country. In the 2015-2016 academic year, there were 1,043,839 international students studying at U.S. colleges and universities (IIE, 2016). The international students contributed \$32.8 billion to the US

economy in the 2015-2016 academic years (IIE, 2016). For every seven international students enrolled, three US jobs are created (IIE, 2016). In the 2015-2016 academic years, international students in the US supported 400,812 jobs (IIE, 2016). 75% of all international students receive the majority of their funds from personal and family sources (IIE, 2016). The economic impact of international students in Illinois is \$1.6 billion (IIE, 2016). The economic impact of international students for the states of California, New York, Florida and Pennsylvania are \$5.2 billion, \$3.9 billion, \$1.3 billion and \$1.7 billion respectively (IIE, 2016).

In the 2015-2016 academic the maximum numbers of international students were from Asian countries such as China and India. The number of international students from China pursuing STEM degrees in US was 140,290. The number of international students from India pursuing STEM degrees in US was 132,900.

The US attracts some of the best academically prepared students from foreign countries. International students contribute to America’s scientific and technical research. International students bring international perspectives into US classrooms. Exposure to international perspectives helps prepare US undergraduates for global careers. About 21 % of Fortune 500 CEOs were born outside the US (IIE, 2016). Around 25% of Physicians in the US are foreign born (IIE, 2016). Highly skilled immigrants are driving billion dollar startups in the US. At least 51% of the unicorn startups (valued at a billion dollars or more) had at least one immigration founder (IIE, 2016). Foreign born entrepreneurs create an average of 760 US based jobs per company (IIE, 2016).

Changes in United States education policy are required to counter the growing global challenges from countries especially China which threaten to dislodge United States from the position of the top doctoral degree granting nation in the world (Larsen, 2011). International students constitute a significant part of PhD degrees awarded in each year. It is important for policy makers to adopt and initiate effective policy measures in order to protect the interests of the international student community, and help United States perpetuate its leadership in the area of higher learning. It is important to emphasize the valuable contributions of the international students in innovative research at universities based in the US. There is a growing concern that a stricter international student immigration policy will adversely impact patent applications and reduce university grants, and will further have a domino effect on lowering productivity (Chellaraj & Aaditya, 2008). Around 35% of international students in the US pursue STEM degrees. A decline in the number of international student enrollments might cause a decline in the number of STEM graduates from US based research universities. This can have an adverse on grant funding/

R&D for US universities. A large number of international graduates graduating from top US research universities might return back to their home countries and become entrepreneurs due to problems in securing work visas in US. This is called the “Reverse Brain Drain Theory. A sharp decline in international student enrollments would make it very tough for the US to continue to be a leader in innovation and research and development.

It is important to undertake a holistic study on the proportion of the skilled immigrant work visa holders in various sectors and the contributions they make in shaping the US economy. It is important for US policy makers to simplify and ease the entry process of high quality skilled immigrant workers into United States by legislating immigration reforms (Lowell, 2010). It is important to analyze the academic and economic impact that student mobility brings about in an economy. Both the government and private sector can gain economic leverage from the growing international student community (Open Doors Factsheet, 2016). International students play a very important role in supporting local jobs as well as promoting economic growth (Open Doors Factsheet, 2016).

It is important to formulate a strategy that will help bring in more student diversity. It is important for US universities and colleges to work-out new student enrollment strategies or else may lose international students to other preferred destinations with better future prospects (McMurtrie, 2011). The benefits of cross cultural interactions between domestic and international students in the current inter connected globalized world need to be analyzed in detail (Luo & Drake, 2013). The outcomes of such interactions will heighten sensitivity and camaraderie.

It is important to highlight the predicament of the technology job recruiters as they face a sharp shortage of domestic technology workers and are forced to hire international workers to compete globally (Gower, 2011). It is important to streamline the H1B visa program by plugging the loopholes that vis-à-vis market wage; recruiters exploit the foreign visa holders by undercutting the wage (Matloff, 2013). It is important to restrain the recruiters from manipulating the hiring process to accommodate foreign workers for their pecuniary gains. The recruiter should hire truly the best and talented foreign worker only after exhausting the search for a domestic candidate (Matloff, 2013). It is important to plug the loopholes in the work visa issuance process that would enable only the most talented and academically qualified students from foreign countries to secure jobs in the US, and contribute to the vitality of the US economy. The recruiters are often held accountable for suppressing the wage and undercutting jobs for the American workers.

II. LITERATURE REVIEW

Majority of the international students who graduate from universities based in the major host countries end up permanently immigrating to the host nations. The international students who set up firms in the host countries end up generating jobs for the local residents. International students are instrumental in bring global perspectives into classrooms and labs. International students help in innovation and promote entrepreneurship. International students help in funding university wide programs at American universities by paying out of state tuition that is largely funded by non-US sources. International students also play a very important role in fostering relations between different countries.

According to UNESCO Statistics: The top 10 destination countries for international students are United States (21% share), United Kingdom (12% share), France (7% share), Australia (6% share), Germany (5% share), Russian Federation (4% share), Japan (4% share), Canada (4% share), China (2% share) and Italy (2% share). Approximately 57% of the international students go to Western Europe and North America for their studies (UNESCO). Approximately 20% of the international students are hosted by East Asia and the Pacific (UNESCO). Central and Eastern European countries host approximately 10% of the international students (UNESCO). The most interesting fact is that there are a few countries that have more students studying abroad than at home. Some of the countries in this category are Luxembourg, Andorra, Anguilla, Seychelles, Bermuda Liechtenstein and Turks/Caicos islands.

The four major stakeholders in the process of internationalization are international students, public policy institutions/think-tanks, educational institutions and the nation. The international students are primarily concerned regarding their financial commitments and expectations of future increased income. Educational institutions are involved in the implementation of foreign student services and educational policy initiatives for promoting diversity, and bridging the educational achievement gap. The nation stands to gain from the investments made in human capital that is caused by highly skilled international students making vital contributions to the economy.

A number of countries in the global economy have a highly skilled immigration model that is based on attracting the most academically qualified students from overseas. Canada and Australia have an immigration model that is essentially based on highly skilled immigration. Australian immigration and education policy are conjointly making efforts to attract large number of skilled international students to Australia. Malaysia is making efforts to expand its skilled workforce base.

Australia has turned to Malaysia as its partner to recruit and leverage from Malaysia’s skilled workforce initiative.

Prospective international students look for certain criteria while applying to universities overseas (Daily & Gaurav, 2010). The students usually look for substantive financial aid, employment prospects and academic ranking etc. The universities in US and elsewhere should be a differentiator to catch the imagination of the students. In the current era of internationalization, the need for global engagement in higher learning is critical. The need of the hour is to have collaborative efforts to incorporate global perspectives in studies and bring in intercultural awareness in the student fraternity (American Council on Education, 2012).

It is important to seek the opinions on social and academic needs of domestic and international students on campus by conducting research surveys (Tas, 2013). The surveys could analyze the outcomes and recommendations that would improve the quality of campus life and promote unity in diversity. Best practices for hosting international students need to be established at the US based universities (Tas, 2013). There is a great amount of variation in pedagogy and the academic environment that is prevalent in different countries. It is important to educate international students regarding these subtle differences when they select US universities as their destination for higher studies. There is an immediate need for establishing more orientation programs in foreign countries that would expose international students to the US culture. The US consulates in foreign countries should offer cultural orientation programs at local universities and high schools located in foreign countries. The international admissions office and the international student advisor can help in the transition process by enabling the international student to assimilate easily with the US cultural and academic environment.

III. METHODOLOGY

The goal of the study is to estimate the impact of international student enrollment on the US real gross domestic product (GDP). It is important to analyze the rationale as to why highly skilled immigration is vital for promotion of entrepreneurship and innovation in the US economy.

$$E = f(IE, E)$$

$$E = \alpha + \beta_1 IE + \beta_2 E$$

E is the economic growth rate (percentage increase in Real GDP). IE is the annual percentage increase in international enrollment. IE is the annual percentage increase in economic impact of international students. Economic growth rates for the US economy (2009 to 2015) have been gathered from the Bureau of Economic analysis. Annual percentage change in

international student enrollment data (2009 to 2015) has been collected from NAFSA.

Economic impact of international students in the US data (2009 to 2015) has been collected from NAFSA.

(International students enrolled in US higher education) *(Expenses) minus US support paid by Carnegie Classification + Living Expenses for Dependents = Economic impact

Here expenses include tuition and fees, room and board etc. It is hypothesized that an increase in international student enrollment tends to have a positive impact on real gross domestic product. It is also hypothesized that an increase in economic impact of international students has a positive impact on the US real gross domestic product.

Table 1: ANOVA Summary Output

<i>Regression Statistics</i>	
Multiple R	0.955105
R Square	0.912226
Adjusted R Square	0.868339
Standard Error	0.674105
Observations	7

Table 2: Regression Statistics

<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept			
2.83071	0.747543	3.78668	0.019324
IE			
0.323074	0.086628	3.729425	0.020307
E			
0.252502	0.047849	5.277111	0.006182

Table 3: Regression Coefficients

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	18.8909	9.44545	20.78583	0.007704
Residual	4	1.817671	0.454418		
Total	6	20.70857			

R square is a goodness of fit measure for linear regression models. It indicates the percentage of variance in the dependent variable that the independent variables explain. R square shows the amount of variance of

economic growth rate explained by growth rate in yearly international enrolments and growth rate in economic impact of international students.

In this case, the model explains 91.22% of the variance in US economic growth rates. Two tail P values: tests the hypothesis that each coefficient is different from zero. To reject this, the P value has to be less than 0.05.

P value for IE is 0.0203 which is less than 0.05. Thus IE is statistically significant.

P value for E is 0.0061 which is less than 0.05. Thus E is statistically significant.

If the P value for the F test of overall significance is less than 0.05, you reject the null hypothesis and conclude that the model provides a better fit than the intercept only model. In this case, 0.007704 is less than 0.05. In other words, the model does have merits.

The regression coefficient pertaining to IE (the annual percentage increase in international enrollment) indicates that an increase in international student enrollment does have a positive impact on the US real gross domestic product. The regression coefficient pertaining to E (annual percentage increase in economic impact of international students) indicates that an increase in the economic impact of international students also has a positive impact on US real gross domestic product.

IV. RECOMMENDATIONS

If the Trump administration agrees to implement policies pertaining to restriction of the number of student visas as well as work visas in the US, then there is a very high likelihood of a huge loss in revenue for US universities. In such a scenario, US universities would have to establish foreign campuses as well as forge partnerships with foreign universities in other countries. This would help in offsetting the loss in revenue due to potential decline in international student enrollments in the near future. A number of US based universities have set up satellite campuses in foreign countries. Some of the prominent examples are: Northwestern University has set up a campus in Qatar; Arkansas State University has a campus in Queretaro, Mexico; Duke university has established Duke Kunshan University in Kunshan, China; Georgia Tech has a campus in Metz, France; St. Louis University has a campus in Madrid, Spain and New York University has a campus in Florence, Italy. There is a lot of collaboration between foreign universities and US based universities. A lot of them are offering joint degrees for their students. A prominent example in this category is the Indian School of Business in Hyderabad, India that has been established as a joint partnership by the Government of India, Northwestern University, University of Pennsylvania (Wharton), MIT and London Business School.

The highly reputed public research universities in the US should offer more number of graduate degrees in the online format via video conferencing to students located in foreign countries. Presently, there is a huge shortage of state funding for public universities in the US. The additional revenue obtained from the online degrees offered at public universities would help in offsetting the losses due to state funding. The private universities in the US should also increase their online degree offerings. This would enable the private universities to increase their profits. The private universities can reinvest their profits back into research and development projects pertaining to STEM degrees. The increase in online degree offering by US universities would democratize the education process and enable the global economy to have a highly skilled workforce. Creation of human capital in foreign countries would promote innovation and entrepreneurship. This would promote commerce between US and the foreign countries. It is important for US and foreign universities to establish twinning agreements where students would spend a first couple of years in their home country and the last two universities at a US university. This model would be similar to the community college model where students transfer onto a university after completing the first two years of general education courses at a community college. The US government should carry out an immigration reform process that would expedite the permanent residency process (Green Card) for international students who are graduating with STEM degrees from US universities. This would enable the international students graduating from universities in the US to stay back in the US, and promote entrepreneurship and innovation in the US economy

V. CONCLUSION

International students contribute to America's scientific and technical research. International students play a very important role in the STEM community. International students bring international perspectives into US classrooms. The presence of international students helps in promotion of diversity and cultural sensitivity on US university campuses. International students help in promoting entrepreneurship and innovation in the US economy. It is important for US to continue to attract the best academically qualified students from foreign countries who would help America to continue to be a global leader in innovation and entrepreneurship.

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