

**Kopi:****Analysis of the macroeconomic benefits of attracting international students**

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The Danish Ministry of Science, Innovation and Higher Education has commissioned an analysis of the socioeconomic benefits of attracting international students to complete full Master's degree programmes in Denmark.

**Danish Agency for Universities  
and Internationalisation**

The analysis has been carried out by the Danish Rational Economic Agents Model (DREAM) group. The DREAM group is an independent institution with the main purpose of developing, maintaining and performing economic analysis using the economic model Danish Rational Economic Agents Model (DREAM).

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The main area of analysis of the DREAM system is the long-term development of public finances in Denmark. A central question is whether fiscal policy is sustainable and if not, which factors explain the lack of sustainability. This assessment requires knowledge of two variables: the future revenues and the future expenditures of the public sector. The total DREAM system deals with the projection of these two variables; it is a toolbox available for projecting public revenues and expenditures.

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The total DREAM system consists of four independent models. The models are:

- The population projection model,
- The education projection model,
- The socioeconomic projection model,
- The DREAM economic model.

The DREAM system consists of three so-called pre-models that feed into a macroeconomic model (the DREAM economic model). The first pre-model is the population projection model. It is a national demographic projection model which forecasts the Danish population by gender, age and origin (immigrants and descendants from Western and non-Western countries respectively, and the residual population) until the turn of the century.

The population projection by gender, age and origin serves as an input into the education projection model. The education projection further divides the population by age and according to current participation in education and highest completed level of education.



The education projection serves as an input into the socioeconomic projection model. In this, the population is subdivided into 36 labour market categories (employed, early retirement pensioners, early retirement pay recipients, public pensioners etc.).

A detailed description of the DREAM model can be found here:  
[http://www.dreammodel.dk/default\\_en.html](http://www.dreammodel.dk/default_en.html)

The DREAM system is used in Denmark in connection with projections of the Danish economy and has significant credibility in economic forums.

The present analysis concerns the socioeconomic benefits of attracting international students to Denmark. The analysis shows that attracting international students with a Bachelor's degree level of education to Denmark to complete a full Master's programme is socioeconomically beneficial. This is true both of students who are subject to fees when attending a Master's programme in Denmark and of students from other EU/EEA countries which attend Master programmes in Denmark based on financing from the Danish state.

Attracting 1,000 additional international students annually results in a lasting improvement of public finances of between DKK 0.4 billion and 0.8 billion. The revenue primarily results from tax revenue generated by graduates who choose to stay in Denmark.

The DREAM model is built and the calculations are made on the basis of experience with the behaviour of consumers, businesses and so on. An important assumption in these particular calculations is that the share of students which stay in Denmark after their graduation remains the same as in recent years.

### *The analysis*

The Danish Ministry of Science, Innovation and Higher Education chose to carry out three simulation experiments using the DREAM model.

- A. An annual increased influx of 1,000 immigrants from Western countries with Bachelor's degrees; all of whom are accepted for Master's programmes and where the Danish state finances the educational costs.
- B. An annual increased influx of 1,000 immigrants from non-Western countries with Bachelor's degrees; all of whom are accepted for Master's programmes and where the educational costs are borne by the student based on tuition fees.
- C. An annual increased influx of 1,000 immigrants from Western countries with Bachelor's degrees; all of whom are accepted for Master's programmes and where the educational costs are borne by the student based on tuition fees.

The simulations emulate the behaviour of each of the said immigrant groups as regards educational attainment, employment, tax payments, utilisation of public services, fertility and remigration during their life span. Effects are summed up as a total effect on public finances (the primary public balance).



Experiment A shows the socioeconomic effect of attracting 1,000 students annually from EU/EEA countries (Western countries in the DREAM model). Under EU legislation, they can avail themselves of free education in Denmark just like Danish students. A share of these international students can be eligible to and in fact receive SU (“Statens Uddannelsesstøtte”, state grants and loans for students) in Denmark. It is assumed that this share is 35 per cent.

Experiment B shows the socioeconomic effect of attracting 1,000 students annually from non-Western third countries. These students are subject to fees and do not receive SU.

Experiment C shows the socioeconomic effect of attracting 1,000 students annually from Western third countries (such as the US, Australia, Canada and New Zealand). These students are subject to fees.

Distinctions are made between Western and non-Western students from EU/EEA and non-EU/EEA countries because of the profiles that the DREAM model is based on – and from which analyses can be drawn. This means that the group of international students in experiments A and C have the same characteristics, and the difference between these two experiments is in the area of self-financing of tuition and the eligibility and reception of grants to cover maintenance.

There are 2,8 million people in the Danish labour force and the Danish GDP (PPP) was approx. €29.000 per capita in 2011. The exchange rate is EUR 1 = DKK 7.44.

### *The results*

Overall, the analysis shows that there is a socioeconomic benefit in attracting international students to study a full Master’s programme, even if the programme is financed by the Danish state (which is the case for students from EU/EEA).

The positive effect stems from a significant amount of the international students finishing their degrees and finding employment in Denmark. This increases the labour force and leads to increased employment and consumption which results in higher tax revenues. The public expenditure also increases, but this increase is less than the overall increase in GDP.

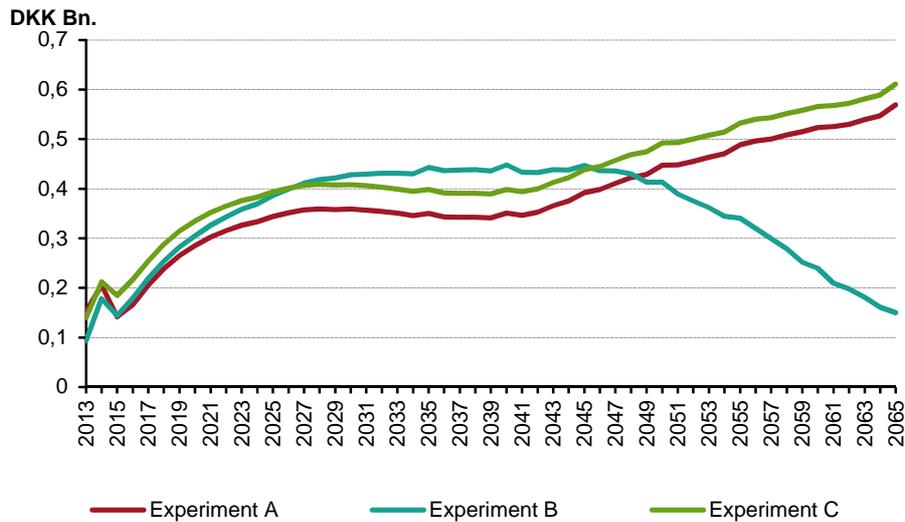
The graph below (figure 1) shows the annual improvement of the primary public balance<sup>1</sup> until 2065 comparing the three experiments to the baseline.

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<sup>1</sup> The public balance is adjusted for net interest revenues.



**Figure 1: Variation relative to the baseline in the primary public balance, 2011 level**



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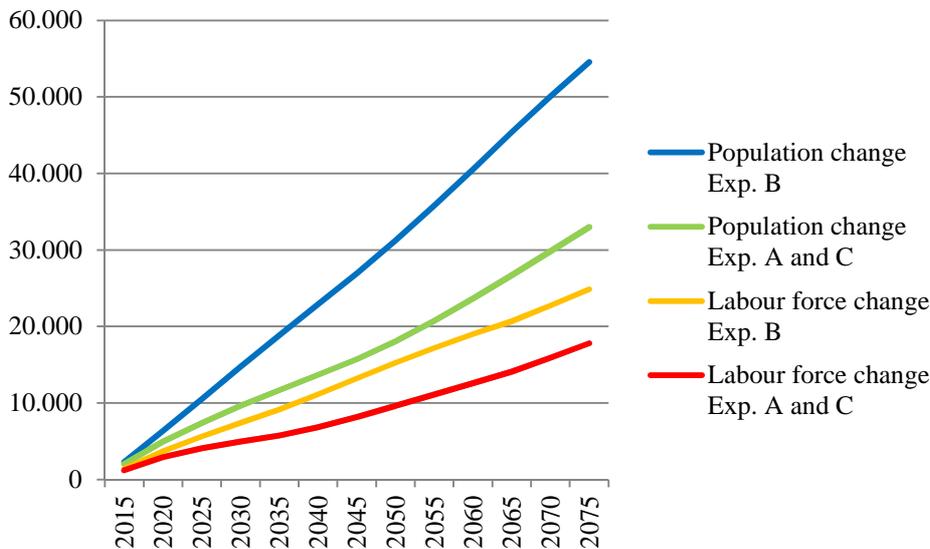
The figure shows an improvement of the primary public balance already from the first year and throughout the entire time span of all three experiments. The socio-economic benefit is greatest in experiment C, which refers to fee-paying students from Western countries. In the first couple of years, the benefit from Western students financed by the Danish state (experiment A) is greater than that of non-Western students who are paying tuition fees (experiment B). This is due to a higher rate of employment among Western students.

However, over a longer period of time (until 2050), this trend changes and non-Western students provide the greater benefit, mainly because they are less likely to remigrate and so remain in Denmark to work. After this period, the benefit from non-Western students begins to fall as there are more elderly people to care for, and also because the group has a higher rate of fertility and therefore have more descendants.

The DREAM model does not take the parents' education into account when modeling the forecast for descendants. Since descendants from non-Western immigrants in general have a negative effect on the economy in the DREAM model, this leads to the significant decrease in benefit in this experiment.

The graph below (figure 2) shows the population growth and labour force for the three experiments.

**Figure 2: Variation relative to the baseline in population and labour force, 2011 level**

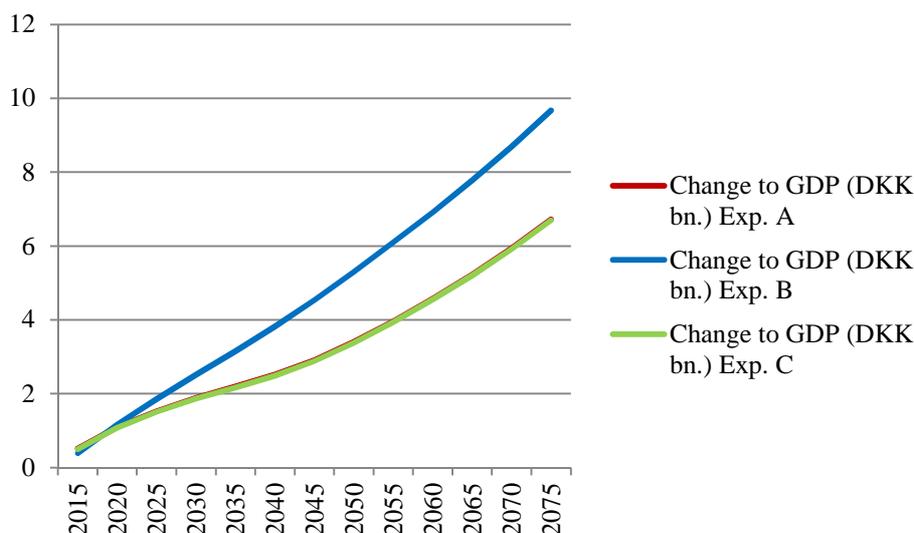


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When the increase in the fiscal sustainability<sup>2</sup> is calculated, Western students attending Master's programmes financed by the Danish state (experiment A) lead to a lasting annual increase of the primary public budget of DKK 0.75 billion compared to the 2011 level. Non-western students subject to fees (experiment B) lead to an annual increase of DKK 0.36 billion and Western students subject to fees (experiment C) contribute an annual increase of DKK 0.79 billion.

All three experiments will obviously contribute to increasing GDP as a result of the increase in population and labour force. Given that the greatest change in population and labour force takes place in experiment B, it is also this experiment that produces the greatest growth in GDP, as is seen in the graph below (figure 3).

**Figure 3: Variation relative to the GDP baseline, 2011 level**



<sup>2</sup> The fiscal sustainability is the permanent improvement to the primary public budget that is necessary in order for the public sector to meet its long-term budget constraints.



In conclusion, all three experiments lead to an increase in public finances of between DKK 0.36 bn. and 0.79 bn. annually – an increase in GDP, but a slight drop in GDP per person.

### *Validity*

The analysis can be seen as being slightly conservative in the estimated effect with regard to the fact that it does not take into account the effects on productivity of the highly educated immigrants. This is due to the structure of the DREAM model which does not factor in such effects.

Furthermore, the analysis can be seen as underestimating the positive effects of a high level of education as the level of education is not taken into account in the demographics. At the same time, the analysis can be seen as underestimating factors which can have a negative impact on the results such as the level of emigration.

The main conclusion of the analysis, that attracting international students with a Bachelor's degree level of education to Denmark to complete a full Master's programme is socioeconomically beneficial, is, however, viewed to be fully valid.

The analysis was carried out in 2012 before the ECJ-ruling in C-46/12, L.N which potentially will have the effect that a larger number of international students from EU/EEA countries will receive SU. The analysis was – in the absence of valid data based on a conservative assumption that 35 percent of incoming students are eligible to and receive SU. In connection with the ECJ ruling, the Ministry of Higher Education has produced more precise estimates pointing to the fact that 20 percent of the students from EU/EEA countries are eligible for SU today and after the ruling this could increase to 40 percent.

Therefore, the conclusions of the analysis are still deemed to be valid at this point in time, after the ECJ-ruling. If, however, the ECJ-ruling leads to a significant change in the behavioral patterns of the international students (e.g. significant changes in patterns of employment during studies and remigration patterns) this could have a negative effect on the results.