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How Do Economic Sanctions Impact Quality of Emigrating Students

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Abstract

In this note, we provide a very simple mathematical model for analyzing the effect of economic sanctions on quality of students who decide to emigrate from a country which has economic sanction exposure. Our model's results suggest that applying decisions for foreign universities are based on quality of students but probability of economic sanctions as well as its costs have great impact on this decision. Furthermore, the model provides results which are consistent with empirical findings especially the positive relationship between cost of emigration and quality of applying students.

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1. Introduction

In past decades the dilemma of emigration has become an important part of international debates. Clearly, students' emigration affect the prospect of both home and host countries. On the one hand, students' emigration involves outflow of years of investment through public schools from home country. On the other hand, presence of immigrant students in host country affect its educational system. Therefore, the quality and performance of immigrant students have sizeable impact on human capital accumulation in host country. (Albornoz et al. 2018).

Based on the above argument, the educational impact of emigration is central concern of policy- makers and led to considerable empirical research effort. Some of researches in this area provide evidences indicating of the outperformance of immigrants relative to natives (e.g., Schnepf, 2004; Card, 2005; Dustmann and Theodoropoulos, 2010; Dustmann et al. 2010). But some studies recently have examined the determinants of educational performance of immigrant children. Ohinata and Ours (2012) for instance, analyzed the determinants of reading literacy, mathematical and science skills of young immigrant children in Netherlands. Albornoz et al. (2017) providing a theoretical model which links immigration and school system found that effect of immigration on schooling depends on parents' characteristics, such as wages and skills, but also on parental motivation, which refers to parents' concerns about their child's educational achievement and their perceived value / importance of their involvement for their child's success. Recently, Albornoz et al. (2018) provided a theoretical framework showing how immigration costs affect school performance of immigrant children. Their results show that for a given socioeconomic background and parent characteristics, school performance of immigrant children improves with parental immigration costs. They also showed immigrant children in the Madrid (Spain) perform better if their parents faced higher immigration costs after controlling for different family and country of origin characteristics such as skills or the education system at the origin country.

However, the effect of economic sanctions on quality of emigrating students has been overlooked. Economic sanctions have recently become one of the most important international issues. This is mainly due to outburst of political tensions between different countries. Economic sanctions are often used when parties involved in tensions cannot reach an acceptable agreement through negotiation. Therefore, it usually acts like a leverage in order for pressuring parties to return to the negotiation table.

Many countries from Russia and Turkey to Iran and Venezuela have been grappling with economic sanctions dilemma. These sanctions would significantly impact under sanction countries and produce negative economic and social consequences. One of the main social repercussion of economic sanctions is exit of human capital from countries under sanction mainly through emigration of university students. The latter outcome of economic sanctions often are more important than other ones because of its long-term economic effects. Besides the dissipating the years of investment through public schooling, emigration of students from under sanction countries does not usually produce any economic benefits because many emigrating students do not tend to return to their home countries. This process hampers one of the main ways of technology transition to developing countries.

Up to our knowledge, this note is the first paper in economic literature which quantitatively analyzes the effect of economic sanction on quality of emigrating students. This paper expand the current literature in two main directions. First, most of the previous researches has studied the performance of immigrant children and their school achievements. In this note, we provide a

simple model for analyzing impact of sanction on emigration decision of higher education students. Second, not only our model provide results which establish ground for future empirical research, but also some of previously well-establish empirical results are confirmed.

2. The model

We assume all students have an increasing utility function U. Furthermore, we hold that education future payoff e positively enters the utility function. One can see e as financial payoff of education continuation which bring about economic welfare in near future. Students' expected prospect of continuing education in home country is:

$$E[U(e)] = p.U(e^s) + (1-p).U(e^{ns}) \quad (1)$$

Where p is the probability of economic sanction, e^s is education payoff under economic sanctions and e^{ns} is education payoff under normal conditions (without sanction) in home country. Furthermore, we assume that each student has a subjective probability of acceptance of her application by foreign universities q. This probability is an indicator of students' quality. In other words, the higher the quality of emigrating students, the more confident she is of being accepted by foreign universities. It must be emphasized that in this study for simplification, we assume that (without loss of generality) q does not affect the financial benefits of education and merely determines the probability of acceptance by foreign universities[1]. It is clear that when the following condition holds, the students try to emigrate from a country which has sanction-risk exposure:

$$q.U(e^f, C) + (1-q).U(e^d) > p.U(e^s) + (1-p).U(e^{ns}) \quad (2)$$

Where e^f is future financial payoff of education in foreign universities, e^d is future financial payoff of education in domestic universities, q is probability of being accepted (indicator of students' quality) and C is the sanction-related cost of education in foreign universities. Inequality (2) indicates that whenever students are sure that their expected payoff is higher through applying for foreign universities (relative to home country), they would apply, regardless of being accepted or rejected at the end. In addition, the following assumptions are made:

Assumption 1) $U(e^s) < U(e^{ns})$.

Assumption 2) $U(e^s) < U(e^d) < U(e^{ns})$.

Assumption 3) $U(e^d) < U(e^f)$.

First assumption states that education in home country yields more utility in normal condition than in economic sanctions condition. This is clearly the case since many students graduated under economic sanctions cannot find relevant and well-paying job which obviously leads to decrease of financial benefits of education. Utility of financial benefits of education in a country with sanction exposure i.e. a country in which economic sanctions is likely to happen, is a weighted average of utilities of financial benefits of education under economic sanctions and in normal condition (without sanctions). This is exactly what assumptions (2) states. Furthermore, this assumption ensures that the only criteria for being accepted by foreign universities is quality

[1] One can assume mentioned financial benefits of educations in different conditions as average of benefits over large sample of students.

of students and no student with zero quality can immigrate[2]. Finally, financial and economic benefits of education in foreign countries is higher than financial benefits of education in home countries at any condition (regardless of probability of sanctions in home country). This assumption guarantees that students in home country always have incentives for emigration.

Before continuing, a little discussion about cost of education in foreign universities is important. First, we have assumed that C enters negatively in utility function of applying students. Second, it is reasonable to assume that C is an increasing function of probability of sanction. The rationale behind these assumptions is that economic sanctions significantly increase the cost of education especially through deprecation of home country currency. In what follows it is assumed that

$$U(e^f, C) = U(e^f) - p.c \tag{3}$$

Where $U(e^f)$ is the utility of future financial payoff of education in foreign universities when there is no significant sanction cost and c is unit constant cost of economic sanctions for applying students. Furthermore, since with increase of sanctions, both the cost of living in home country and immigration increases, we have following assumption:

Assumption 4) $U(e^f, C) > U(e^d)$.

3. Results of model

After model specification, we provide the main results from the model:

Proposition 1. There exists some hurdle value of subjective probability of acceptance by foreign universities q^* such that if $q > q^*$, students in a country with sanction risk exposure try to emigrate.

Proof: see appendix.

The main implication of proposition (1) is that for low-quality students ($q \leq q^*$) the inequality (2) cannot be satisfied and they don't apply for foreign universities. Hence, they face the same prospect as in equation (1).

It is expected that in absence of any significant cost, more students apply for foreign universities with increase of sanction probability. Therefore the average quality of immigrant students diminishes:

Proposition 2. In the case of insignificant cost of sanctions c, with the increase of probability of sanctions, the quality of emigrating students decreases. In other words, hurdle value of quality is decreasing function of probability of economic sanctions i.e. $\frac{\partial q^*}{\partial p} < 0$.

Proof: see appendix.

[2] To see this, put $q = 0$ in equation (2) which yields $U(e^d) > p.U(e^s) + (1-p).U(e^{ns})$. With assumption (2), this is impossible.

Proposition (2) has very important implications both for home and foreign countries. The proposition indicates that in the case of insignificant sanction-related costs, more students with lower quality apply for foreign universities. Regardless of efficiency of quality-checking mechanism of foreign higher education institutions, this has negative effects on educational achievements of immigrant students. More importantly, the proposition suggests that countries under sanctions will most likely suffer from lower quality level of remaining students in home country in future which eventually make effects of sanction long-lasting.

In next proposition, we encounter with more general case:

Proposition 3. *When the sanction-related cost for students' emigration is significant, there exists a threshold unit cost of sanction,* c^* *such that:*

- *If* $c < c^*$*, the quality of emigrating students decreases with the increase of probability of economic sanctions i.e.* $\frac{\partial q^*}{\partial p} < 0$.
- *If* $c > c^*$*, the quality of emigrating students increases with the increase of probability of economic sanctions i.e.* $\frac{\partial q^*}{\partial p} > 0$.

Proof: see the appendix.

The result of proposition (3) indicates that with the increase of emigration costs, the quality of emigrating students increase with probability of economic sanctions. The main rationale behind the above result is that with increase of emigration costs, only very talented students have the emigration opportunity. Besides this, only the students who are confident that can earn sufficiently from their investment in education in foreign university are likely to tolerate the high costs of education.

4. Conclusion

Our simple model provide results which have great consequences for educational systems. Furthermore, this model allows us to replicate the major empirical regularities in literature. We showed that sanctions does have important effects on quality of emigrating students. Our model can also be used to inform policy makers for selection of immigrating students.

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Appendix

Proof proposition 1.

Rewriting the inequality (2) as:

$$q.U(e^f, C) + U(e^d) - q.U(e^d) > p.U(e^s) + (1-p).U(e^{ns}) \quad (1)$$

Taking the same variables to one side we have

$$q\left(U(e^f, C) - U(e^d)\right) > p.U(e^s) - U(e^d) + (1-p)(U(e^{ns})). \quad (2)$$

Dividing two sides by $(U(e^f, C) - U(e^d))$ one easily obtains:

$$q > \frac{U(e^{ns}) - U(e^d)}{U(e^f, C) - U(e^d)} + p\frac{U(e^s) - U(e^{ns})}{U(e^f, C) - U(e^d)}$$

Finally, it can be easily seen that

$$q^* = \frac{U(e^{ns}) - U(e^d)}{U(e^f, C) - U(e^d)} + p\frac{U(e^s) - U(e^{ns})}{U(e^f, C) - U(e^d)}. \quad (3)$$

Assumption (4) rule out that denominator of (3) is zero.

Proof of proposition 2.

When c is not very significant, it is clear from assumption (3) (and also assumptions (4)) that $U(e^f, C) > U(e^d)$. Furthermore, regarding the assumption (1), one can easily see that $\frac{\partial q^*}{\partial p} = \frac{U(e^s) - U(e^{ns})}{U(e^f, C) - U(e^d)} < 0$.

Proof of proposition 3.

Taking derivatives of $q^*$with respect to p, we have:

$$\frac{\partial q^*}{\partial p} = \frac{-\left(U(e^{ns}) - U(e^d)\right).\frac{\partial U(e^f, C)}{\partial p}}{(U(e^f, C) - U(e^d))^2} + \frac{(U(e^s) - U(e^{ns})).\left(U(e^f, C) - U(e^d)\right) - p.(U(e^s) - U(e^{ns})).\frac{\partial U(e^f, C)}{\partial p}}{(U(e^f, C) - U(e^d))^2} \quad (4)$$

Assumption (4) insures that the denominator of equation (4) in nonzero. With doing very simple algebra, one can easily obtain:

$$p^* = \frac{U(e^f, C) - U(e^d)}{\frac{\partial U(e^f, C)}{\partial p}} - \frac{U(e^{ns}) - U(e^d)}{U(e^s) - U(e^{ns})} \text{ For which } \frac{\partial q^*}{\partial p} > 0 \text{ iff } p > p^*.$$

It is obvious that if $\frac{\partial U(e^f, C)}{\partial p} = 0$ i.e., when there is no sanction-related immigration cost, $p^* = \infty$ which means we have $\frac{\partial q^*}{\partial p} > 0$ for no p and it is hold that $\frac{\partial q^*}{\partial p} < 0$ for all p, simply the proposition 2. Putting $U(e^f, C) = U(e^f) - p.c$ in Eq. (4) and again doing very simple mathematics, it simply yields the following relation:

$$c^* = \frac{U(e^{ns}) - U(e^s)}{U(e^{ns}) - U(e^d)} U(e^f). \quad (5)$$

Assumptions (1) and (2) together guarantee that the denominator of (5) is nonzero and $c^* > 0$.

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