

System Dynamics Modeling of Emigration and Brain Drain: The Case of Iran

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Abstract

Net migration rate of -3.28 migrants/1000 population ranked Iran 145th in the world. Popular discourse about Iranian immigration focuses on the social and political freedoms associated with relocation. In the current research, the focus is on the authority of the educated people, their impacts on the society, their access to the power and the wealth which seems far negligible. The elites of Iran are no longer the educated people. Based on this assumption, a system dynamics approach is presented to study the long term effects of the emigration on Iranian society. Each emigrant develops themselves in the target country and attracts more emigrants. The success and satisfaction in the target country motivates the young generation to move than to change. The emigrants, when their number increases to millions, form a basement to attract more talented ones from the source country. Emigration of elites is more than a move of people; it has important negative effects on the country to produce wealth, to become industrialized, and to produce more talented generations.

1. Introduction

For different people there are various reasons behind a decision to emigrate. At the onset of 1979 revolution the first massive move to the U.S. and Europe created the first generation of Iranian emigrants in the West only in some months. Emigrants escaped the revolutionary revenge or could not cope with the order set by the new rulers. The following years for almost a decade the first generation remained isolated with little contact to the people in Iran. The war and sanctions imposed on Iran by the western countries left only a narrow stream of emigrants. By the end of the war a new era began. State-sponsored education and business created chances for young elites to travel mainly to Europe. Many of those who left during 1990s stayed there with solid contact with the homeland and relatives, as they did not escape but moved to other countries. Increased number of youths to tens of millions (the median age is 26 years), the shortage of seats in universities for the demanding applicants, and the globalization now visible by the international TV channels and the

Internet motivated the third generation of emigration. A continuous stream with increasing power now absorbs annually more than two hundred thousands of young, talented and educated persons, while the U.S., Canada and Europe are main destinations. In big universities and among engineering students the emigration is taken for granted; the question is only about when and where to. A survey shows that 85% of bachelor and master students of engineering disciplines in good universities plan to leave as soon as they graduate. Another survey shows that 96% of those who have been awarded the gold medals in international science Olympiads did leave the country after the high school or the first university degree.

Popular discourse about Iranian immigration focuses on the social and political freedoms associated with relocation. This is certainly true for the first generation of emigration. A better life was the one of the main reasons for the second and third generations. The field data shows that some specific classes of graduates, doctors of medicine for examples, stay in the country and do not will to leave it while some others plan their leave even before graduation. Engineers are the engines of industrialization and creation of wealth in all societies. Best Iranian graduates of engineering disciplines look for their ideal jobs in other countries. When the better than average graduates of engineering fields do not work in the domestic firms and enterprises, the industrial production growth rate of Iran is far less than of the neighboring countries like Turkey, despite the rapid increase of GDP due to high oil revenues.

The facts that “51% of the Iranian immigrants to the U.S. have a bachelor's degree or higher”, “over 63% of them participated in the labor force”, “more than half of the Iranian immigrant population were employed in management, professional, and related occupations” [1] can indicate well that the immigrants have been among the educated elites of Iran who left the country.

University graduates in general and Engineers in particular have little authority in Iran in terms of access to power, wealth, and impacts on the future. The elite society of Iran, who imposes its will on the economy and power, is a mixture of different recognized sections like the clergy, doctors of medicine, and the traders.

A system dynamics model is presented in this paper to study the long term effects of the emigration on the Iranian economy and society. The success and satisfaction in the target country, thanks to the advanced communication ways, motivates the young generation planning rather to move than to change. The emigrants, when their number increases to millions, form a basement to attract more talented ones from the source country.

2. Emigration from Iran

Emigration is the act of leaving the native land to settle in another. There are many reasons why people might choose to emigrate. Some are for political or economic reasons, and some are rather private. Most political or economic emigrants move together with their families to new countries where they hope to find peace or job opportunities not available

to them in their original location. Throughout history a large number of emigrants return to their homelands, often after they have earned sufficient money in the other country. Sometimes these emigrants move to countries with big cultural differences and will always feel as guests in their destinations, and preserve their original culture, traditions and language, sometimes transmitting them to their children. The conflict between the native and the newer culture may easily create social contrasts, generally resulting in an uncomfortable situation for the "foreigners", who have to understand legal and social systems sometimes new and strange to them. Often, communities of emigrants form in the destination countries [2].

Iran, since the Revolution, has been the starting point of steady emigration of educated people. Estimates of the number vary from 750,000 to 1.5 million. Most such emigrants have preferred to settle in Western Europe or the United States, although there are also sizable communities of Iranians in Turkey, United Arab Emirates, Malaysia and other East Asian countries. The United States census for 1980 found 122,000 Iranians living in the United States. By 1987 it was estimated that this number exceeded 200,000, with the largest concentration found in southern California [3]. "Based on a report that was published by the National Science Foundation in 1998, 1,369 Iranian born professors were teaching engineering and science on a full-time basis in the US. There are about 8,000 Iranian physicians working in the United States who have their own practice and/or work in medical institutions. Based on a count in 2001, about 4,000 of them obtained their primary medical education in Iran, and have gone through advanced training in the US." [4] Iranian emigrants tended to be highly educated, many holding degrees from American and West European universities. A sizable proportion was members of the pre-Revolutionary political elite. They had been wealthy before the Revolution, and many succeeded in transferring much of their wealth out of Iran during and after the Revolution. Other Iranians who have emigrated include members of religious minorities; members of ethnic minorities; and political dissidents. There were virtually no economic emigrants from Iran, although a few thousand Iranians have continued to work in Kuwait, Qatar, and other Persian Gulf states, as before the Revolution [5].

3. Reasons of Iranian Emigrant

Among numerous factors that might be important in deciding for immigration, the followings are mentioned by researchers as the reason for emigrating from Iran [5-17]: religious persecution, political persecution, lack of social freedom, pursuit of educational opportunities abroad, lack of employment opportunities, lack of various rights, higher incomes, better medical facilities, better education facilities, family reasons, political stability, etc. The major groups of Iranian emigrants are elites who look for a better life condition: education opportunity, appropriate job situation, well-equipped facilities, more income, etc. Defiantly, eminence of a society is highly based on its educated people who will lead to improve infrastructure of the society, improve life style, business doing and so on. About 58 percent of emigrants in Iran belong to this part of society. In year 2000, Iran ranked the fourth in the world in terms of the ratio of educated to total emigrants per year. In

the same year about 308,000 educated people abandoned Iran and immigrated to other countries.

In modern societies, highly-educated supervisors are the most likely to have decision-making power and wealth. In Iran, the converse is true. Despite variety of reasons to leave the country, the main reason behind leaving Iran for the educated people seems to be the lack of authority, *i.e.* their limited access to power and wealth. The economic elite of Iran are a mixture of different sections like politicians, businessmen, physicians, and firm-owners. The voice of fractions of educated people who may produce wealth, like scientists and engineers, are not heard in the society. Even before revolution Iran was far from a liberal society but most Iranians educated in the U.S. or Europe returned to the country, as they had immediate access to high ranked positions in the society and earned much more than the average while tradesmen and shop-keepers lived relatively simple lives. Recent decades have witnessed an adverse trend when engineers and manufacturing entrepreneurs earned far less than the tradesmen. Low earnings left no room for an impact on the society, even for the professional self-esteem which would be necessary to claim management positions by elites. This may explain why the majority of emigrants in recent generation are engineers. Success of an emigrant in the destination society is echoed in the departure society and among relatives and friends; thus motivates more talented people to emigrate. Consequently, a positive loop gains power and more people emigrate. The balancing loop is only activated by returning to homeland, as happened in case of China or India in massive scales in recent years.

4. System dynamics Approach

We can describe a dynamic system for our study purposes, but we may not be able to find the data necessary to feed the levels and rates, especially in cases like escape emigration while real data are scarcely available. We choose thus only variables that can be measured by the existing data.

4.1 Economy sector

The following economic factors are taken into the dynamic model:

- GINI index
- Tax revenue to GDP
- GDP growth rate
- Unemployment
- Inflation rate
- Business doing

Figure 1 shows the model by emphasizing only on the economical factors.

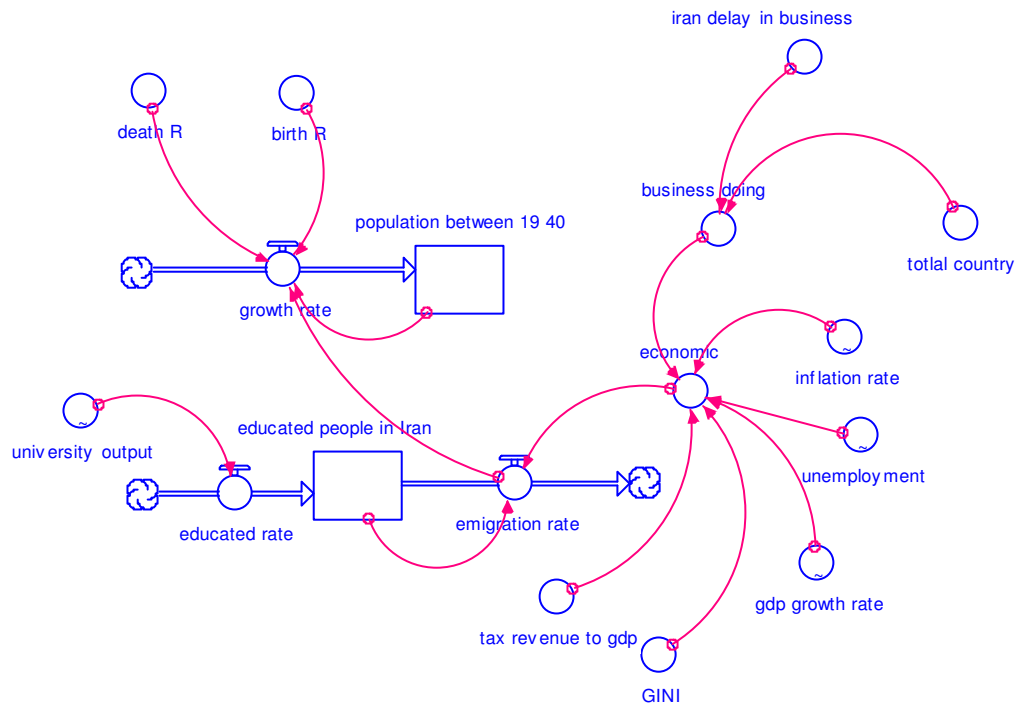


Figure 1 The economy sector of the model.

These are not the only factors of real economy sector but they can be the most crucial economic factors affecting the emigration. The GINI index of Iran is 0.445 whose high value is against the revolutionary slogans for just distribution of wealth. In Iran, the Internal Revenue Service is poorly managed and is able to tax only the companies which have an engineered infrastructure including the state departments and large manufacturing firms which deal with the government, leaving almost all tradesmen to escape from the tax. The growth rate of GDP or GDI is used to visualize the current and flow of economic state of the country. Despite the fact that GDP of Iran increased over recent years, the poorly managed industry with little access to human resources had the least role in its increase. In fact, only the high price of oil changed the GDP. Unemployment is well documented for those graduates who had little chance to emigrate such as agricultural engineers. For demanded engineers most industries are hardly able to feed their demands for well-educated engineers. In 2007, Iran had the highest inflation rate only after seven countries which experience severe droughts or civil wars. The figure is dynamically the result in the scale of Iran.

4.2 Society sector

Another sector of the model considers social issues. The following factors are considered:

- Life satisfaction
- Crime
- Life expectancy

Figure 2 shows how the dynamic model is formed using these factors.

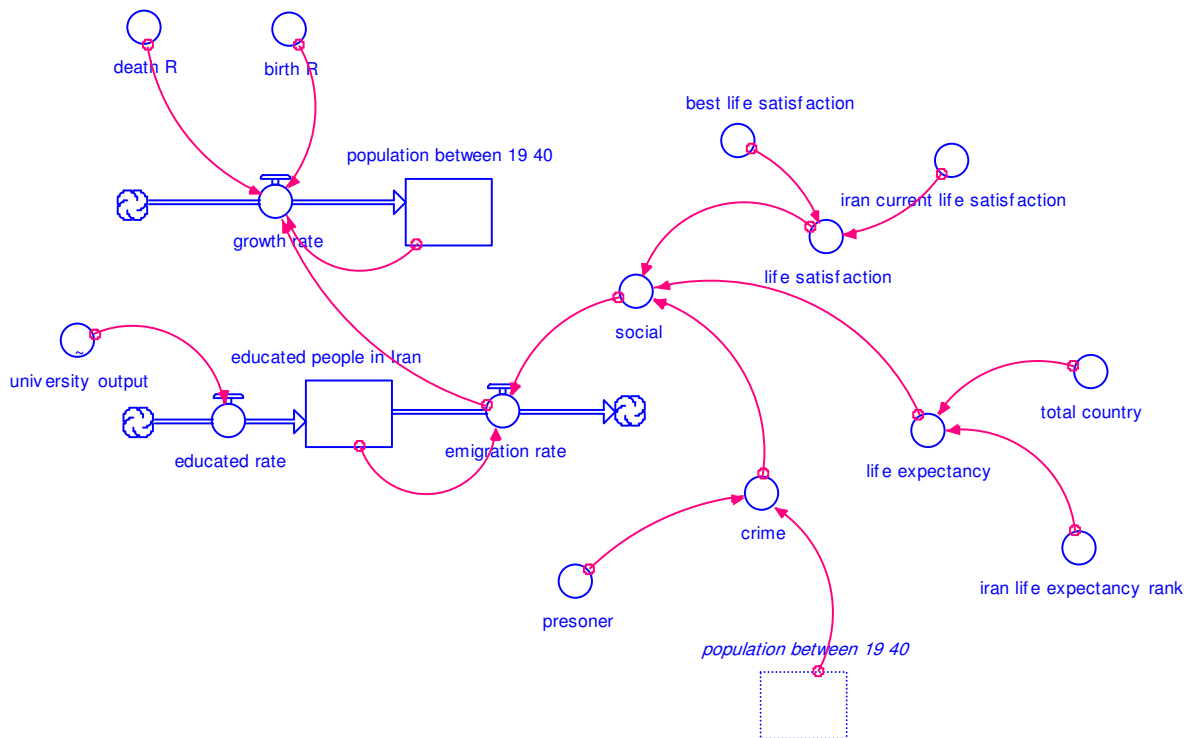


Figure 2 The social sector of the dynamic model.

The life satisfaction is typically indexed in the range of 1 to 10. Iran with value 6 is in the middle of the world list. Although, this index represents overall opinion of society, eager to emigrate by the educated elites can indicate that this index is much lower for the potential talents. Satisfaction is about all aspects of life and social impact is of course for talented persons an important measure of satisfaction. Social life has only meaning if the society is secure in terms of crimes. The ratio of young prisoners (19-40 year old) to the total population has one of the highest values in Iran. But the security issue goes much further since everyone likes enjoying the support of law in daily affairs, to ensure fair and honest business. This is certainly missed in the country as everyone must protect themselves from the chances of fraud. The life expectancy index can represent the access to the health services by people. Thanks to the official bribing of medical doctors by the patients in their practicing offices, the life expectancy is about 70 years. The mechanism is that patients must pay extra charges, sometimes hundred times more than the official rates, in cash to the doctors before they can be operated in hospitals.

4.3 Education sector

The third sector, figure 3, we can include in the model considers education by the following variables:

- Percent of GDP spent for education
- Ratio of the Internet penetration

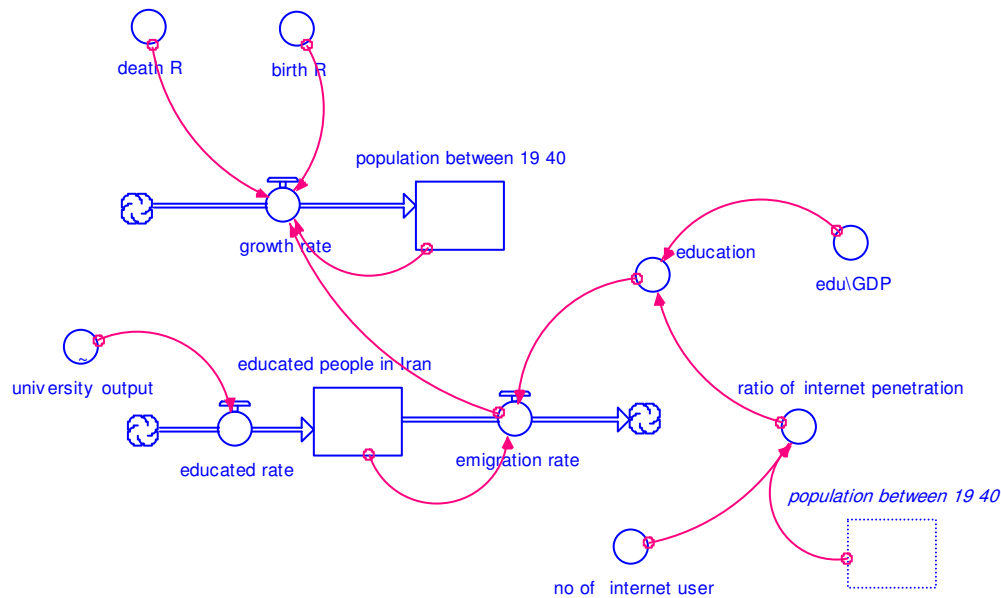


Figure 3 The sector on education.

In terms of spending on education as a percentage of GDP, Iran is ranked as an average country. In 2000-2002, Iran's place was at 59th among 132 countries with 4.9% of GDP spent on education. This is as half as of the spending of the developed countries. When this index is composed with the population indices, the figure is not that good since Iran has one of the youngest populations in the world which need more investments in education. Elites form a small class of the society unable to make changes when the chances given to gifted people are scarce.

In the model, the ratio of internet penetration is used to show access to the information. Internet users, usually, belong to educated class of the society. On the other hand, the level of the infrastructure of the country for information is reflected in this index.

We can divide a society to some parts. Some part does not play any crucial role in eminence of society or cannot change their effect by themselves as children, retired people, disables, etc. Other part which adds value to society includes: the government, educated people, skilled workers, and so forth. The academic ones are the grey eminences behind the government ministers. Therefore, they play the main indispensable role in progress of country, developing better life style, proper social and economical condition, etc. we use ratio of total educated people which live in Iran to total population of group of society that add value to society.

5. Conclusion

Our focus in this paper is to provide evidences to show that the possibilities for the educated elites of Iran are rare to have access to the power and wealth. Among different

sectors of the society, educated elites create wealth and add value. The elite society of Iran is no longer the university graduates. This is the main reason why the talented graduates leave the country in a short time after graduation. The model developed in our study is the first step to evaluate the long-term effects of the emigration if an opposite stream does not balance the move. Emigration could have positive effects on the society if the emigrants contributed somehow to the culture and economy changes of the departure land. The model must be completed by field data which are at the moment not thoroughly available. The genetic changes due to emigration should also be added to provide measures for the natural intelligence of next generations.

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