

A Multilevel Analysis of Economic Literacy Among International Students: Implications for an International Assessment of Heterogeneous Vulnerable Learner Groups

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ABSTRACT

International student mobility has increased in the past years. The inclusion of a highly heterogeneous group of students requires updated recruitment and admission strategies. A particularly vulnerable group of international students are refugees, who have an exceptionally high risk of dropping out of their studies. We present an entrance assessment of incoming international students from 77 countries who are at the beginning of their studies in Germany. Based on this unique sample, we examine (i) whether there are systematic country-specific effects on the economic literacy of beginning students of business and economics and (ii) whether refugee students differ from the group of international students. The results show that refugee students have a higher level of economic literacy although their country-specific prerequisites are worse. Hence, the results highlight the high relevance of an international assessment of heterogeneous vulnerable learner groups to promote their integration into the increasingly internationalized higher education sector.

Keywords: economic literacy, higher education, refugee students, study-entry diagnostics, TEL

INTRODUCTION AND RESEARCH OBJECTIVES

Need for Valid Entrance Diagnostics Among International Students

To meet the growing demands of the global market, the internationalization of higher education is a declared goal of politics and higher education institutions. To facilitate the exchange of higher education students, the necessary infrastructure and international programs such as ERASMUS have been established (Altbach & Knight, 2007; Streitwieser et al., 2017). Despite the increasingly large heterogeneity of study-related preconditions among international students, which are influenced by the many different ways of gaining access to higher education as well as by the very different conditions in the countries of origin, for instance, in terms of preuniversity school curricula and school-leaving examinations. The most decisive admission criterion has usually been the final school grade (Carstensen et al., 2019). As many studies show, however, school grades are diagnostically less conclusive, and can hardly be compared nationally, let alone internationally (Brand & Xie, 2010; Coates & Friedman, 2010; Kuncel et al., 2001).

The increasing importance of the subject economics in higher education is undisputed internationally (Hoyt & McGoldrick, 2012). Economics is one of the most studied major and minor subjects (U.S. Department of Education, National Center for Education Statistics, 2019), and it is particularly popular among international students due to the high degree of internationalization in this domain in terms of “international core curricula” (Siegfried & Walstad, 2014).

Due to the very high heterogeneity of incoming students in higher education economics, where the rate of international students for instance in Germany is 25% (Destatis, 2019), it is of particular importance to gain valid information on their economic literacy when beginning their economics studies. So far, however, there are only very few studies on the extent to which international students differ within their study-relevant previous knowledge; nor are there studies on cross-national comparisons of economic literacy, although economic study programs share similar curricula on an international level (Brückner et al., 2015a).

This diagnostically valid information would be particularly important in view of the high number of dropouts in this domain, especially among international students. For instance, at German universities, almost one in four students drop out of their studies, and this rate is even higher at some institutions (Heublein, 2014).

After massive refugee movements in 2015, refugee students represent an increasingly significant special group of international students. They differ from international students in a number of key issues: in contrast to refugees, international students have voluntarily made the decision to move to another country to study, and were able to decide for themselves when, how, and which university to choose; this is usually accompanied by a certain proficiency in the host country’s language as well as systematic preparation for the new study

requirements at the chosen university. International students have a desirable status among the migrant population (Raghuram, 2013; Sullivan & Kashubeck-West, 2015). They are less frequently confronted with prejudice and marginalization than refugee students (Schneider, 2018). Refugee students have often had less time to prepare; the reason for their resettlement is mostly forced, which can manifest itself in low language proficiency and sociocultural difficulties in adaptation (Zlatkin-Troitschanskaia et al., 2018; Campion, 2018; Romiti et al., 2016).

In educational practice and research, refugee students are therefore considered to be a vulnerable student group (Baker et al., 2018), which can also result in an increased risk of study dropout (Ferede, 2012). Based on previous research indicating an extreme heterogeneity in economic knowledge among refugee students (Zlatkin-Troitschanskaia et al., 2018; Reinhardt et al., 2018), it can be assumed that economic literacy differs between international students with and without refugee background.

A broad spectrum of factors is decisive for academic success in the potential host country for both student groups. In addition to language proficiency, nonlinguistic factors such as previous education, sociocultural background, domain-specific knowledge, and additional personal characteristics such as learning motivation can have an influence on academic performance and study success (Akanwa, 2015; Oliver et al., 2012). Among these study success predictors, research stresses the particular relevance of students' previous knowledge (Happ et al., 2018; Brückner et al., 2015a).

International Assessment of Economic Literacy

In economic studies, the construct of economic literacy is considered a reliable and valid indicator of economic knowledge and understanding of beginning students that can validly predict study success in higher education economics (Kühling-Thees et al., 2020).

Economic literacy describes the ability to understand and utilize basic economic concepts and principles such as supply and demand, inflation and competition in everyday life (Al-Rabaani, 2019; CEE, 2010; Walstad et al., 2013). The construct of economic literacy was initially established beyond the academic settings by showing both individual and societal effects (Walstad, 1998). The societal component means that countries have an advantage from economically informed citizens because it improves their ability to judge critical economic events (Walstad, 1998).

There are some studies on economic literacy from countries such as Japan, Korea, Germany, and the United States, indicating systematic differences among students from different countries (Brückner et al., 2015b; Förster et al. 2015; Walstad et al., 2013; Yamaoka et al., 2007, 2010; Yoo 2007; Zlatkin-Troitschanskaia et al., 2016). International comparisons of economic literacy, however, are scarce, especially between developed and less developed countries of origin. As one of the very few studies in this field, a study by Jappelli (2010)

showed a significant variance in economic literacy between different countries, depending on factors such as educational achievement and the social security system of the countries. Results on the related cognitive construct of financial literacy also often show lower financial literacy for low-income countries or developing countries (Kaiser & Menkhoff, 2017; Xu & Zia, 2012).¹

Further cross-country assessments would be particularly important in the domain of higher education economics due to the increasing number of international students, including students with a refugee background. Assessments to determine the differences in economic literacy among heterogeneous international students would provide crucial information for higher education practitioners, for instance, in terms of how curricula and instruction can be adapted to increase equality in education and to promote targeted study progress for all international students.

Research Questions

Based on the international state of research on the valid assessment of economic literacy and on the international testing in other domains, in our study, we focus on the following research questions (RQs):

1. Are there systematic differences in the level of economic literacy among international students with and without refugee background?
2. Do the country-specific variables of education and income have an effect on the level of economic literacy at the beginning of university studies?

After presenting the study design and the main findings, the effects of possible differences in the economic literacy of international students will be discussed with a particular focus on the significance of an international assessment of heterogeneous vulnerable learner groups to promote the integration of refugees into higher education.

METHOD

Study Design

The data are aggregated from two consecutive related substudies. First, data from the WiWiKom research project were included in this analysis. WiWiKom II

¹ Financial literacy can be considered an integral part of economic literacy (Lusardi & Mitchell, 2017). Some studies model financial literacy as an extension of economic literacy (Pang, 2010; Koh, 2016). In this article, economic literacy is seen as knowledge of core concepts of economics, which is the basis for financially sound decisions.

is funded by the German Federal Ministry of Education and Research (funding code 01PK15001) and runs from 2015 to 2020 (for details, see Zlatkin-Troitschanskaia et al. 2019). The project focuses on the longitudinal modeling of economic knowledge and understanding over a course of university studies in business and economics. To determine the level of students' knowledge and understanding of economics at the beginning of their studies, we conducted a nationwide study ($N = 39$ universities) in 2016 (first measurement point) with a representative sample of 5057 university students in Germany. The international student sample in this analysis is taken from this data set.

Second, data from the SUCCESS project were included in this analysis (funding code 16DHLQ007). The SUCCESS project is running from 2017 to 2020 and is funded by the German Ministry of Education and Research (for details, see Zlatkin-Troitschanskaia et al., 2018). On a study platform offered by Kiron Open Higher Education, refugees are given the opportunity to start or continue their studies in online courses and to possibly transfer to a regular university. There are different study programs available at Kiron, among them business and economics. To determine the refugee students' level of knowledge and understanding of economics when entering Kiron, we included all business and economics students in the analysis who completed the test in winter 2018 and in a follow-up in summer 2018.

Instruments

In both substudies presented here, the economic literacy of international students and of refugee students was assessed with the same internationally established test comprising 15 items from the fourth version of the test of economic literacy (TEL4; Walstad, et al., 2014), which has been proven to be a valid test for assessing the basic economic knowledge of beginning students in many studies (Happ et al., 2018; Zlatkin-Troitschanskaia et al., 2019, Walstad et al., 2013).

To examine the systematic effects that could theoretically be expected, individual covariates (test language, age, gender, university background, refugee status) as well as specific context variables (Educational Index, Income Index) were included in this analysis. The Educational Index is composed of the variable Mean Years of Schooling (United Nations Development Programme [UNDP], 2019) and the Education Index (value range 0–1; UNDP, 2019), aggregated from the average years of schooling of adults and children (value range 0–1, UNDP, 2019). The Income Index is composed of the gross national income (GNI) per capita (UNDP, 2019) and the World Bank Income Classification (low income, lower middle income, upper middle income, high income).

University background was operationalized on three levels: no experience, started higher education, completed higher education; and test language was measured dichotomously: equivalent to mother tongue and not equivalent.

Sample

The combined sample consisted of two groups: (i) a group of international students ($n = 327$) as part of a representative sample assessed at several traditional universities in Germany in an entrance assessment in the winter semester 2016 WiWiKom II project (for details, see Zlatkin-Troitschanskaia et al., 2019); (ii) refugee students ($n = 89$), who were also assessed at the beginning of their studies in Kiron in the context of the SUCCESS project.

The international students (62% female) were on average 21.7 years old. The refugee students (17% female) were on average 28.7 years old. The significant age difference between the two groups also manifests itself in the highly different previous study experience. While 52% of international students have no previous experience, 88% of refugee students do; 61% of refugee students state that they already have a university degree.

The distribution of countries of origin shows a strong heterogeneity. Altogether, the students come from 74 different countries. While the majority of international students come from Europe (58%), however, refugee students come mainly from the Middle East and North Africa (52%). The two groups differ significantly with regard to country-specific factors. Based on WHO regional classifications, 54% of international students come from developed countries, while almost 100% of refugees come from less and least developed countries. Based on World Bank Income classifications, 72% of the international students come from states with a high income or upper middle income while 84% of refugee students come from states with a lower middle income and low income.

Analysis

To answer both RQs, multilevel analysis was conducted, as a nested data structure is given due to the different nationalities (see Figure 1). The economic literacy of the participants may differ not only because of their individual capacities but also because of their origin and different societal influences, for instance in terms of school education. Thus, the observations are not independent of one another, and an ordinary regression would lead to biased standard errors (Preacher et al., 2010). An analysis performed at the group level would subsume the individual variance under the group mean, which also limits the amount of available information about significant effects (Krull & MacKinnon, 2001).

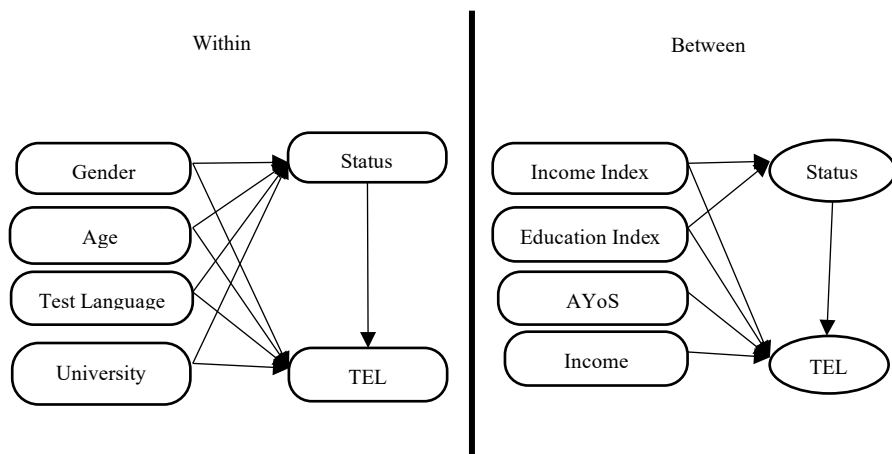


Figure 1: The Multilevel Model

Notes: TEL = test of economic literacy; In. Index = Income Index; Ed. Index = Education Index; Income WB = World Bank Income Classification; AYoS = Average Years of Schooling.

An intercept-only model was initially used where only the dependent variable (TEL score) within the two levels was analyzed to examine if a nested structure explains a reasonable amount of variance. Using this model, the intraclass correlation (ICC) and the design effect (DEFF) were calculated. The ICC of 0.149 and a DEFF of 1.65 indicate variance within countries of origin and justify a multilevel approach (Asparouhov & Muthén, 2019; Krull & MacKinnon, 2001). A total of 77 clusters (country of origin) were found at level 2 with an average cluster size of 5.3.

MPLUS 7 software was used to conduct a multilevel analysis. The Bayes estimator was used to deal with the nested data structure (Krull & MacKinnon, 2001).

In RQ1, therefore, a distinction is made between the two groups of students. The analysis aimed to determine how the status (refugee) and economic literacy (the TEL score) at the individual level (level 1) were related. For RQ2, we examined whether the country-specific variables of education and income at the country level (level 2) also have a significant effect on the TEL score.

RESULTS

Different levels of economic literacy were determined within the sample. The significant results are shown in Table 1. Effects were found both at the individual level (RQ1) and at the country level (RQ2). The TEL scores differ depending on the context variables: for instance, female students performed worse than their male counterparts, which was evident in both groups (with and without refugee background). Furthermore, students whose proficiency in the test language is equivalent to that in their mother tongue achieved better scores, as expected.

Table 1: Multilevel Modeling Approach of Economic Literacy on Level 1 and Level 2 Predictors in Relation to Student Status

Variable	Model 0	Model 1	Model 2	Model 3
	Null model	Plus status	Plus fixed effects	Full model
	B [CI] TEL	B [CI] TEL	B [CI] TEL	B [CI]TEL
Intercept		4.835 [2.996,7.404]***	5.486 [4.809,6.184]***	3.708 [0.546,7.119]***
Level 1 Variance	8.110 [6.886, 9.406]***	0.874 [0.660,1.000]***	6.288 [4.069,8.160]***	6.89 [4.923,8.675]***
Level 2 Variance	1.646 [0.523, 3.298]***	1.613 [0.419,3.178]***	0.833[0.044, 1.963]***	0.625 [0.002,1.828]***
Step 1: Random effects TEL ON status				
Level 1 Status		0.354 [0.010,0.631]*	1.242 [0.352,2.017]**	0.928 [0.011,1.832]*
Level 2 Status		-0.093 [-0.600,0.376]	0.122 [-0.051,0.335]	0.146 [-4.070,3.611]
Step 2: Random effects and fixed effects with controls				
Level 1 Fixed effect				B [CI]TEL B [CI]Status
Test language			1.207 [0.561,1.885]***	1.893 [0.680,3.333]** -0.983 [-1.900,-0.068]**
Gender			0.894 [0.280,1.565]**	0.469 [-0.787,1.558] 0.724 [-0.150,1.538]
Age			-0.053 [-0.127,0.023]	-0.177 [-0.329,-0.033]** 0.136 [0.059,0.208]***
University background			-0.037 [-0.444,0.403]	-0.284 [-1.147,0.404] 0.448 [-0.064,0.919]
Level 2 Fixed effect				
Education Index			-1.390 [-6.882,4.094]	-14.727 [-44.332,14.309] -6.177 [-9.257,-3.012]***
Income Index			5.487 [0.483,10.953]*	4.231 [-13.382,16.852] -3.381 [-6.501,-0.324]*
Step 3 Random effects and Level 1 and 2 fixed effects for TEL and status				
Level 2 Fixed effect				
Average years of schooling				0.659 [0.005,1.252]*
Income				0.574 [-0.603,1.666]
R ² within	.126 [.000,.340]***	.284 [.070,.519]***	.193 [.049,.406]***	.518 [.315,.681]***
R ² between	.036 [.000, .281]	.063 [.000,.432]***	.959 [.713,1.000]***	.890 [.557,1.000]***

Annotation * $p < .05$; ** $p < .01$; *** $p < .001$; TEL = test of economic literacy, Gender¹ = male, Status¹ = refugee, Testlanguage¹ = equivalent to mother tongue.

When the status variable (refugee) is added to the model, the gender effect disappears. Instead, the control variable age shows significant effects on the TEL score, i.e. older participants achieve lower TEL scores. Moreover, refugee students are older than nonrefugee students. Despite this age effect, however, refugee students achieved significantly higher TEL scores ($= .424$ CI [0.138, 0.688]) at the individual level, adjusted for the variance between the countries, i.e. the status *refugee* leads to an increase of 1.3 points in the TEL score.

The effect of education and income on economic literacy was observed at level 2. The TEL score is correlated with a higher income index and more years spent at school (Table 1). Moreover, education and income reveal negative correlations with refugee status, i.e. the status refugee is correlated with a lower level of education and a lower income (Table 1).

DISCUSSION

To our knowledge, this is the first study conducting a cross-country entrance assessment of economic literacy among incoming international students that systematically differentiates between students with and without a refugee background. Economic literacy is considered a crucial prerequisite for study success in the increasingly internationalized domain of business and economics. Based on previous research, systematic differences in terms of both students' status and their countries of origin were expected. To include socioeconomic context variables systematically in our analysis, we used a multilevel approach.

The two student groups (international students and refugees) differ from each other. Refugee students are much older and already have more academic experience. Despite systematic variation between the countries of origin, an effect of refugee status on economic literacy was found at the individual level (level 1), i.e. the refugee students have a higher economic literacy than the international students. One explanation might lie with this group's significantly longer educational experience and older average age, as some studies assumed that economic abilities increase with age (e.g., Happ et al., 2018).

Refugee students have lower values on the Educational Index, i.e. have fewer school years than international students, and have lower values on the Income Index, i.e. come from countries with a lower Gross National Index. They therefore have poor prerequisites due to country-specific variables. Nevertheless, they score better in the TEL than international students. This result is very encouraging and stresses the particular relevance of an international assessment of heterogeneous vulnerable learner groups to promote their integration into the increasingly internationalized higher education sector. So far, international assessments in higher education in general, as well as the assessment of international students in particular, have been neglected compared to the well-established testing practice in school education. Our study demonstrates the practical use and potential of international assessments in higher education.

For instance, in higher education practice, refugee students are generally assumed to need targeted support. Because of specific institutional, financial, and linguistic hurdles, an unassisted entry into higher education is very difficult to

achieve (e.g., Baker et al., 2018). Our results indicate that a well-developed degree of economic literacy is a valid predictor of study success (Schnell & Loerwald, 2019), and that this group of students therefore has a high potential, which has so far been underestimated in practice. As this test has a strong language-related bias, i.e. students need a high level of English language proficiency to correctly solve it, a sufficient knowledge of English can be assumed for this learner group (see also the findings in Rother et al., 2018). Thus, our findings indicate that common barriers for integration into higher education can be disregarded for refugees (the lack of language proficiency and study-related literacy).

This result has high practical significance, as the integration of refugees into tertiary education is, so far, not well developed. Only a few countries have standardized political guidelines, measures, or programs for integration into higher education. The rather chosen way was to expand existing migration strategies or left to the universities in institutional self-government, although the majority of refugees who apply for asylum have the age of typical higher university students (Crosier & Kocanova, 2019).

Besides education as an exceptionally important integration medium (Cerna, 2019; Ferede, 2012), the promotion of economic literacy can be considered a strategy to integrate vulnerable groups such as people with low socioeconomic status (immigrants, young adults, refugees) into society and the labor market (Engelbrecht, 2008): Regarding RQ2, there are specific positive correlations between the Educational and Income Indices and TEL scores, indicating that high economic literacy among study participants is explained by longer schooling/educational experience and higher gross national income per capita.

This result is in line with other studies where low-income states or people from low-income backgrounds had a lower level of economic literacy (Al-Rabaani, 2019; Bose et al., 2015; Gratton-Lavoie & Gill, 2009; Jappelli, 2010). Societal benefits may be assumed, as economically literate individuals act in a more economically planned way and make financial decisions that are beneficial for the national economy (Al-Rabaani, 2019).

The integration of vulnerable groups brings also national advantages such as higher tax revenues and lower social welfare costs (Ferede, 2012). Also, on the macroeconomic level, positive relationships between economic literacy and the effective interaction of markets and policies can be expected (Bose et al., 2015; Burke & Manz, 2014; Cole et al., 2011).

Inclusive education is an important factor for integration (Cerna, 2019). Since a high number of students already have a tertiary degree, the demand for flexible pathways and alternative paths to formal university entrance should be endorsed (Crosier & Kocanova, 2019). The results presented here underline the recommendation that the integration of refugee students into higher education should be enhanced through social exchange with other students, the creation of a supportive learning environment, and the provision of high-quality courses designed for refugees (Cerna, 2019).

LIMITATIONS AND CONCLUSION

Since a representative sample at the country cluster level could not be established in this study, the results do not allow for country-specific predictions. The results must also be considered in the context of the following limitations. As the international testing practice, for instance, in school education, shows, it is especially challenging to validly measure a highly heterogeneous sample from a wide variety of sociocultural/-economic contexts using a single test. In this sample, we have a multiplicity of cultural differences and educational prerequisites. For instance, Hahn and Jang (2012) show that cultural differences could significantly bias the economic test score. Furthermore, the TEL was originally designed for the school context in North American countries and economic knowledge from the United States cannot easily be generalized to other countries (Wobker et al., 2012). Therefore, it may be assumed that the test fairness as a validation criterion is violated (Zlatkin-Troitschanskaia et al., 2019). Previous international comparisons in which the TEL has been used, however, point to a given comparability among international students in business and economics (Schlax et al., 2020).

Another critical aspect is the study design, as the data come from two substudies, which leads to differences in the collection of data. For example, the administration mode was different. While the refugee students completed the test online, the data from the substudy of the international students were paper-pencil-based. Though previous studies using both the online version and the paper-pencil version found no significant effect on the test results (Zlatkin-Troitschanskaia et al., 2019), De Bruin et al. (2017), for instance, show that the comparability of samples and results can be affected by different administration modes (web-based vs. face-to-face).

Another critical point is that the test questions were offered in German, but the group of refugee students was allowed to choose between the English and German version, and all refugee students in this sample completed the test in English. Though the German version was adapted in accordance with the Test Adaption Guidelines (International Test Commission, 2017) and very comprehensively validated in accordance with all five validation criteria from the standards of psychological and pedagogical testing (American Educational Research Association et al., 2014) including the establishment of functional and measurement equivalence and measurement invariance between both test versions, it can also be critically questioned whether and to what extent the results could be biased due to test language effects.

Despite these limitations, if the results are viewed in particular in the context of the integration of international students at German universities, then comparability is certainly evident according to official statistics on foreign students in Germany. Since different language skills and different sociocultural conditions actually only reflect the large variance of the student body, one cannot necessarily conclude that the different test procedures lead to a disadvantage of a particular group or to a violation of the psychometric objectivity criterion.

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