

Kaiser, Tim; Oberrauch, Luis; Pang, Ming Fai; Seeber, Günther

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# Using the ‘Test of Economic Competence’ with secondary school students in Hong Kong: Results and psychometric properties

Tim Kaiser, Luis Oberrauch, Ming Fai Pang, and Günther Seeber

## Abstract

We administer an adapted version of the Test of Economic Competence (TEC) to a sample of secondary school students in Hong Kong and study the psychometric properties of the adapted scale relative to test statistics based on a sample of German secondary school students. The results indicate adequate psychometric properties of the adapted measurement scale. Reassuringly, we find no evidence of differential item functioning in the adapted test and student-level correlates of economic competence mirror the results from a large-scale assessment in Germany relying on the original scale. Collectively, these results underscore the construct validity of the adapted test and suggest that the adapted TEC may be well suited to study the economic competence of secondary school students in a variety of educational contexts.

JEL-Classification: A21, G53

Keywords: Pre-college economic education, economic competence, IRT

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Tim Kaiser (corresponding author), Junior Professor of Economics and Economic Education, University of Koblenz-Landau, D-76829 Landau, Germany (ORCID: <https://orcid.org/0000-0001-7942-6693>); [kaiser@uni-landau.de](mailto:kaiser@uni-landau.de).

Luis Oberrauch, Postdoctoral researcher, Eberhard Karls University Tuebingen, D-72074 Tübingen, Germany; [luis.oberrauch@uni-tuebingen.de](mailto:luis.oberrauch@uni-tuebingen.de)

Ming Fai Pang, Associate Professor, Faculty of Education, The University of Hong Kong, Hong Kong; [pangmf@hku.hk](mailto:pangmf@hku.hk)

Günther Seeber, Professor of Economic Education, University of Koblenz-Landau, D-76829 Landau; [seeber@uni-landau.de](mailto:seeber@uni-landau.de)

# Using the ‘Test of Economic Competence’ with secondary school students in Hong Kong: Results and psychometric properties

## 1 Introduction

Many important questions regarding the organization of educational systems require the measurement of specific outputs and outcomes to evaluate learning achievements of students in specific educational domains. Within the domain of economic education, a large empirical literature is dedicated to the measurement of economic knowledge and related constructs (see Walstad, Rebeck, and Butters 2013; Walstad and Rebeck 2017; Knoll and Houts 2012, 2018). While the widespread use of such measurement scales has generated insights into achievement gaps and *knowledge* trajectories of school students in a variety of international settings (e.g., Beck and Krumm 1994; Brückner et al. 2015a, b; Erner, Goedde-Menke, and Oberste 2016; Förster, Happ, and Molero, 2017; Gill and Gratton-Lavoie 2011; Happ and Förster 2018; Walstad and Buckles 2008, Walstad and Rebeck 2001a,b, Walstad 2013), literature on the measurement of economic *competence* is more limited.<sup>1</sup> This gap in the literature has been a challenge for educational research, as most large-scale assessments in school settings aspire to measure competencies (i.e., cognitive dispositions needed to master situations or tasks in specific domains) rather than factual textbook-knowledge based on a rigid catalogue of contents (see Weinert 2001, Klieme, Hartig, and Rauch 2008 for a conceptual introduction). We contribute to this literature by providing a psychometric validation of a translated and adapted version of the *Test of Economic Competence* (TEC) (Kaiser, Oberrauch, and Seeber 2020) in an international setting. The German-language version of the TEC was developed on the

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<sup>1</sup> See, e.g., OECD (2012) for a large-scale assessment within the narrower domain of *financial literacy*, Schumann and Eberle (2014) for an assessment of economic competencies in German-speaking Switzerland, and Macha (2015) for a study of economic competence among a convenience sample of German youth. Unfortunately, the employed test items are not publicly available for any of these scales, impeding the employment of these measurement scales in international comparative settings.

occasion of an educational large-scale assessment in Germany and based on a conceptual model of economic competence described in Retzmann et al. (2010) and Retzmann and Seeber (2016).

While this conceptual model was developed in context of the German discourse on economic education in general education schools, the aspiration in developing the conceptual and psychometric competence model has always been its international applicability: “[The model] should be applicable to different national education systems and various curricular settings.” (Retzmann, Seeber 2016, p. 9). Thus, we probe this hypothesis by administering a translated and adapted version of the TEC to a sample of secondary school students in Hong Kong and compare test statistics and student-level correlates of economic competence between the samples. Three results emerge: (i) While we identify six out of 30 items with poor psychometric properties, the overall test statistics based on the remaining individual items within the adapted test generally mirror the results obtained with the original item set. (ii) Testing for differential item functioning based on the student-level split criteria “gender”, “mother tongue”, and “books at home” (as a proxy for educational attainment and socio-economic status of parents), we find no evidence of item bias. We tentatively interpret this result as suggestive evidence of construct validity and overall test fairness. (iii) We explore correlations of test scores to student-level covariates and find that these are qualitatively similar for many variables which we interpret as suggestive evidence of congruent validity of the adapted measurement scale. Collectively, these results suggest that the adapted TEC may be well suited to study the economic competence of secondary school students in a variety of educational contexts.

This article is structured into three further sections: Section two details the sampling of students in the respective countries, delineates the testing procedures and data collection, and describes the psychometric models and methods employed. Section three discusses descriptive statistics of student-level observables and the comparability of the samples. Section 4 discusses results in four steps: While section 4.1 shows descriptive statistics on test items and results

based on classical test theory, section 4.2 discusses results from IRT modelling. Section 4.3 probes differential item functioning, and section 4.4 presents results on the correlation between estimated student-level competence scores and observable characteristics to probe concurrent validity of the adapted measurement scale. Section five discusses these results with a focus on challenges in future test implementation.

## **2 Sampling, procedures and psychometric models**

### **2.1 Sampling and procedures**

The test and background questionnaire was administered to all student samples as a computer-based assessment and supervised by the teacher during regular school lessons. The German-speaking part of our total sample is a stratified random selection of students attending the higher track public (i.e., state) schools (“Gymnasium”) in the German federal state of Baden-Wuerttemberg.<sup>2</sup> We stratified by the degree of urbanization and school size and surveyed 9<sup>th</sup>-graders in 2020 and the previous cohort in 2019. Due to a recently introduced curriculum reform, the cohort surveyed in 2020 (N=524) received two years of mandatory economic education in a standalone subject whereas the 2019 cohort (N=570) received only one year of mandatory economic education within a combined subject course.

The student sample in Hong Kong (N=478) was recruited from public schools within a partnership network of the University of Hong Kong. For this setting, we translated the TEC into English and slightly adapted the vignettes and response options to the local context, when necessary, but without changing the underlying problem (e.g., by changing the names of fictitious persons within the vignette to names popular in Hong Kong, and by adapting the currency to Hong Kong Dollars instead of Euro). We also removed one item prior to

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<sup>2</sup> As the German system is characterized by early tracking of students into different ability tracks, we limit the sample of students to the highest track in Germany, as these are possibly more comparable to average students in Hong Kong who consistently achieve high scores in other large-scale educational assessments.

administering the test, since this item alluded to the German health insurance system with no equivalent application in Hong Kong. We conducted the competence assessments and survey in April to June 2021 and all participating schools are located in different district areas of Hong Kong and include boys' schools, girls' schools and co-educational schools. Similar to the German system, in Hong Kong, 12-year free primary and secondary education is provided to all children through public sector schools, which represents the majority of schools in both systems. There are six years of schooling at the primary level, three years at the junior secondary level and three years at the senior secondary level. As in Germany, children start primary schooling at the age of six. The basic education of Hong Kong aims to enable children to develop knowledge, skills and values for their further studies and personal growth, to nurture their lifelong learning capabilities and whole-person development, and to enhance their abilities to be biliterate (i.e., to be proficient in written Chinese and English) and trilingual (i.e., to be proficient in spoken Cantonese, Putonghua and English). Both Chinese and English are official languages and core subjects in primary and secondary education curriculum. Thus, while the primary language spoken at home may not be English for the majority of students in the Hong Kong sample, the setting allows to study the psychometric properties of an English translation of our test with students of relatively high English proficiency.

## 2.2 Psychometric models

To evaluate psychometric properties of the item set, we use a three-parameter logistic model from the family of item response models (Birnbaum 1968) following the equation

$$P(X_i = 1|\theta, b, a, c) = c_i + (1 - c_i) \frac{\exp\{a_i(\theta_v - b)\}}{1 + \exp\{a_i(\theta_v - b)\}} \quad (1),$$

where  $\theta_v$  denotes estimated ability for person  $v$ , and  $\sigma_i$  estimates item difficulty for item  $i$  on a common logit scale.  $a_i$  defines a discrimination parameter that measures how accurate item  $i$

discriminates between low-achieving and high-achieving students. Since most of the items in the test are single-choice items, the IRT model estimates a guessing parameter  $c_i$  for each item which assumes a positive probability of solving an item correctly for low-ability respondents. Additionally, we probe for differential item functioning using the well-established Educational Testing Service (ETS) scheme that categorizes DIF effects according to their magnitude and significance (e.g., Zieky 1993).

### **3 Descriptive statistics**

Table 1 reports sample characteristics for the German sample (with and without exposure to mandatory economic education) as well as for respondents from Hong Kong.

< Table 1 about here >

While we do not observe differences in gender proportions between the different samples, age as well as (self-assessed) reading and math abilities are, on average, significantly lower among Hong Kong respondents. We proxy socio-economic status by asking respondents how many books (without schoolbooks and magazines) are available within the parents' household on a scale from 1 (no books at all) to 6 (several bookshelves). The percentage of students reported to have 25 or less than 25 books at home is significantly higher among students from Hong Kong which may be attributed to country-specific characteristics (e.g., smaller average apartment size). To proxy students' effort, we follow the well-established time-response-effort approach described in Wise and Kong (2005) that takes average item response times into account. We define a (normative) time threshold of ten percent of the mean item response time that separates rapid guessing from solution behavior (Wise and Ma 2012). The effort score employed in the subsequent analysis is the share of solution behavior across all items. Effort scores are sufficiently large in all three samples (>90%) but are significantly lower in the Hong Kong sample relative to the two sampled cohorts in Germany. Turning to the resulting scores

on the competence test (TEC), we observe the expected differences between respondents in Hong Kong and the German cohorts, as age has been shown to be a meaningful predictor of test performance in student samples (cf. Kaiser et al. 2020). To summarize, while the samples are selected to be broadly comparable (both target students of similar age and class-level as in other large-scale educational assessments such as PISA), some important differences in student-level observables exist. Thus, we do not discuss the differences in test *performance* from a comparative perspective but mainly use the Hong Kong sample to probe the psychometric properties of the translated and adapted test relative to benchmark item statistics based on the original version employed in Germany.

## **4 Results**

### **4.1 Item characteristics (CTT)**

Table 2 displays item characteristics for the whole item set based on methods from Classical Test Theory (CTT).  $r_{it}$  denotes the (corrected) item-total correlation, i.e., the point-biserial correlation between solving an item correctly and the total score on all remaining items. Positive correlations indicate that high-achieving students are more likely to solve the item, while low-achieving students are less likely to solve it. Regarding the German sample, support for the validity of the TEC comes from the percentages of correctly solved items shown in Table 2.

< Table 2 about here >

As the Test of Economic Competence (TEC) was developed to assess competence levels among German-speaking respondents (cf. Kaiser et al. 2020 for details), test scores should result in higher scores for students who have had (mandatory) instruction relative to students without instruction. Our data reveal that the percentage of correctly solved items is higher for



students with instruction on 28 of 30 items indicating that the underlying concept was captured by most items.

Turning to the results from Hong Kong, our data reveal that most items show positive correlations among (English-speaking) respondents from Hong Kong, i.e., they appear to be good discriminators. Six items show values close to 0 which is why they will be excluded from analysis based on estimated person abilities (i.e., regression analyses in section 4.4). One reason for the poor discrimination of these items in the Hong Kong sample (relative to the German sample) may be strong European or German references in the vignettes (see discussion in section 5).

#### **4.2 Results based on the 3-PL IRT model**

Table 3 shows estimated parameters and standard errors for the IRT model employed. In essence, the remaining 24 test items show sufficient or better discrimination and evenly distributed difficulties among the English-speaking respondents from Hong Kong.

< Table 3 about here >

#### **4.3 Differential Item functioning**

One potential problem that comes with the use of IRT models is that individual observables may interact with the measurement model potentially violating key model assumptions. We therefore probe for differential item functioning (DIF) across three split criteria: gender, mother tongue and books at home. In essence, we scale the IRT model along the two groups within the split criterion separately (e.g., male and female) and then probe for statistical differences, with results shown in Table 4. These differences are then categorized into the well-established ETS-Scheme (e.g., Zieky 1993) based on effect size, i.e., the magnitude of the Mantel-Haenszel delta difference ( $\Delta - DIF$ ), and its significance following a  $\chi^2$ -distribution ( $MH\chi^2$ ). Within the ETS-scheme, “A” denotes negligible or non-significant

DIF, “B” denotes slight to moderate DIF and “C” represents moderate to severe DIF (for more details, see Kaiser et al. 2020).

< Table 4 about here >

Our analysis detects no moderate to severe DIF (category C) among the remaining 24 items for the Hong Kong sample providing further evidence on the construct validity and the overall test fairness for English-speaking respondents.

#### **4.4 Regression estimates**

Figure 1 reports results of multiple regressions with German and Hong Kong respondents. The dependent variable (economic competence) is estimated by means of the three-parameter IRT model specified in section 2 and is z-standardized to have a mean of 0 and a standard deviation of 1. Non-categorical variables are mean-centered.

< Figure 1 about here >

The estimates for the German sample show the expected correlations documented in previous competence assessments (Kaiser et al. 2020, Oberrauch and Kaiser 2020). Among Hong Kong students, we observe a gender gap in favor of male participants with a slightly lower magnitude of 0.18 standard deviation (SD) units compared to the German gender gap (0.3 SD units) but this difference between the two samples is not statistically significant. While we find a difference in competence scores by 0.47 SD units among German children with low socioeconomic status (i.e., 25 or less than 25 books at home) relative to German children with higher socioeconomic status, no significant difference is found among children from Hong Kong. This indicates that the number of books is not a valid proxy to assess the socio-economic background in Hong Kong. Regarding (self-reported) math, reading and English skills, we observe a meaningful correlation between English proficiency and test scores (0.17 SD units)

among Hong Kong students while the other two predictors show with small point estimates and large standard errors . However, using a subsample of Hong Kong students with good or very good English skills, we observe the expected correlations for both math and reading skills (for more details, see [Table A1](#) in the appendix). Finally, students' effort is positively correlated with economic competence in both German and Hong Kong student samples. A one-percentage point increase in the effort score is associated with an increase of 0.03 SD units in both samples. In summary, correlates obtained from the Hong Kong sample qualitatively correspond with results from previous large-scale assessments. The results provide further evidence on the criterion validity of the test.

## **5 Discussion**

The main goal was to pilot the applicability of (a translated and adapted version) of the Test of Economic Competence (TEC) (Kaiser et al. 2020) with students in Hong Kong. To this end we focused on a psychometric analysis of the adapted scale and a discussion of student-level correlates. While this analysis showed no differential item functioning, six out of 30 items did not show satisfactory discrimination in the Hong Kong sample and were removed from further analyses. One potential reason for low discriminatory power of these items may be connected to the process of item development which relied on the structure of a competence model (Retzmann et al. 2010) and made use of content analyses of school curricula and textbooks to identify relevant contents. Five of these six problematic items represented problems of competence area C (system and order). In this area the model specifies the following competencies: i) understanding of and reflection on the purpose of institutions in a market economy, ii) understanding of guiding principles of the economic order, and iii) deliberative economic evaluation on government intervention and regulatory policies (Retzmann et al. 2010). We now discuss the contents of the inadequate items in the following:

Item 18 refers to consumer advice and consultation centers, and item 22 to a mandatory provident fund scheme. Both institutions have no equivalent in Hong Kong, rendering the use of these items in an international setting problematic. Item 23 refers to the problem of collusive pricing by referencing an excerpt of a German newspaper article referring to German retailers. We hypothesize that the situational context of these vignettes may be responsible for their low discriminatory power in Hong Kong.

Similarly, the original version of item 21 references value added taxes (and more specifically a “to decrease VAT” as a correct answer) while Hong Kong does not impose VAT. Thus, we had changed the previous distractor “none of the above is correct” to be the correct solution in Hong Kong, but simply referencing an unknown concept (VAT) in this student sample may have been enough to affect the psychometric properties of the item.

The remaining two items (25 and 29) include terms and conditions of two fictitious banks. One may speculate whether the (fictitious) names of the banks or the wording of the terms and conditions may have appeared unusual in the Hong Kong setting. Using the reduced item set, we studied the correlation of student-level observables to the test score and found results qualitatively similar to previous large-scale assessments in Germany. Yet, certain student-level covariates did not show the expected correlations: While self-reported math and reading abilities were insignificant predictors of the economic competence score in the full Hong Kong sample, these variables were positively correlated with the test score in student samples of high English proficiency. Additionally, we find that English proficiency in general is a strong predictor of test performance (see figure 1). Thus, one may speculate whether the specific vocabulary in the vignettes may have caused additional problems, as the test persons were non-native speakers. Similarly, the variables (books at home) appear not to be a good proxy of socio-economic status in Hong Kong. The percentage of students reported to have 25 or less than 25 books at home is significantly higher among students from Hong Kong which may be attributed to country-specific characteristics (e.g., smaller average apartment size). Thus, these variables

does not capture the same information in this sample and may have to be replaced with something more relatable in this setting (e.g., number of cultural items at home).

Despite the limitations, the adapted and reduced item set appears to still work well in measuring the underlying latent construct. The remaining 24 items cover all three competence areas (see table 2) and the different item response types (i.e, constructed and selected response). We conclude that this English version may be a valid test of the cognitive facet of economic competence. Future research may administer a revised and reduced set of items to native speakers to study the applicability of the scale in broader contexts.

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**Table 1: Sample characteristics**

	German sample			Hong Kong sample (without instruction)	
	Without instruction (C)	With instruction (T)		Mean	Diff. from
	Mean (SD)	Mean (SD)	Diff. from (C) [SE]	(SD)	(C) [SE]
Male	0.447 (0.498)	0.437 (0.496)	-0.002 [0.045]	0.485 (0.5)	0.047 [0.077]
Age [years]	15.479 (0.766)	15.718 (0.634)	0.284 [0.068]	14.583 (0.634)	-0.892 [0.053]
≤ 25 books at home	0.119 (0.325)	0.096 (0.295)	-0.021 [0.02]	0.399 (0.49)	0.281 [0.042]
Reading abilities	4.063 (0.75)	4.118 (0.695)	0.042 [0.066]	3.282 (0.74)	-0.786 [0.07]
Math abilities	3.561 (0.962)	3.664 (0.92)	0.121 [0.096]	3.088 (1.008)	-0.466 [0.105]
English proficiency				3.162 (0.893)	
Effort	97.087 (9.395)	98.741 (6.731)	1.592 [0.747]	93.279 (12.439)	-3.764 [1.194]
Competence score [Sum score]	17.438 (5.855)	19.022 (5.954)	1.583 [0.743]	12.423 (4.842)	-5.016 [0.659]
Competence score [IRT score]	0.129 (0.926)	0.399 (0.946)	0.270 [0.090]	-0.626 (0.833)	-0.755 [0.114]

Note: 'Instruction' stands for the fact whether there is a single school domain of economic education or not. Mean differences between the cohorts are estimated by means of OLS regressions with clustered standard errors. To control for students' performance, we asked to assess their reading and math abilities on a scale from 1 (low) to 5 (high). English proficiency among Hong Kong students was assessed accordingly. Effort displays percentages of exhibited time-response effort. Competence score (sum score) represents the number of correctly solved items for each group. Competence score (IRT score) shows the (z-standardized) IRT scores.



**Table 2: Percentages for correct responses and item discrimination**

Itemnr.	Hong Kong sample (without instruction)		German sample (without instruction)		German sample (with. instruction)		Item type	Competence area
	Frequency	$r_{it}$	Frequency	$r_{it}$	Frequency	$r_{it}$		
1	0,699	0,372	0,813	0,297	0,895	0,207	SR	C
2	0,583	0,268	0,793	0,356	0,922	0,335	SR	A
3	0,646	0,351	0,863	0,144	0,898	0,124	SR	A
4	0,297	0,287	0,688	0,263	0,775	0,111	CR	B
5	0,754	0,275	0,858	0,216	0,898	0,181	SR	A
6	0,616	0,364	0,779	0,21	0,895	0,127	SR	B
7	0,411	0,383	0,632	0,457	0,717	0,438	SR	C
8	0,579	0,199	0,816	0,359	0,869	0,229	SR	A
9	0,702	0,283	0,742	0,255	0,845	0,198	SR	C
10	0,723	0,211	0,873	0,25	0,892	0,202	SR	C
11	0,28	0,109	0,69	0,247	0,635	0,257	SR	B
12	0,634	0,345	0,841	0,309	0,886	0,23	SR	A
13	0,576	0,367	0,797	0,231	0,857	0,287	SR	C
14	0,566	0,389	0,771	0,337	0,797	0,302	SR	A
15	0,393	0,164	0,577	0,255	0,612	0,331	SR	B
16	0,533	0,441	0,66	0,358	0,699	0,296	SR	C
17	0,21	0,177	0,472	0,48	0,579	0,394	SR	C
18	0,176	-0,027	0,428	0,381	0,511	0,315	SR	C
19	0,619	0,318	0,554	0,314	0,628	0,337	SR	C
20	0,525	0,34	0,513	0,378	0,626	0,275	SR	B
21	0,185	0,008	0,396	0,237	0,625	0,245	SR	C
22	0,091	-0,084	0,568	0,301	0,669	0,235	SR	C
23	0,176	0,066	0,334	0,339	0,412	0,36	SR	C
24	0,363	0,331	0,376	0,358	0,47	0,308	SR	B
25	0,152	-0,029	0,452	0,324	0,507	0,401	SR	C
26	0,491	0,305	0,534	0,35	0,561	0,434	CR	B
27	0,338	0,2	0,367	0,234	0,38	0,246	SR	C
28	0,309	0,172	0,251	0,319	0,244	0,399	SR	B
29	0,228	-0,031	0,23	0,163	0,273	0,152	SR	A
30	0,208	0,303	0,407	0,244	0,459	0,261	CR	C

Note: This table provides item characteristics from Classical Test Theory for samples from Hong Kong (N=478), Germany without economic education (N=524) and Germany with economic education (N=580). Frequency is the percentage of correctly solved items and  $r$  denotes corrected item-total correlations, i.e. the point-biserial correlation between correct responses to an item and the total score (sum score) the student achieved on the other items. Item type indicates whether the item was based on selected response (SR) or constructed response (CR). The last column displays competence areas based on the competence model our test is set in. "A" indicates the individual perspective (decision-making and rationality), "B" indicates the group perspective (relationships and interaction) and "C" denotes the societal perspective (system and order).

**Table 3: Three-parameter IRT estimates and standard errors for TEC items**

Itemno.	German sample			Hong Kong sample		
	b [SE]	a [SE]	c [SE]	b [SE]	a [SE]	c [SE]
1	-1.253 [0.09]	1.246 [0.094]	0.347 [0.045]	-0.828 [0.091]	1.267 [0.121]	0.000 [0.056]
2	-1.606 [0.068]	1.485 [0.083]	0.000 [0.060]	-0.272 [0.142]	0.751 [0.116]	0.074 [0.046]
3	-4.059 [0.184]	0.511 [0.025]	0.000[0.080]	-0.260 [0.092]	1.423 [0.174]	0.165 [0.043]
4	-1.958 [0.133]	0.544 [0.036]	0.000 [0.050]	1.212 [0.122]	1.096 [0.129]	0.047 [0.024]
5	-0.228 [0.107]	1.682 [0.251]	0.706 [0.023]	-1.385 [0.125]	0.934 [0.085]	0.000 [0.072]
6	-2.917 [0.147]	0.578 [0.031]	0.000 [0.067]	-0.099 [0.094]	1.435 [0.186]	0.177 [0.041]
7	-0.482 [0.05]	1.711 [0.117]	0.064 [0.029]	0.610 [0.081]	1.733 [0.224]	0.105 [0.026]
8	-1.729 [0.078]	1.173 [0.064]	0.000 [0.062]	0.810 [0.168]	1.041 [0.217]	0.362 [0.033]
9	-1.818 [0.100]	0.791 [0.046]	0.000 [0.055]	-1.079 [0.120]	0.918 [0.092]	0.000 [0.064]
10	-2.190 [0.103]	1.021 [0.057]	0.103 [0.070]	-1.536 [0.159]	0.681 [0.068]	0.000 [0.070]
11	-1.210 [0.112]	0.615 [0.049]	0.000 [0.041]	1.975 [0.147]	4.080 [2.023]	0.257 [0.021]
12	-1.154 [0.086]	1.388 [0.108]	0.387 [0.043]	-0.634 [0.105]	1.008 [0.109]	0.000 [0.051]
13	-1.821 [0.089]	0.972 [0.053]	0.000 [0.061]	-0.301 [0.094]	1.118 [0.126]	0.000 [0.043]
14	-1.457 [0.078]	1.038 [0.060]	0.000 [0.051]	0.390 [0.075]	2.489 [0.385]	0.292 [0.032]
15	-0.200 [0.086]	0.869 [0.086]	0.101 [0.030]	1.261 [0.270]	0.357 [0.063]	0.000 [0.036]
16	-0.196 [0.07]	1.391 [0.129]	0.276 [0.029]	0.192 [0.069]	2.138 [0.267]	0.149 [0.031]
17	0.344 [0.053]	1.937 [0.180]	0.179 [0.021]	2.905 [0.243]	0.478 [0.041]	0.000 [0.022]
18	-	-	-	-	-	-
19	-0.420 [0.075]	0.911 [0.074]	0.000 [0.031]	0.371 [0.101]	1.833 [0.319]	0.369 [0.033]
20	0.316 [0.069]	1.430 [0.146]	0.248 [0.023]	-0.096 [0.111]	0.919 [0.119]	0.000 [0.040]
21	-	-	-	-	-	-
22	-	-	-	-	-	-
23	-	-	-	-	-	-
24	0.825 [0.062]	1.774 [0.178]	0.185 [0.018]	0.927 [0.084]	2.089 [0.316]	0.158 [0.024]
25	-	-	-	-	-	-
26	0.347 [0.060]	1.679 [0.163]	0.183 [0.023]	0.655 [0.134]	1.092 [0.187]	0.185 [0.036]
27	1.316 [0.043]	6.519 [1.483]	0.304 [0.016]	1.487 [0.105]	3.324 [0.902]	0.270 [0.023]
28	1.319 [0.065]	1.780 [0.151]	0.084 [0.012]	1.746 [0.16]	1.674 [0.310]	0.220 [0.023]
29	-	-	-	-	-	-
30	0.481 [0.096]	0.713 [0.072]	0.000 [0.025]	1.611 [0.127]	1.079 [0.104]	0.000 [0.019]

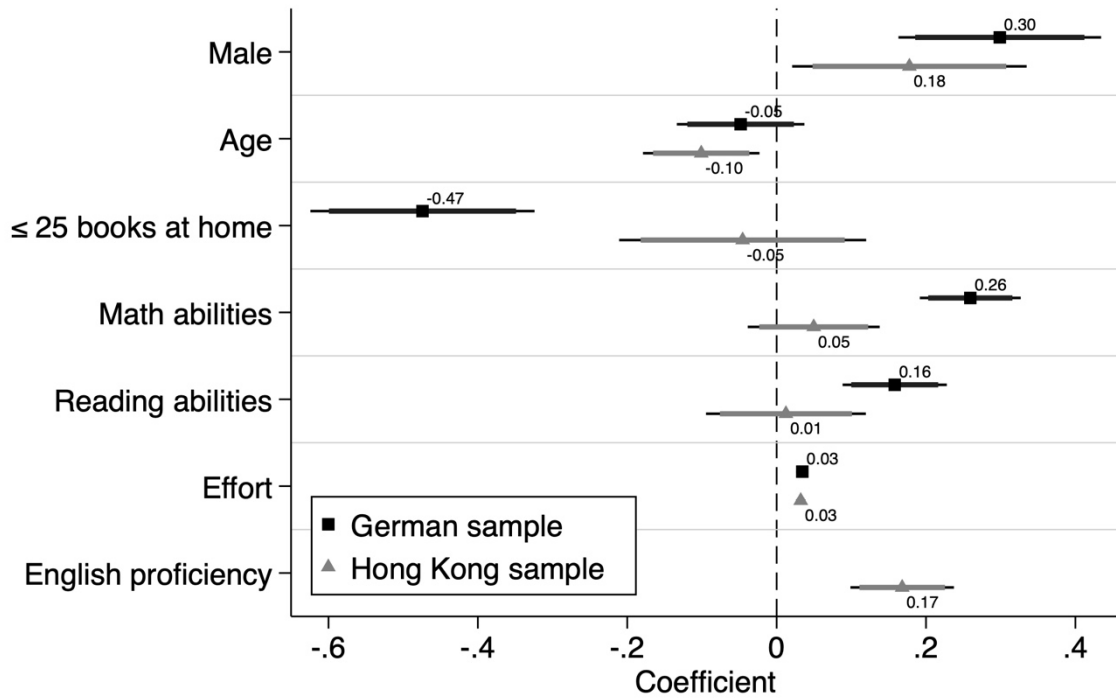
Note: This table reports parameter and standard errors (in brackets) for the three-parameter logistic IRT model, where  $b$  denotes the difficulty parameter,  $a$  the discrimination parameter and  $c$  the guessing parameter as described in equation (1). Estimates were obtained by means of R-package *sirt* (Robitzsch 2020)

**Table 4: Differential Item Functioning (DIF)**

Item no.	German sample						Hong Kong sample					
	Gender		Books at home		Mother tongue		Gender		Books at home		English proficiency	
	$\Delta$ - DIF [MH $\chi^2$ ]	ETS	$\Delta$ - DIF [MH $\chi^2$ ]	ETS	$\Delta$ - DIF [MH $\chi^2$ ]	ETS	$\Delta$ - DIF [MH $\chi^2$ ]	ETS	$\Delta$ - DIF [MH $\chi^2$ ]	ETS	$\Delta$ - DIF [MH $\chi^2$ ]	ETS
1	-1.41 [0.6]	B	0.166 [-0.071]	A	0.233 [-0.099]	A	-0.401 [0.17]	A	-0.098 [0.042]	A	-0.136 [0.058]	A
2	-1.677 [0.713]	C	-0.674 [0.287]	A	-1.159 [0.493]	B	0.039 [-0.017]	A	0.617 [-0.262]	A	-0.345 [0.147]	A
3	0.794 [-0.338]	A	0.819 [-0.348]	A	0.13 [-0.055]	A	0.148 [-0.063]	A	-0.048 [0.02]	A	-1.296 [0.551]	B
4	0.577 [-0.245]	A	0.433 [-0.184]	A	0.498 [-0.212]	A	-0.567 [0.241]	A	-0.003 [0.001]	A	0.2 [-0.085]	A
5	0.312 [-0.133]	A	0.546 [-0.232]	A	-0.301 [0.128]	A	0.463 [-0.197]	A	0.21 [-0.089]	A	-0.042 [0.018]	A
6	0.621 [-0.264]	A	0.542 [-0.231]	A	0.449 [-0.191]	A	-0.252 [0.107]	A	-0.677 [0.288]	A	-1.372 [0.584]	B
7	0.225 [-0.096]	A	-0.2 [0.085]	A	0.156 [-0.067]	A	1.203 [-0.512]	B	0.019 [-0.008]	A	0.04 [-0.017]	A
8	-0.57 [0.243]	A	-0.07 [0.03]	A	-0.343 [0.146]	A	0.237 [-0.101]	A	0.092 [-0.039]	A	0.828 [-0.352]	A
9	0.947 [-0.403]	A	0.328 [-0.14]	A	0.376 [-0.16]	A	-0.095 [0.041]	A	0.326 [-0.139]	A	1.211 [-0.515]	B
10	1.443 [-0.614]	B	-0.174 [0.074]	A	0.244 [-0.104]	A	-0.461 [0.196]	A	-0.981 [0.417]	A	0.554 [-0.236]	A
11	-0.314 [0.134]	A	-0.132 [0.056]	A	0.569 [-0.242]	A	-0.275 [0.117]	A	0.101 [-0.043]	A	0.848 [-0.361]	A
12	0.642 [-0.273]	A	-0.722 [0.307]	A	0.027 [-0.011]	A	0.497 [-0.212]	A	0.2 [- 0.085]	A	-0.785 [0.334]	A
13	0.809 [-0.344]	A	0.089 [-0.038]	A	0.121 [-0.051]	A	-0.425 [0.181]	A	0.722 [-0.307]	A	0.434 [-0.184]	A
14	0.627 [-0.267]	A	0.265 [-0.113]	A	-0.129 [0.055]	A	-0.256 [0.109]	A	-0.88 [0.374]	A	-0.115 [0.049]	A
15	0.192 [-0.082]	A	-0.18 [0.076]	A	0.413 [-0.176]	A	0.24 [-0.102]	A	-0.148 [0.063]	A	-0.425 [0.181]	A
16	-1.008 [0.429]	B	-0.467 [0.199]	A	-1.082 [0.461]	B	-0.068 [0.029]	A	-0.42 [0.179]	A	0.25 [-0.106]	A
17	-0.38 [0.162]	A	-0.557 [0.237]	A	-0.483 [0.206]	A	0.826 [-0.352]	A	1.142 [-0.486]	B	0.828 [-0.352]	A
18	-	-	-	-	-	-	-	-	-	-	-	-
19	-0.084 [0.036]	A	0.12 [-0.051]	A	0.709 [-0.302]	A	0.314 [-0.134]	A	0.717 [-0.305]	A	0.253 [-0.108]	A
20	-0.317 [0.135]	A	-0.017 [0.007]	A	0.279 [-0.119]	A	-0.941 [0.4]	A	-0.078 [0.033]	A	0.614 [-0.261]	A
21	-	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-
24	0.509 [-0.217]	A	-0.019 [0.008]	A	-0.166 [0.071]	A	0.445 [-0.189]	A	-0.542 [0.231]	A	-0.581 [0.247]	A
25	-	-	-	-	-	-	-	-	-	-	-	-
26	-0.768 [0.327]	A	0.18 [-0.077]	A	-0.654 [0.278]	A	-0.776 [0.33]	A	-0.987 [0.42]	A	-0.459 [0.196]	A
27	-1.655 [0.704]	C	0.21 [-0.089]	A	1.042 [-0.443]	B	-1.057 [0.45]	B	0.106 [-0.045]	A	-0.354 [0.151]	A
28	0.049 [-0.021]	A	-0.396 [0.168]	A	-0.558 [0.238]	A	0.653 [-0.278]	A	0.495 [-0.21]	A	0.977 [-0.416]	A
29	-	-	-	-	-	-	-	-	-	-	-	-
30	0.437 [-0.186]	A	-0.088 [0.037]	A	-0.37 [0.158]	A	0.51 [-0.217]	A	0.116 [-0.05]	A	-1.123 [0.478]	B

Note: This table reports results from the analysis of differential item functioning along the split criteria gender, books at home and mother tongue (English proficiency for Hong Kong students).  $\Delta$  - DIF represents the Mantel-Haenszel delta difference and MH $\chi^2$  its significance based on a  $\chi^2$ -distribution. ETS displays the classification according to the ETS scheme. An item is classified as severe DIF (category C) if  $|\Delta - DIF| \geq 1.5$ , as moderate DIF (category B) if  $1 \leq |\Delta - DIF| \leq 1.5$  and as negligible or insignificant DIF (category A) if  $|\Delta - DIF| < 1$ .

**Figure 1: Regression estimates (OLS)**



*Notes:* This figure displays OLS regression coefficients with 90% and 95% CIs. The dependent variable “economic competence” is obtained by weighted least squares estimation (WLE) from a two-parameter IRT model as described in section 4 and z-standardized to have a mean of 0 and a standard deviation of 1. Non-categorical variables are mean-centered. Number of observations are  $n = 1032$  (Germany) and  $n=465$  (Hong Kong). Adjusted  $R^2$  are 0.23 and 0.27, respectively. For detailed regression results, see Table A3.

## **Appendix**

**(online appendix not intended for print publication)**

**to accompany**

**“Using the ‘Test of Economic Competence’ with secondary school students  
in Hong Kong: Results and psychometric properties”**

**Table A1: Regression estimates (OLS)**

	(1)	(2)	(3)
	German sample	Hong Kong sample	Hong Kong sample (high English proficiency students)
Male	0.299*** [0.068]	0.178** [0.075]	0.170 [0.108]
Age	-0.048 [0.043]	-0.101** [0.037]	-0.167* [0.094]
25 books at home	-0.474*** [0.075]	-0.045 [0.079]	-0.058 [0.106]
Math abilities	0.259*** [0.034]	0.050 [0.042]	0.094* [0.051]
Reading abilities	0.158*** [0.035]	0.012 [0.051]	0.197* [0.098]
English proficiency		0.168*** [0.033]	
Effort	0.034*** [0.004]	0.032*** [0.003]	0.037*** [0.004]
Constant	0.810 [0.657]	0.893 [0.540]	2.097 [1.334]
Observations	1,032	465	148
R-squared	0.232	0.275	0.334

*Note:* This table reports OLS regression estimates with standard errors in brackets, clustered at school-level. Dependent variable is the z-standardized IRT score obtained from the two-parameter IRT model specified in equation (1). Column 3 reports OLS estimates for Hong Kong students that report to be either proficient or very proficient English-speakers. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## TEC items - translated original version

1) In the 1960s, many shoes were still produced in Germany. Today, most shoes are imported from abroad. What is the reason for this?

- Labor costs are higher in Germany than abroad.
- Shoes are produced by machines nowadays.
- German shoe manufacturers were bought by foreign companies.
- The shoes produced in Germany were of lower quality.
- The kinds of shoe produced in Germany have gone out of fashion.

2) Which statement about investing in shares is correct?

- Investing in shares is more secure than a savings account.
- Investing in shares can lead to losses.
- Investing in shares leads to constant income from interest.
- Investing in shares leads to constant income from dividends.

3) One day, the bakery “Backblech” mistakenly bakes more pumpkin-seed bread rolls than usually can be sold. Which measure would you recommend to the bakery on this day?

- Give away the remaining pumpkin-seed bread rolls.
- Increase the price of pumpkin-seed bread rolls on this day.
- Reduce the price of all of the bakery’s products.
- Offer the pumpkin-seed bread rolls at a lower price

4) Fairtrade is a kind of supervised trade with manufacturers in developing countries. Why are some people willing to spend a larger amount of money for Fairtrade products than for the respective conventional products?

5) After three years, the management of the cinema “Cinex” has increased the price per ticket for the evening screening from €8.00 to €8.50. What is the most plausible reason for this price-increase?

- The management has decided to donate more money.
- A competing cinema has opened in the town.
- The cinema’s running costs have increased.
- The management want to offset losses incurred through theft at the snack counter.

6) There is a regular flea market at school before the summer holiday. Emma in Class 8A owns the newest version of a popular video game she received from her aunt in the U.S. and which will only be released in Germany next year. She is considering selling it at the flea market. Which statement is correct?

- She would receive a comparatively high amount for the game this year
- She would receive a comparatively low amount for the game
- She would receive as much this year as she would receive next year
- She would not be able to sell the game this year
- She would not be able sell the game next year

7) An entrepreneur has set up a company manufacturing medical technology. When will the company start to generate profit? As soon as...

- the medical technology is sold in stores.
- income from the sales of the medical technology covers employees' monthly wages
- the company has crowded out all competing manufacturers of medical technology
- income from the sales of the medical technology covers monthly wages and the cost of renting manufacturing space.
- income from the sales of the medical technology is higher than all accrued costs.

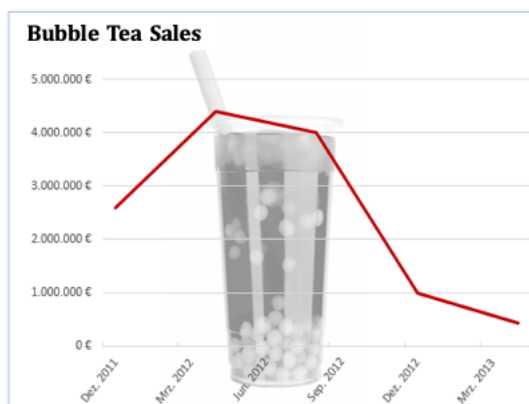
8) Michael had left school at age 16 and entered vocational training. How will Michael's income likely develop in comparison with the income of his former classmates, who continue their schooling and will later graduate from college?

- Michael's income will be higher than the income of his former classmates both now and in the future.
- Michael's income will be higher than the income of his former classmates now, but lower in the future.
- Michael's income will be lower than the income of his former classmates both now and in the future.
- Michael's income will be lower than the income of his former classmates now, but higher in the future.

9) For years, the number of jobs in manufacturing has been declining in Germany. Which of the following reasons leads to less and less jobs related to the manufacturing of goods?

- The majority of goods are sold online.
- Technology has replaced human labor.
- People no longer want to do physical work nowadays.
- Manufacturing machines have become too expensive.
- None of the above statements is correct.

10)



This figure shows how the sales of bubble tea in Germany have developed in the course of 16 months. What can you conclude from the figure about sales of bubble tea?



- Bubble tea was banned in Germany since August 2012.
- Bubble tea continues to be sold profitably in Japan.
- Bubble tea is dangerous to health.
- Bubble tea was sold relatively little since August 2012.

11) In 1923, inflation in Germany was extremely high. With respect to the inflations' effect on retailers, which of the following statements is correct? Please select only one of the following answers:

- The inflation had no effect on retailers.
- They could set aside money for leaner times.
- They could pay their employees a higher salary.
- They no longer accepted cash as a means of payment.

12) An employer, Angela Zapp, wants to give the employees of her company, "Zapp Wohnanlagen", a higher salary. What is a consequence she can expect?

- A decrease in manufacturing costs.
- A decrease in her profits.
- A decrease in product quality.
- A decrease in customer satisfaction.

13) The Marone family runs the ice-cream parlor Fantasia in the town center. This year, the family increase the price per scoop from €1.00 to €1.20. What effects does the increase in price have on the ice-cream parlor's revenue?

- The revenue will decrease because of the price increase.
- The revenue will increase because of the price increase.
- The revenue will remain the same despite the price increase.
- The revenue depends on how the customer base reacts.

14) Ms. Müller runs a dental surgery and makes €200 per hour. Today she is considering closing the surgery one hour earlier in order to mow the lawn at home. However, she could also hire a gardener for €50. Which statement is correct?

- She should mow the lawn herself in order to save the expense of the gardener.
- She should mow the lawn herself because she could do just as quickly.
- She should hire the gardener in order not to lose her income.
- It makes no difference because both cases involve one hour's work.

15)

Ben and Luca are traveling to Hungary. Luca exchanged euro for forint at the bank counter in Germany, and also paid with his credit card in Hungary. The official ex-change rate remained the same throughout the entire holiday. At home, Luca notices that the exchange rate for credit card payments was better for him than the exchange rate at the bank counter.

Why is this?

- The euro-forint exchange rate is always cheaper in Germany than in Hungary.
- The euro-forint exchange rate is always cheaper in Hungary than in Germany.
- There are more costs involved in exchanging bills than in converting money by machine.
- There are more costs involved in converting money by machine than in exchanging bills.

16) A sharp increase in the price of gasoline causes only a small decrease in the amount of gasoline sold in the short term. Why is this?

- Gasoline is a luxury good.
- The cost of gasoline makes up a large part of a household's expenditure.
- Gasoline cannot be easily replaced with something else.
- Taxes on gasoline are high.
- Vehicles do not need much gasoline nowadays.

17) Age distribution of the German population



(German stamp on the occasion of the 100 years anniversary of social insurance)

Pensions are funded through payments by employees, employers, and a state subsidy from tax revenue. The graphics on the stamp show the age distribution of people living in Germany in the years 1889, 1989 and 2000. What problem presents itself now and in the future for the state pension system?

- The pensions of more and more beneficiaries have to be covered by fewer and fewer employed contributors.
- Before 1889, there were more contributors than pensioners who received payments.
- The contributions paid by the many employed people in 2000 will significantly decrease in value due to inflation.
- The contributions paid in by the many employed people in 2000 exceed the payments to pensioners.
- The contributions paid in by the few people born in the post-war years are insufficient to pay their pensions now.

18) The state supports the work of consumer advice and consultation centers. These allow citizens to get ...

- information about products independently of the manufacturers.
- information about products independently of the state.
- information about what the state consumes.
- information about how the state is financed.
- None of the above statements is correct.

19) The following excerpt from the income tax scale shows the tax burden in absolute numbers and in percent for a given annual income.

Taxable annual income	Tax payment	Taxes (in %) relative to taxable income
€ 8,400	€ 0	0%
€ 10,000	€ 237	2.37%
€ 20,000	€ 2,611	13.06%
€ 40,000	€ 8,918	22.30%
€ 60,000	€ 16,938	28.23%
€ 70,000	€ 21,138	30.20%

The tax progression has a specific policy-objective. Which statement about this objective is correct?

- Nobody should earn too much.
- Everybody should be taxed equally.
- Income after tax should be equally high for everybody.
- Earners of higher incomes should contribute more to funding state expenditures.
- Everybody should contribute an equal amount to funding state expenditures.

20) Two friends, Emil and Kadir, go to the bank. Emil borrows €1000 from the bank, Kadir deposits €1,000 into his savings account. After one year, Emil wants to pay back the money, and Kadir wants to withdraw his money.

- Emil has to pay back €1,000. Kadir receives €1,000.
- Emil has to pay back €1,000. Kadir receives more than €1,000.
- Emil has to pay back more than €1,000. Kadir receives €1,000.
- Emil has to pay back more than €1,000. Kadir receives more than €1,000; the amount is the same for both of them.
- Emil has to pay back more than €1,000. Kadir receives more than €1,000; Emil's amount is higher than Kadir's.

21) The government decides that Germany's economy is to be strengthened by increased consumption. In order to stimulate consumption, the Federal Parliament could...

- decrease VAT.
- set lower prices.
- increase income taxes.
- set higher prices.
- increase wages.

22) After completing his apprenticeship, Jonas continues to work for the same company as a painter. His pay slip is as follows:

Jonas' payslip		July 2015
<b>Gross wage</b>		<b>€2015.00</b>
Income tax	€209.00	
Church tax	€16.72	
Solidarity tax	€11.49	
<b>Total after tax</b>		<b>€1777.79</b>
Health insurance	€165.24	
Nursing insurance	€28.72	
Pension scheme	€180.40	
Unemployment insurance	€30.23	
<b>Total social security</b>	<b>€404.59</b>	
<b>Net wage</b>		<b>€1365.20</b>
<b>Total gross wage 2015</b> (January-July)	<b>€15,005.00</b>	

Jonas pays into the statutory pension scheme every month. His employer also pays in the same amount for him. What are these contributions used for?

- They are paid out to current pensioners.
- They are saved for Jonas' pension.
- They are saved for all employees at Jonas' company.
- They are saved for all employees that will retire at the same time as Jonas.
- They enter general public expenditure

23) Why did the Cartel Office sanction these companies?

Price fixing

## Cartel Office sanctions Aldi, Rewe, Edeka and Haribo

The competition supervisor has imposed fines on several retail groups and manufacturers of branded products for price fixing on confectionery, coffee and beer.

June 18, 2015 11:45

44 Comments | 

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- The retail groups had not stuck to the prices set by the Cartel Office for confectionery, coffee and beer.
- Manufacturers are not allowed to be involved in retail groups' price fixing.
- Price fixing between companies is not allowed at all.

24) Nina's parents run several car dealerships for new and used cars. Compare Nina's mother with one of her salespeople: Which of the following characteristics or capabilities does she as a businesswoman certainly need more than the salesmen and -women that she employs?

- Knowledge of the cars' driving characteristics
- Decisiveness
- Friendliness
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25) Finya got a gift of €2,000 from her grandparents for her sixteenth birthday. She would like to deposit the money into a bank-account. She finds these offers online:



**BonusBank - the green bank**

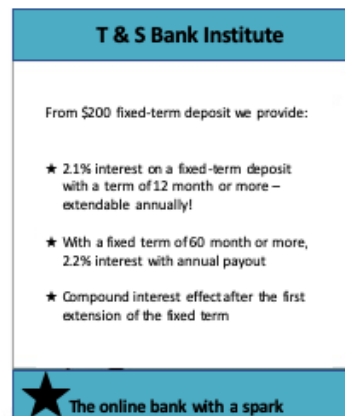
**From \$1500 fixed-term deposit: Get a bonus!**

Set up your account today and secure 2% annual interest – guaranteed for your chosen fixed saving term

Compound interest effect through annual credit of your interest at the end of the year

Starting from a deposit of \$1500, you can receive a fixed saver bonus at the end of the fixed term:

\$24 for 24 month,  
\$36 for 35 month and  
\$50 for 48 month



**T & S Bank Institute**

From \$200 fixed-term deposit we provide:

- ★ 2.1% interest on a fixed-term deposit with a term of 12 month or more – extendable annually!
- ★ With a fixed term of 60 month or more, 2.2% interest with annual payout
- ★ Compound interest effect after the first extension of the fixed term

**★ The online bank with a spark**

T & S Bank Institute and BonusBank mention the effect of compound interest. What does this mean?

- The interest rate is highest in the first year.
- The interest rate rises from year to year.
- Interest will be paid the following year on interest paid out.
- The amount of money invested has an effect on the interest rate.
- The interest rate increases with annual credit.
- None of the above statements is correct.

26) Banks pay savers lower interest than they demand from borrowers. Name one reason for this.

27) Mr. Schneider receives a wage increase. He sees on his bank statement that, starting in January, he received almost exactly 1% more in his wage from his employer compared with January the previous year. The inflation rate for the previous year was 2%. Which statement is correct? Please select only one of the following answers:

- Mr. Schneider can afford more with his January wage than he could 12 months ago.
- Mr. Schneider can afford just as much with his January wage as he could 12 months ago.
- Mr. Schneider can afford less with his January wage than he could 12 months ago.
- There is no connection

28) Nina's parents run several car dealerships for new and used cars. Her mother has listed various corporate goals for the car dealership and says: "The most important thing for me is to make as much profit as possible!" Which of the other goals will most likely conflict with this?

- Sell a lot of used cars.
- Decrease costs.
- Organize childcare for employees' children.
- Have good relationships with suppliers of replacement parts.
- Retain the car dealership's customers long-term.

29) Peter is 18 years old, still goes to school and, apart from his pocket money, has no income. He is interested in opening a checking account, and finds the following two offers online:

**The C-Bank checking account for everyone**

- Secure **€100 credit**<sup>1</sup>
- **Free account maintenance**
- **Free cash withdrawal in Germany** at all C-Bank cash machines with the free C-Bank card
- **Free cash withdrawal in Europe** (in euro) with a credit card
- If you need it: **Free credit card**
- **Free banking app**
- **Low overdraft cost:** Only 7.74% pa (subject to change, 7/15/2015)

**Open a checking account now >**

<sup>1</sup>You will receive €100 credit if three wages of at least €1200 are paid in within 6 months of opening the account.

Gemeinschaftsbank S.E., Berlin

**CheckingPlus account**

- > Checking account with €50 starting balance
- > Account maintenance free
- > Cash without charge: with a card from other 9000 MoneyGroup cash machines across Germany
- > Free ec/Maestro card
- > Large network of branches in Germany
- > With a credit card (credit rating required)

**Open online now**

If one compares both checking accounts with regard to the account maintenance charge, which statement is correct?

- C-Bank has the better offer.
- Gemeinschaftsbank has the better offer.
- Both banks' offers are equally good.
- It is not possible to make a statement.

30) The prices of electricity and asparagus increase significantly. Compare the short-term effect of the price increase on the quantity of the two products demanded.

31) In the event of illness with statutory health insurance, services cost the same for all contributors. However, despite receiving the same services, employees with a higher income have to pay higher contributions. Provide one reason for this.

### **TEC items - version adapted for Hong Kong**

1) In former times, many shoes were still produced in Hong Kong. Today, most shoes are imported from abroad or Mainland China. What is the reason for this?

- Shoes are produced by machines nowadays.
- Labor costs are higher in Hong Kong than abroad.
- Hong Kong's shoe manufacturers were bought by foreign companies.
- The shoes produced in Hong Kong were of lower quality.
- The kinds of shoes produced in Hong Kong have gone out of fashion.

2) Which statement about investing in shares is correct?

- Investing in shares is more secure than a savings account.
- Investing in shares can lead to losses.
- Investing in shares leads to constant income from interest.
- Investing in shares leads to constant income from dividends.

3) One day, the bakery "Bread Superior" mistakenly bakes more bread rolls than usually can be sold. Which measure would you recommend to the bakery on this day?

- Give away the remaining bread rolls.
- Increase the price of bread rolls on this day.
- Reduce the price of all of the bakery's products.
- Offer the bread rolls at a lower price

4) Fairtrade is a kind of supervised trade with manufacturers in developing countries. Why are some people willing to spend a larger amount of money for Fairtrade products than for the respective conventional products?

5) After three years, the management of the cinema “Cinex” has increased the price per ticket for the evening screening from HKD 100.00 to HKD 110.00. What is the most plausible reason for this price-increase?

- The management has decided to donate more money.
- A competing cinema has opened in the town.
- The cinema’s running costs have increased.
- The management want to offset losses incurred through theft at the snack counter.

6) There is a regular flea market at school before the summer holiday. Emma in Class 9A owns the newest version of a popular video game she received from her aunt in the U.S. and which will only be released in Hong Kong next year. She is considering selling it at the flea market. Which statement is correct?

- She would receive a comparatively high amount for the game this year
- She would receive a comparatively low amount for the game
- She would receive as much this year as she would receive next year
- She would not be able to sell the game this year
- She would not be able sell the game next year

7) Sina has set up a company manufacturing medical technology. When will the company start to generate profit? As soon as...

- the medical technology is sold in stores.
- income from the sales of the medical technology covers employees’ monthly wages
- the company has crowded out all competing manufacturers of medical technology
- income from the sales of the medical technology covers monthly wages and the cost of renting manufacturing space.
- income from the sales of the medical technology is higher than all accrued costs.

8) Lan had left school at age 16 and entered vocational training. How will Lan’s income likely develop in comparison with the income of his former classmates, who continue their schooling and will later graduate from college?

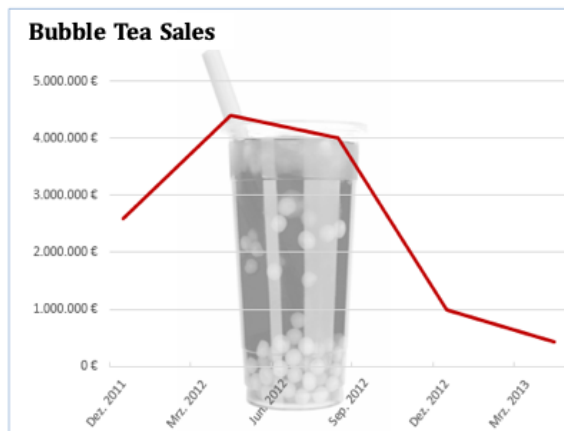
- Lan’s income will be higher than the income of his former classmates both now and in the future.
- Lan’s income will be higher than the income of his former classmates now, but lower in the future.
- Lan’s income will be lower than the income of his former classmates both now and in the future.
- Lan’s income will be lower than the income of his former classmates now, but higher in the future.

9) For years, the number of jobs in manufacturing has been declining in Germany. Which of the following reasons leads to less and less jobs related to the manufacturing of goods?

- The majority of goods are sold online.
- Technology has replaced human labor.
- Manufacturing machines have become too expensive.
- None of the above statements is correct.



10) This figure shows how the sales of bubble tea in Germany have developed in the course of 16 months. What can you conclude from the figure about sales of bubble tea?



- Bubble tea was banned in Germany since August 2012.
- Bubble tea continues to be sold profitably in Germany.
- Bubble tea is dangerous to health.
- Bubble tea was sold relatively little since August 2012.

11) In 1923, inflation in Germany was extremely high. With respect to the inflations' effect on retailers, which of the following statements is correct?

Please select only one of the following answers:

- The inflation had no effect on retailers.
- They could set aside money for leaner times.
- They could pay their employees a higher salary.
- They no longer accepted cash as a means of payment.

12) An employer, Angela Zapp, wants to give the employees of her company, "Zapp Estates", a higher salary. What is a consequence she can expect?

- A decrease in manufacturing costs.
- A decrease in her profits.
- A decrease in product quality.
- A decrease in customer satisfaction.

13) The Marone family runs the ice-cream parlor Fantasia in the town center. This year, the family increase the price per scoop from HKD 35.00 to HKD 40.00. What effects does the increase in price have on the ice-cream parlor's revenue?

- The revenue will decrease because of the price increase.
- The revenue will increase because of the price increase.
- The revenue will remain the same despite the price increase.
- The revenue depends on how the customer base reacts.

14) Ms. Hong runs a dental surgery and makes HKD 2,000 per hour. Today she is considering closing the surgery one hour earlier in order to tidy up her home. However, she could also hire a house cleaner for HKD 500. Which statement is correct?

- She should tidy up her home herself in order to save the expense of the cleaner.
- She should tidy up her home herself because she could do just as quickly.
- She should hire the cleaner in order not to lose her income.
- It makes no difference because both cases involve one hour's work.

15) Lian and Han are traveling to Germany. Lian exchanged Hong Kong dollar (HKD) for euro at the bank counter in Hong Kong, and also paid with his credit card in Germany. The official exchange rate remained the same throughout the entire holiday. At home, Lian notices that the exchange rate for credit card payments was better for him than the exchange rate at the bank counter.

Why is this?

- The HKD-euro exchange rate is always cheaper in Hong Kong than in Germany.
- The HKD-euro exchange rate is always cheaper in Germany than in Hong Kong.
- There are more costs involved in exchanging bills than in converting money by machine.
- There are more costs involved in converting money by machine than in exchanging bills.

16) A sharp increase in the price of gasoline causes only a small decrease in the amount of gasoline sold in the short term. Why is this?

- Gasoline is a luxury good.
- The cost of gasoline makes up a large part of a household's expenditure.
- Gasoline cannot be easily replaced with something else.
- Taxes on gasoline are high.
- Vehicles do not need much gasoline nowadays.

17) Age distribution of the German population



(German stamp on the occasion of the 100 years anniversary of social insurance)

Pensions are funded through payments by employees, employers, and a state subsidy from tax revenue. The graphics on the stamp show the age distribution of people living in Germany in the years 1889,

1989 and 2000. What problem presents itself now and in the future for the mandatory provident fund system?

- The pensions of more and more beneficiaries have to be covered by fewer and fewer employed contributors.
- Before 1889, there were more contributors than pensioners who received payments.
- The contributions paid by the many employed people in 2000 will significantly decrease in value due to inflation.
- The contributions paid in by the many employed people in 2000 exceed the payments to pensioners.
- The contributions paid in by the few people born in the post-war years are insufficient to pay their pensions now.

18) The state supports the work of consumer advice and consultation centers. These allow citizens to get ...

- information about products independently of the manufacturers.
- information about products independently of the state.
- information about what the state consumes.
- information about how the state is financed.
- None of the above statements is correct

19) The following excerpt from the income tax scale shows the tax burden in absolute numbers and in percent for a given annual income.

	Not chargeable income	Rate	Tax
On the first	HK\$ 50,000	2 %	HK\$ 1,000
On the next	HK\$ 50,000	8 %	HK\$ 3,000
	HK\$ 100,000		HK\$ 4,000
On the next	HK\$ 50,000	10 %	HK\$ 5,000
	HK\$ 150,000		HK\$ 9,000
On the next	HK\$ 50,000	14 %	HK\$ 7,000
	HK\$ 200,000		HK\$ 16,000
Remainder		17 %	

The tax progression has a specific policy-objective. Which statement about this objective is correct?

- Nobody should earn too much.
- Everybody should be taxed equally.
- Income after tax should be equally high for everybody.
- Earners of higher incomes should contribute more to funding state expenditures.
- Everybody should contribute an equal amount to funding state expenditures.

20) Two friends, Emil and Kadir, go to the bank. Emil borrows HKD 10,000 from the bank, Kadir deposits HKD 10,000 into his savings account. After one year, Emil wants to pay back the money, and Kadir wants to withdraw his money.

- Emil has to pay back HK\$ 10,000. Kadir receives HKD 10,000.
- Emil has to pay back HK\$ 10,000. Kadir receives more than HKD 10,000.
- Emil has to pay back more than HK\$ 10,000. Kadir receives HKD 10,000.
- Emil has to pay back more than HK\$ 10,000. Kadir receives more than HKD 10,000; the amount is the same for both of them.
- Emil has to pay back more than HK\$ 10,000. Kadir receives more than HK\$ 10,000; Emil's amount is higher than Kadir's.

21) The government decides that Hong Kong's economy is to be strengthened by increased consumption. In order to stimulate consumption, the Parliament could...

- set lower prices.
- increase income taxes.
- set higher prices.
- increase wages.
- None of the above statements is correct.

22) After completing his apprenticeship, Jonas continues to work for the same company as a painter.

**Monthly Pay slip**

Employee ID: 13579

Pay Month: March 2021

Position:

Painter

**Earnings:**

Salary HKD 16,000

**Deductions:**

Mandatory Provident Fund (MPF) Contribution by employee HKD 800

Jonas pays into the mandatory provident fund scheme every month. What are these contributions used for?

- They are paid out to current pensioners.
- They are saved for Jonas' pension.
- They are saved for all employees at Jonas' company.
- They are saved for all employees that will retire at the same time as Jonas.
- They enter general public expenditure

23) The Competition Commission has imposed fines on several retail groups and manufacturers of branded products for price fixing on confectionery, coffee and beer. Why did the Competition Commission sanction these companies?

**Price fixing**  
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