

## Inequality and Reform in Models of Formation of Competence – an analysis of PIAAC Data

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### agenda

- research questions
- basic approach
- methodology
- results

## ...based on a study published in German in a broader Austrian research project...

- Lassnigg, Lorenz; Vogtenhuber, Stefan (2014), Das österreichische Modell der Formation von Kompetenzen im Vergleich, in: Statistik Austria (Hrsg.), Schlüsselkompetenzen von Erwachsenen – Vertiefende Analysen der PIAAC-Erhebung 2011/12, Statistik Austria, Wien, S. 49-79.

- Internet (in German):

chapter: [http://www.equi.at/dateien/lassnigg-vogtenhuber\\_2014\\_ko.pdf](http://www.equi.at/dateien/lassnigg-vogtenhuber_2014_ko.pdf)

presentation at conference:  
<http://www.equi.at/dateien/lassnigg-piaac-wien-pres.pdf>

detailed research report: <http://www.equi.at/dateien/IHS-PIAAC.pdf>

## research questions

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- ...not so much about curricula...
- ...main issue is combination of ‚tracking‘ and vocational education (VET) at secondary level, and relationship to tertiary education
  - **tracking**: structuring of distribution of curricula, and allocation to curricula
- ...and how this combination relates to achievement and in\_equality
- models for skills formation, understood as types of combinations...
 

|                        |                        |                           |
|------------------------|------------------------|---------------------------|
| <b>lower secondary</b> | <b>upper secondary</b> | <b>tertiary</b>           |
| comprehensive          | late or no VET         | selective, differentiated |
| tracked                | strong early VET       | secondary entitlements    |
- ...mostly the three dimensions are analysed separately, and VET is not considered...

## research questions

- ...competing expectations about tracking and results
  - comprehensive structure and tertiarisation would structurally reduce inequalitiy, VET would carry risk to increase inequality
    - implicitly it is expected, and also claimed, that tertiary participation would overall increase competence levels*
- vs.
- [advocates of VET]: tertiarisation would strengthen ‚meritocratic competition‘, with a bias towards ‚academic learning‘ and a risk to put parts of of young people (the ‚practically interested‘) at disadvatage

## research questions

### **STRUCTURES: CROSECTIONAL COMPARISON, all countries**

- How are **structural traits of education systems** (differentiation of VET/general education; achievement tracking) related to results to **PIAAC competence scores** (level and distribution)?
  - How do **structures of VET** (early VET or late; proportion of VET in initial education) influence the competence level and distribution?

### **REFORMS: COMPARISON AGE-GROUPS REPRESENTING TIME, selected countries, according welfare regimes (Nordic, Liberal, Continental)**

- Can we trace **signs of past reforms** in different countries in the competences of the adult population through **age specific patterns** of achievement?
  - How does **educational policy time** translate into results among population?
- Selection of countries: reference AUSTRIA

*Nordic: DK, FIN, SWE*

*Liberal: CAN, UK, US*

*Continental: AT, DE, NL*

## basic approach

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- PIAAC observes competences of 16-65-y **population**...

### CROSSECTION

- ...we can ask, whether certain **current educational structures** are related to the **current competence levels/distributions**...
- ...in this cross-sectional perspective the politics/policies exert their **cumulative influence** of the previous decades...
  - ...here constellations **without much reform** can be compared with constellations that have mainly performed the **1st reform wave** of the 1960s or the **2nd wave** from the 1980s, or **both**

## basic approach (cont.)

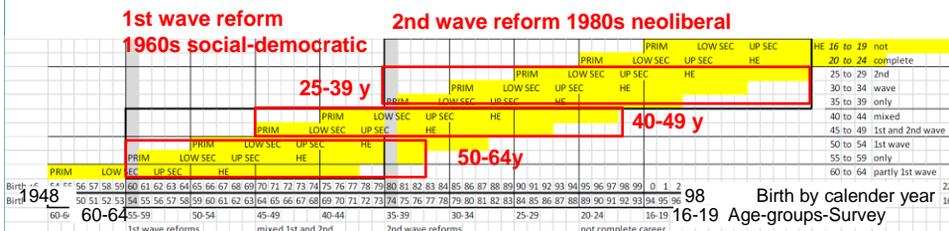
### REFORM-DYNAMICS

- ...having in mind that these structures **have evolved** in a certain (path-dependent) way through the competence formation processes of the observed population...
- ...as a result of overall process of **competence/skills production**...
- ...results can be traced back to **the timing of school careers**:
- **how are past policies reflected in the current competences of the population? ...**
  - problem in the data: **adult learning (AL)** has **not been observed** in a sufficient way (only participation in year before measurement), also ageing effects might bias results (this might be corrected for)...
    - ...however, so far the effects of AL have **not been proven to be substantial** in their own right (still the initial stage has much stronger effects, and influences AL)

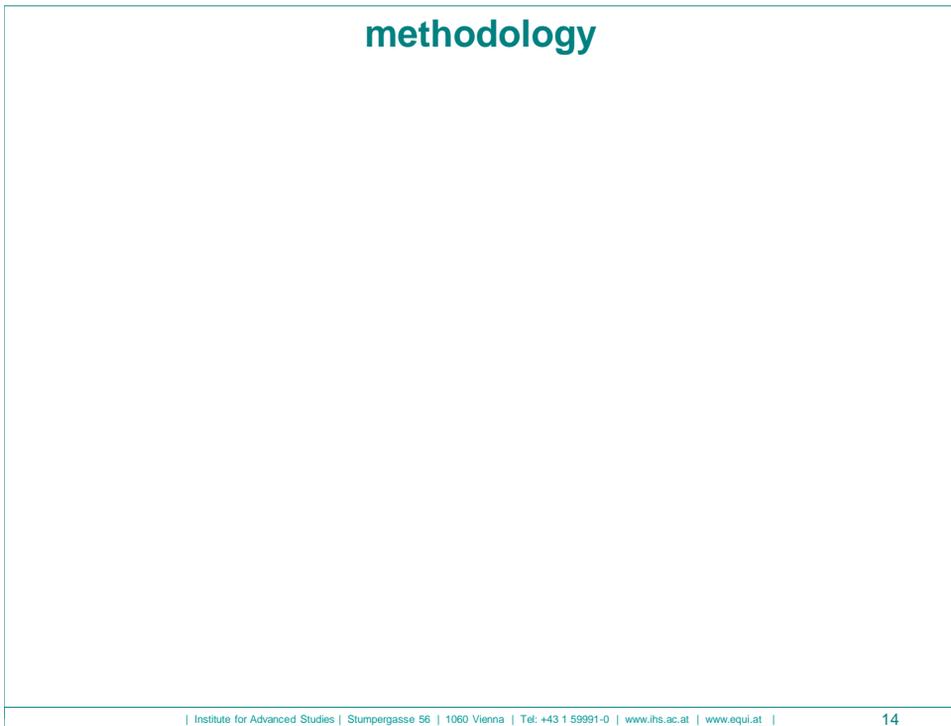
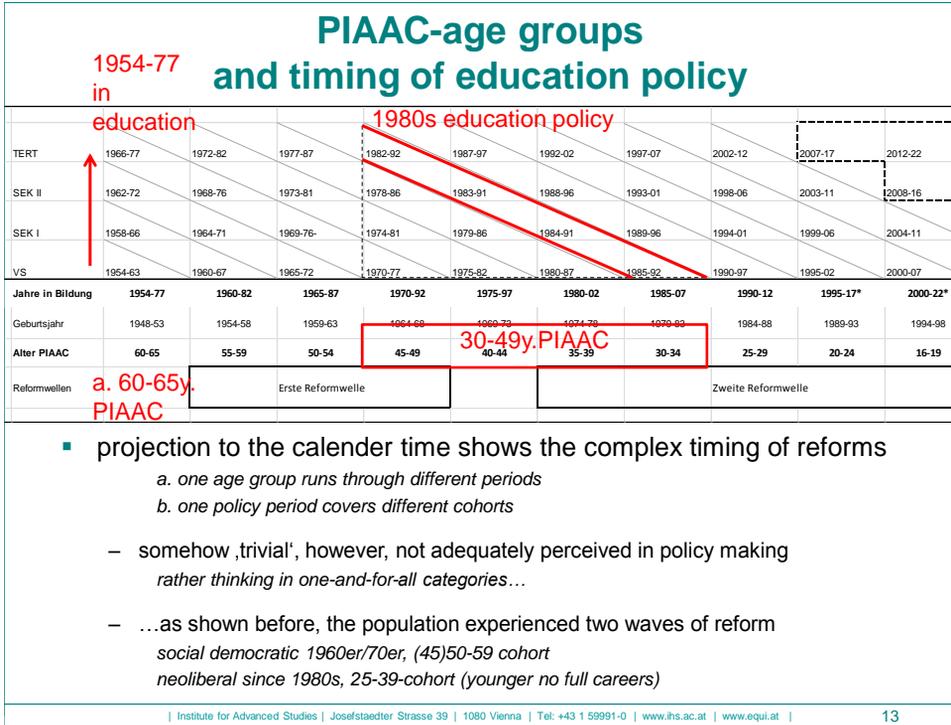
## ...framework of analysis: timing of policies & competence formation

- very complex structures/relationships ...
- ...and long-term and blurred effects of policies...

## illustration of flows through education



- **rows** are 5-years age groups in PIAAC from 16-19y up to 60-64y
- **columns** are calendar years, related to the timing of the education career of the age groups (primary education ~1954-2004)
- and also to the **political time logic** of the same historical period which runs across the career stages
  - showing the **interrelation** of education **careers** with phases of policy **reforms**
  - which is **fairly complex and not easily understandable** at first sight
    - ...the reactions to PISA often underestimate this timing factor, as the potential for improvement from one wave to the next is quite limited
    - measures only improvement between age 12 tp 15y (around grades 6 to 9)

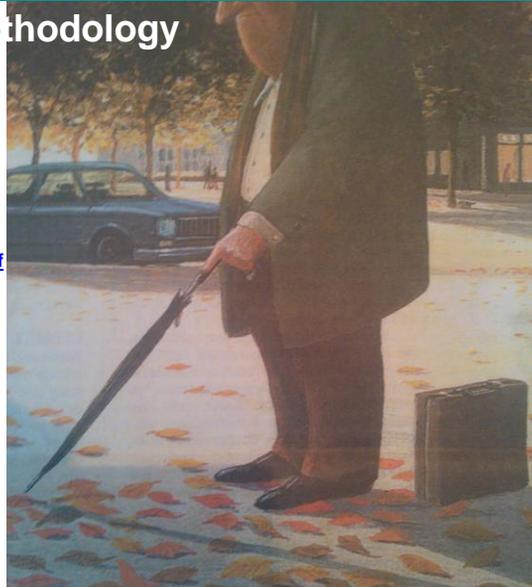


## methodology

### counting...

detailed research  
report:

<http://www.equi.at/dateien/IHS-PIAAC.pdf>



Mr Klüter counts up to 4000 leaves per hour, provided it remains windless...

*Herr Klüter zählt bis zu 4000 Blätter in der Stunde,  
vorausgesetzt, es bleibt windstill.*

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## methodology cross-section

### two parts

- ...**crosssection**
  - quite simple (so far)
    - median or mean scores in literacy and numeracy
    - distribution measured by 95/5 and 75/25 decile- and quartile-ratios
- (1) analysis of structural traits: 'tracking' in selected systems
  - Finland, Sweden, Denmark // U.K., Canada, US // Netherlands, Germany, Austria
- (2) cross-sectional analysis: structural patterns & obs.competences
  - mean and/or median; 95/5 and 75/25-percentil-ratios;
- all PIAAC-countries and
- selected countries by welfare regimes liberal, nordic, continental

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## methodology

### reform-dynamics

- **...reform-dynamics**  
more complex approach including the following steps:
  - (1) relating age structure of the population to flow through education
  - (2) analysis of the timeline of reforms
  - (3) exploring age specific patterns of competences & reforms
    - level and distribution
  
- so far mainly at the level of descriptive cross-tabulations or trend-analyses
  - will be further developed through modeling and confirmatory approaches

## results

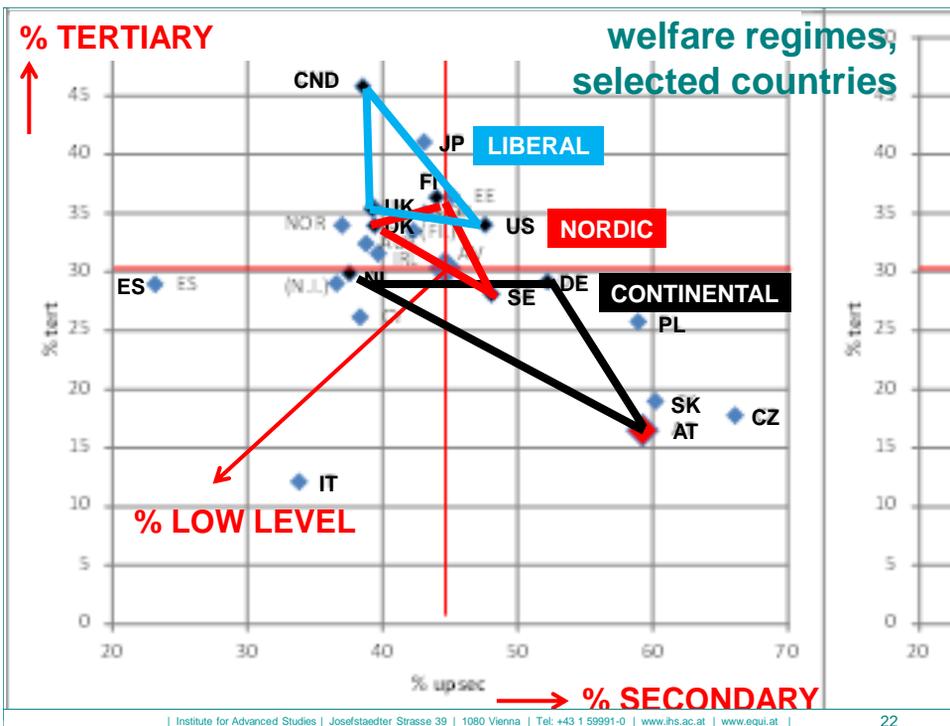
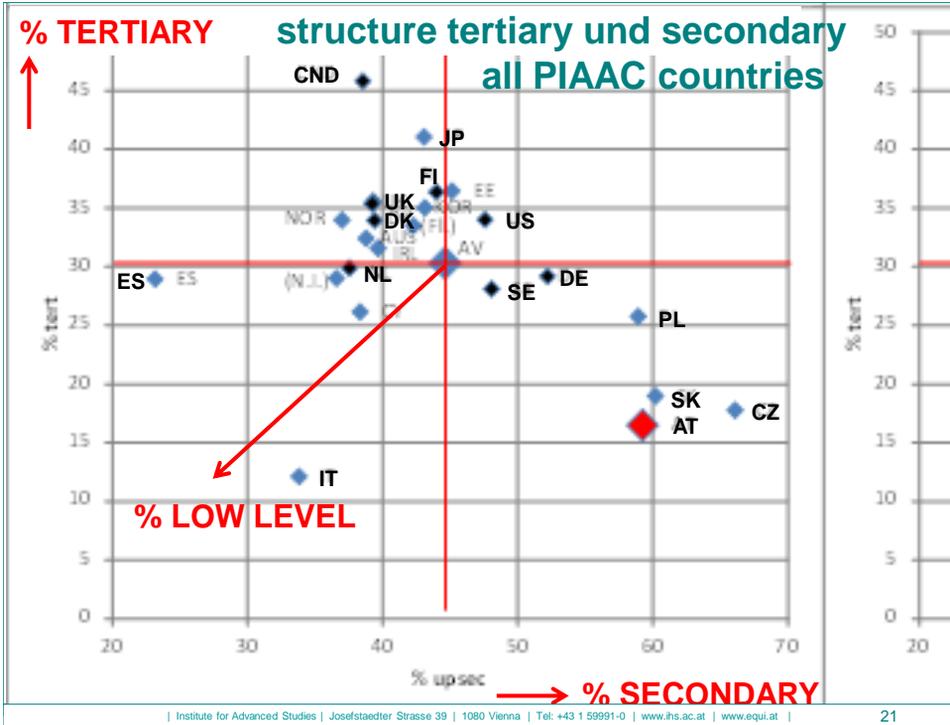
- **already shown**: uncovering of patterns, of how education reforms translate into the competence/ or skills formation process of the population
  - time dependent and complicated pattern of 'translation process'
  
- cross-section: PISA indicators about differentiation at level of individual schools are misleading, because they do not catch the **differentiation between schools** (only within schools)
  - a classification that takes into account both forms shows, that - against expectations - the differentiated vocational systems are not correlated with a greater degree of inequalities of the competences in the population
  
- analysis of the reform policies shows **only for Finland** a very consequent long term reform process that is correlated to the competence profiles; **the US** on the other extreme do not show any positive results related to their reform policies since the 1980s  
*(however, are the paradigm of current reforms in many countries)*

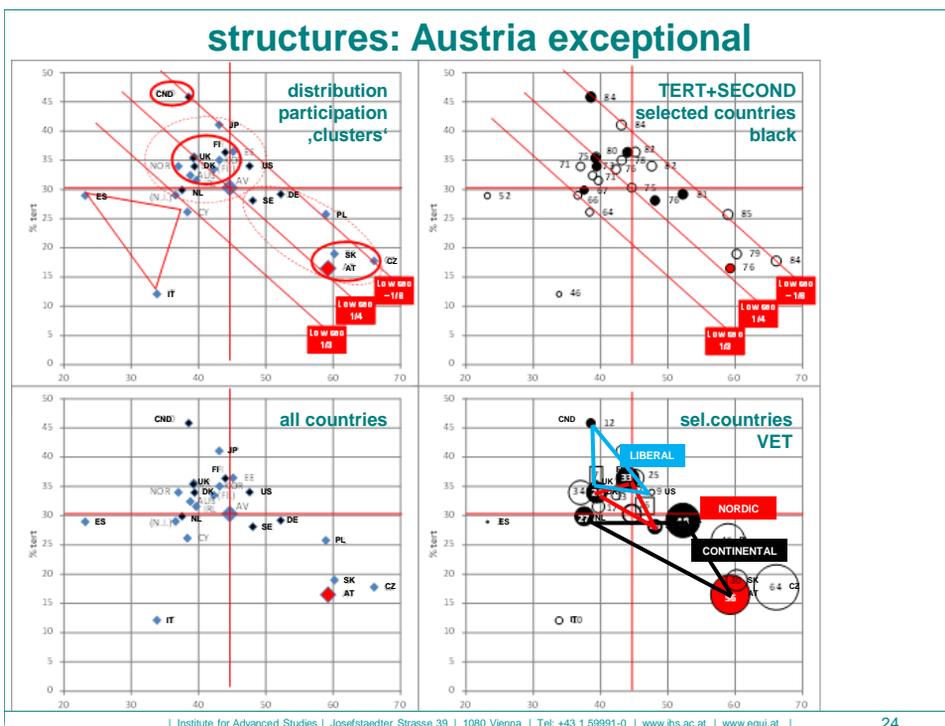
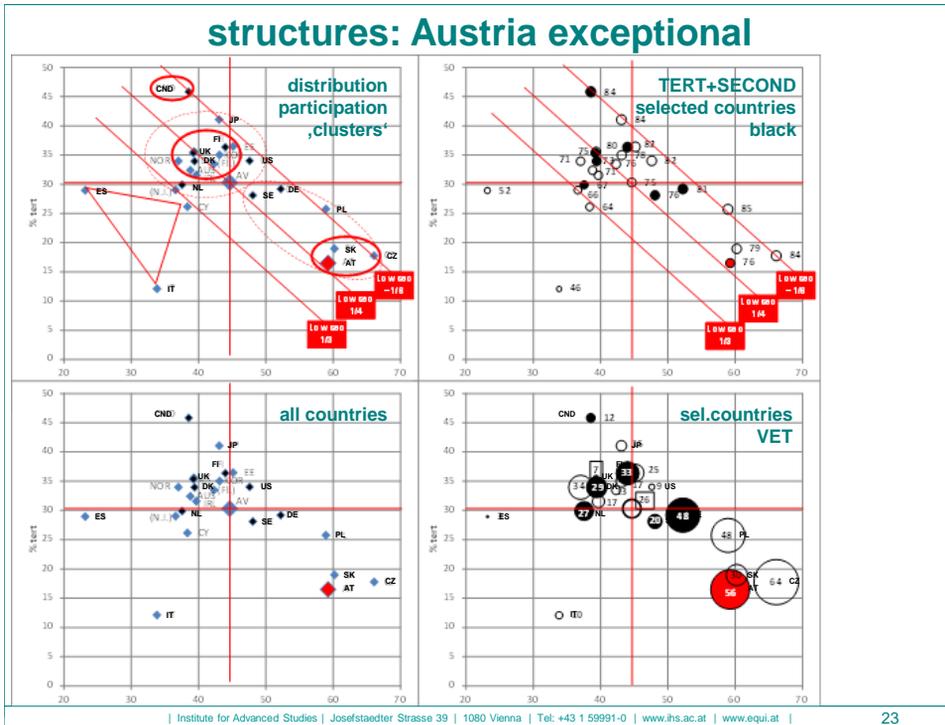
## results cross-section

- structure of attainment
- classification, identification of tracking
- tracking and competence (levels, distribution)
- tertiarisation and competence levels

## structure of attainment

- %tertiary level
- %secondary level total
  - and proportion of vocational education
- %lower than secondary





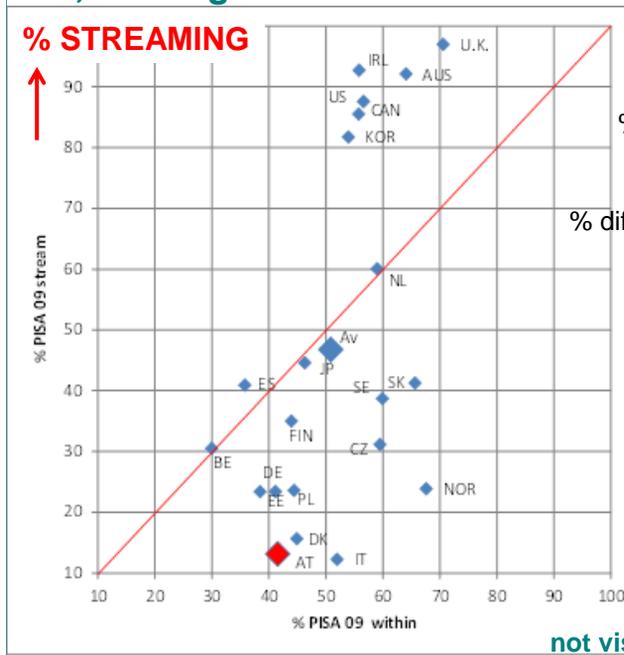
## classification of tracking

## cross-sectional (cumulative) structures: ,tracking' and PIAAC competences

- 1 classification of tracking structures based on information from PISA (2009 & 12) about differentiation within schools (**,covert' tracking**):
  - amount of streaming (diff within schools)
  - amount of setting (diff. within class)
- 2 traditional tracking of different school types (,between schools'), not covered by PISA-variables (**,open' tracking**)
  - > these countries display low level of tracking at PISA (,within school') variables
- question: how related are both forms to competence levels and distribution?
  - inequality
- **expectations:**
  - (1),conservative': *open tracking should increase scores*
  - (2),progressive': *open tracking should increase inequality*

## classification

## „tracking“-structures acc. PISA (principals answ.)



▪ **vertical:**  
% stream within schools

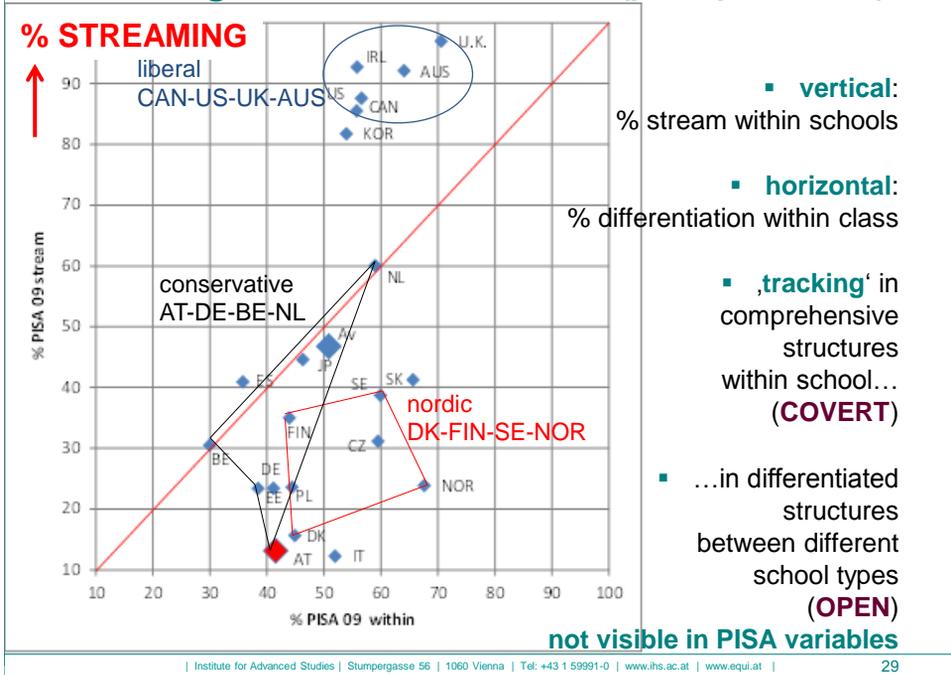
▪ **horizontal:**  
% differentiation within class

▪ **„tracking“** in comprehensive structures within school...  
**(COVERT)**

▪ ...in differentiated structures between different school types  
**(OPEN)**

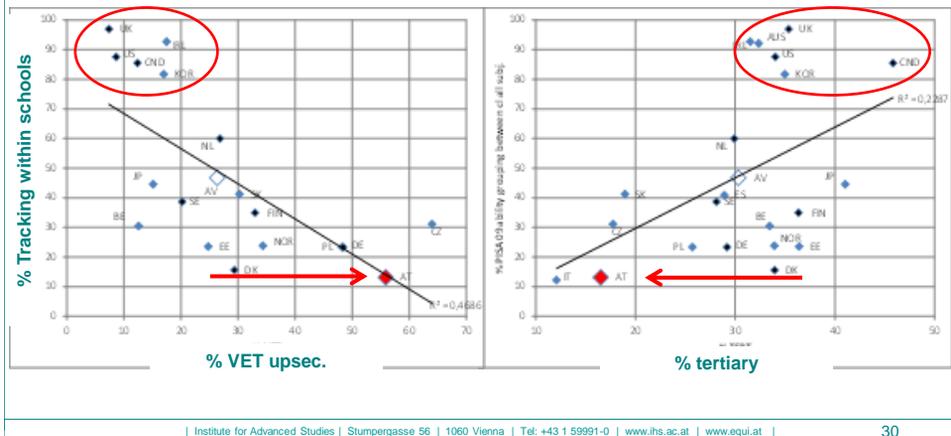
**not visible in PISA variables**

**,tracking'-structures acc. PISA (principals answ.)**



**...,covert' tracking related to tertiarisation and vocationalism...**

- ...in countries with high level of ,covert' tracking
  - VET participation is low
  - tertiary participation is high
- ...Austria reverse

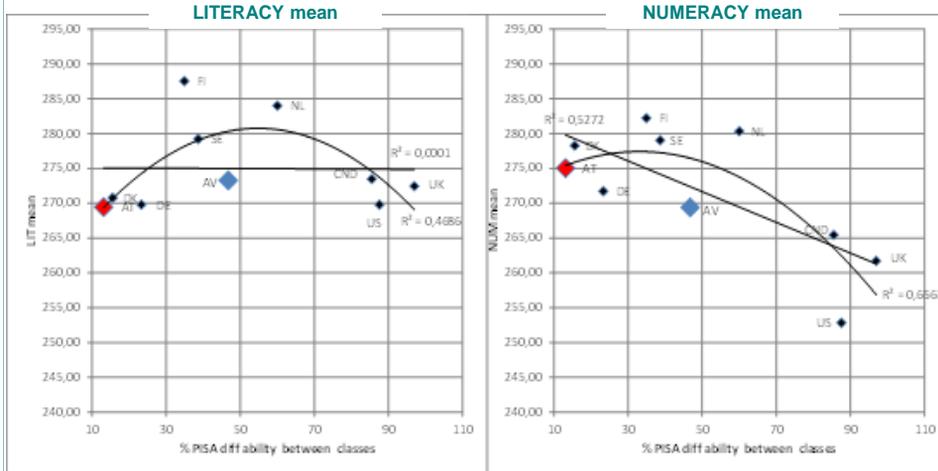


## tracking and competence (levels, distribution)

## tracking and competence levels, distribution

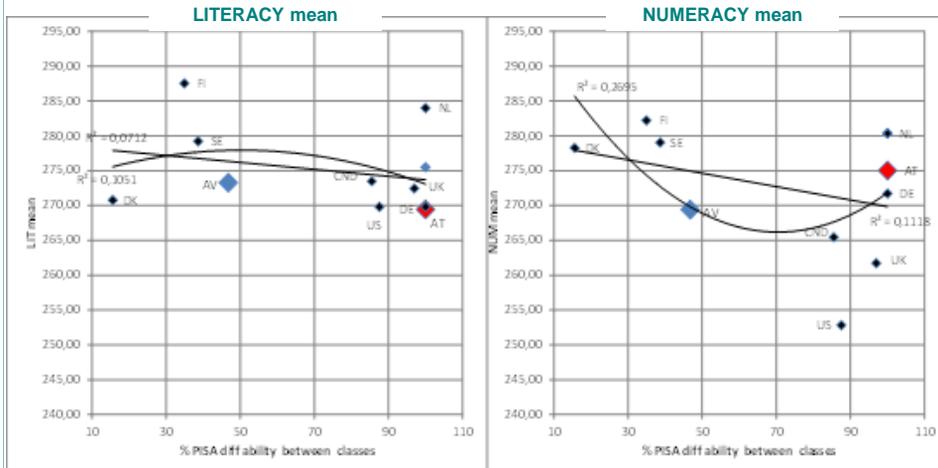
- ...both classifications of tracking (‘covert’ and ‘open’) compared...
- ...to competence indicators
  - level: test scores
  - distribution: 95/5 percentile
- ...complex relationships between educational structure and competences...

## structure & competence LEVEL y-axis x-axis-variable tracking



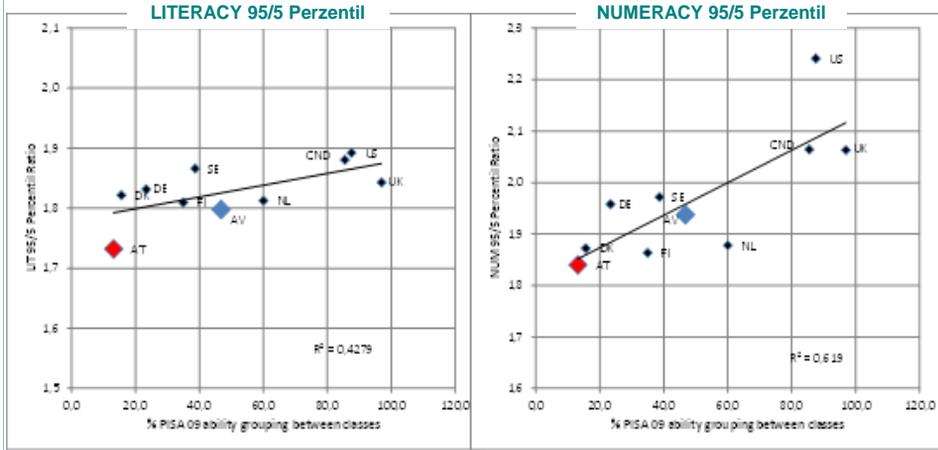
- tracking only within schools (PISA): only ,COVERT' tracking
- reading no linear relationship (medium tracking, higher score > .4); numeracy negative (more ,covert' tracking, lower score > .5 to .7)

## structure & competence LEVEL y-axis x-axis-variable tracking



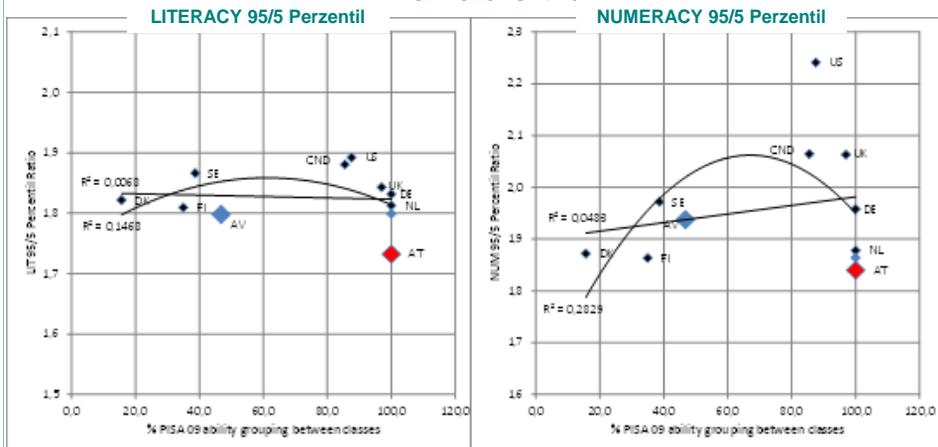
- combined tracking PISA and institutional (,covert' and ,open')
- reading: less relationship, not more 0 to .1
- numeracy: also less relationship .1 to .3 > both against expectation

## structure & competence INEQUALITY y-axis x-axis-variable tracking



- tracking only within schools (PISA): only ,COVERT' tracking
- reading slight and numeracy stronger positive relationship .4 to .6

## structure & competence INEQUALITY y-axis x-axis-variable tracking



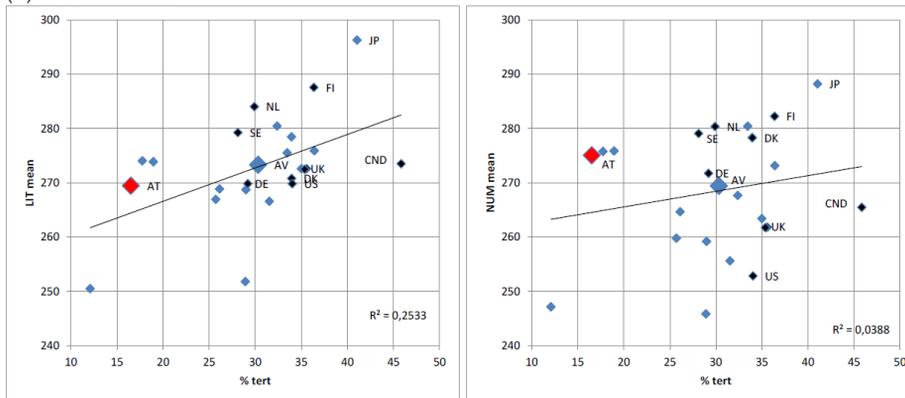
- combined tracking PISA and institutional (,covert' and ,open')
- reading (0 to .1) and numeracy (0 to .2) weakening of relationship
- OVERALL: no support for widely held expectation that openly tracked systems increase inequality of competences (and scores)

## tertiarisation and competence levels

- tertiarisation does not increase overall competence levels

## tertiary participation and scores, all countries

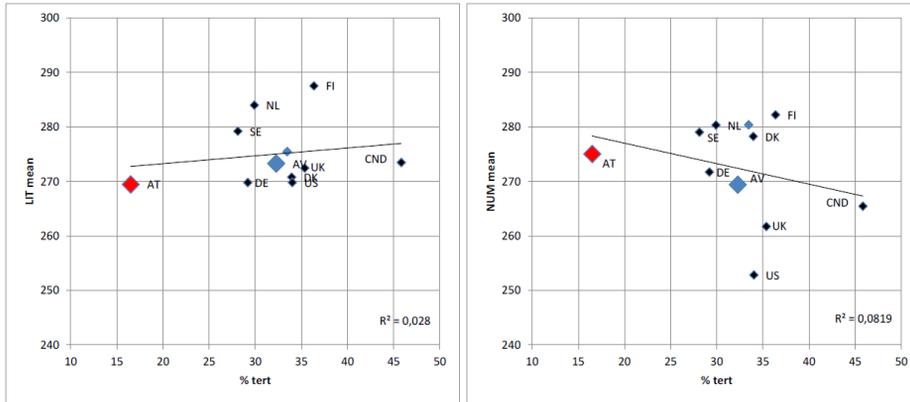
(b) % Tertiärstufe



Korrelation wesentlich bestimmt durch Ausreißer (unten Italien, oben Japan, ohne die beiden Länder:  $R^2$  LIT .04)

- Corr. determined by outliers: below IT, above JP, literacy corr. reduced to .04 if these outliers are eliminated

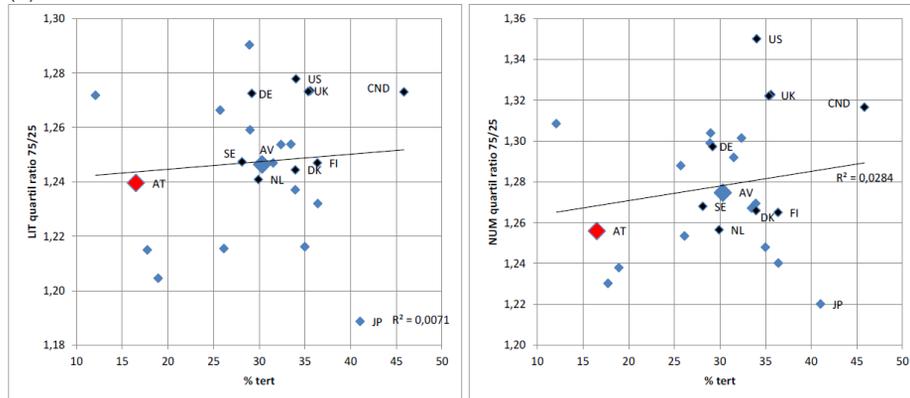
## tertiary participation and scores, sel.countries



- no corr. in selected countries

## tertiary participation and inequality, all countr.

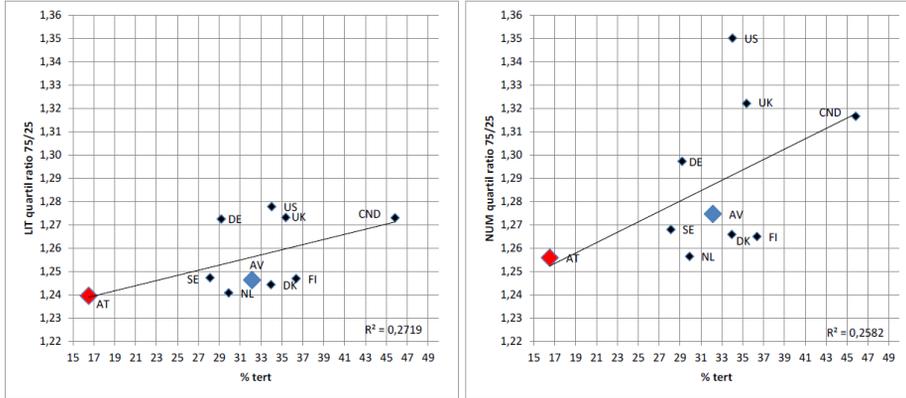
(b) % Tertiärstufe



- 75/25 ratio no corr.

## tertiary participation and inequality, sel.countr.

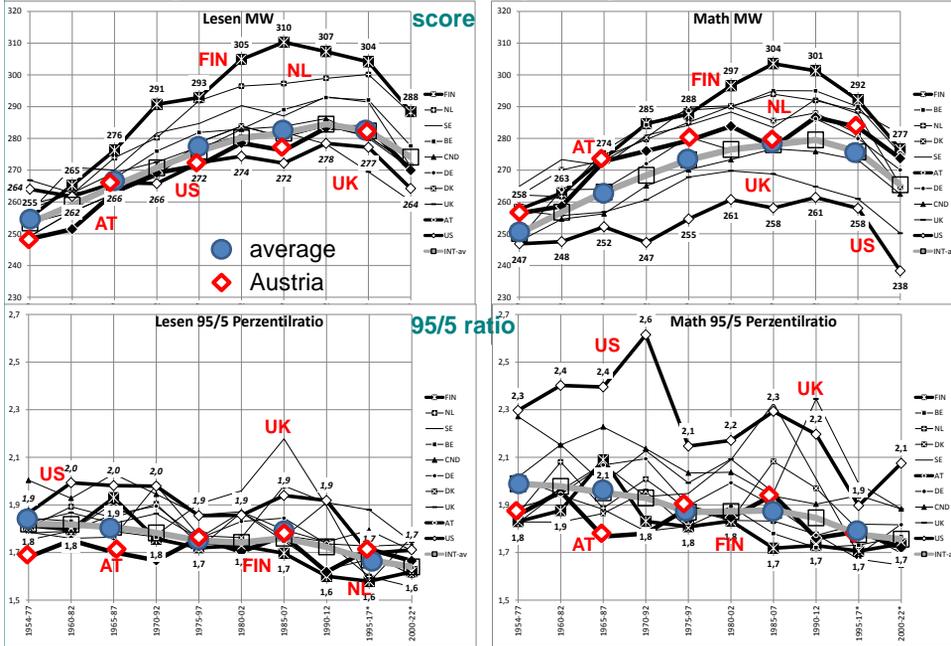
(b) % Tertiärstufe



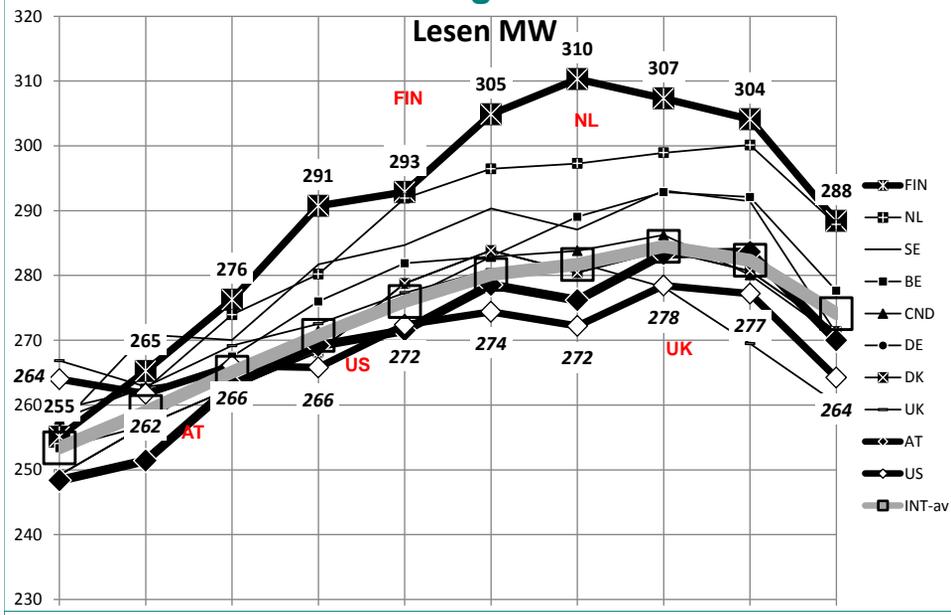
- 75/25 ratio positive corr., stronger in numeracy

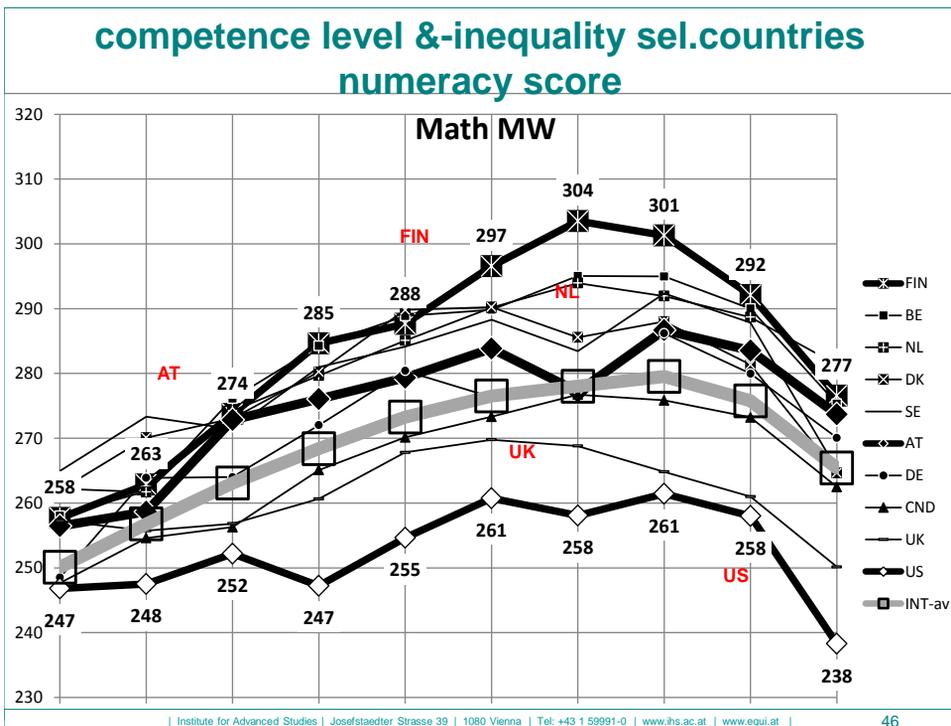
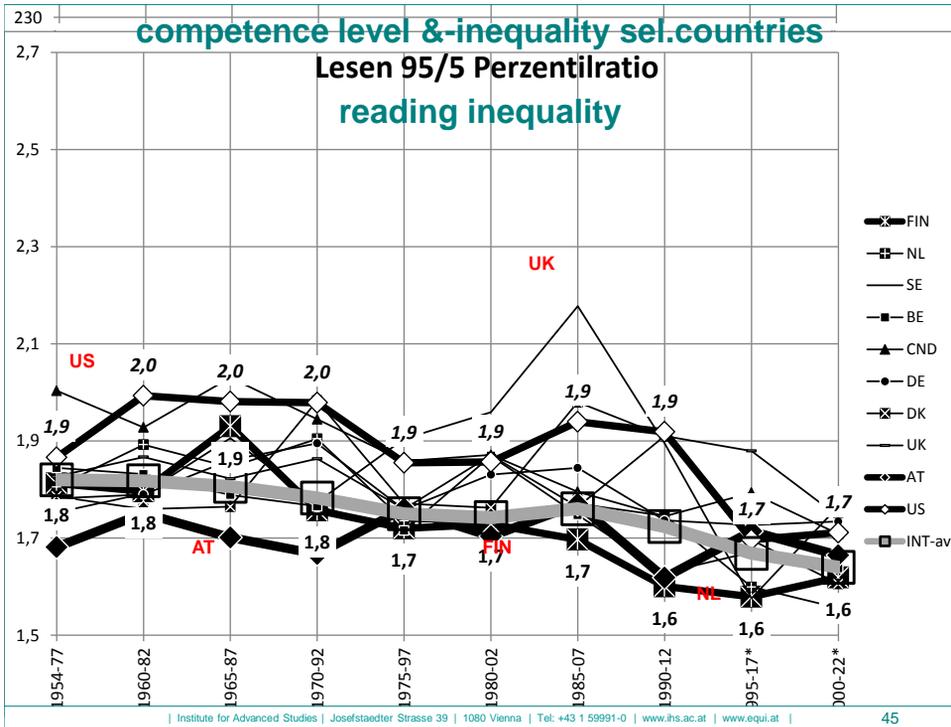
## reform dynamic and competences

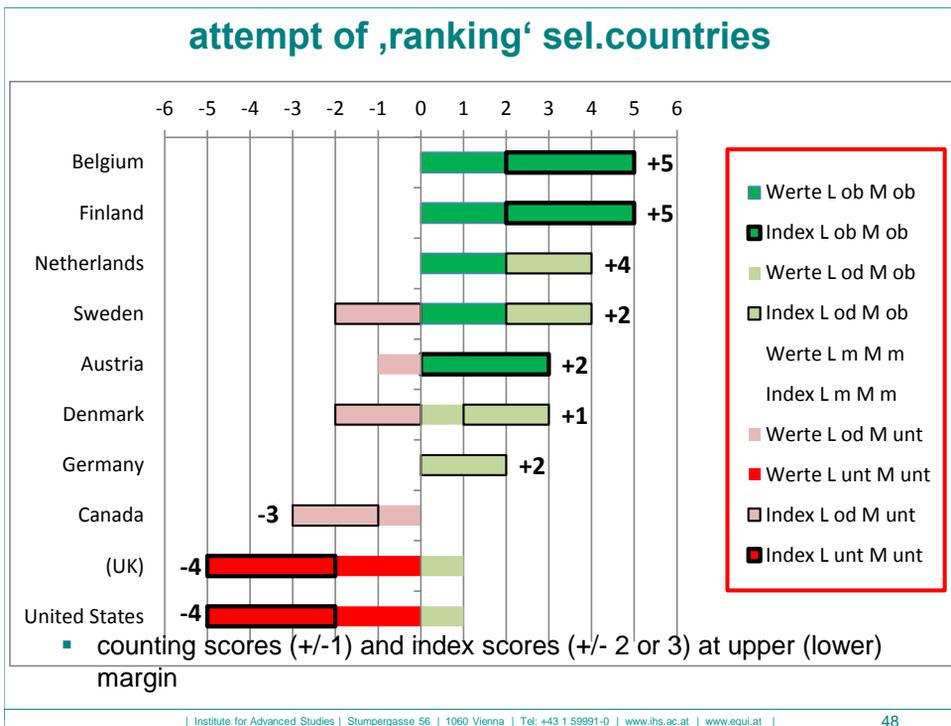
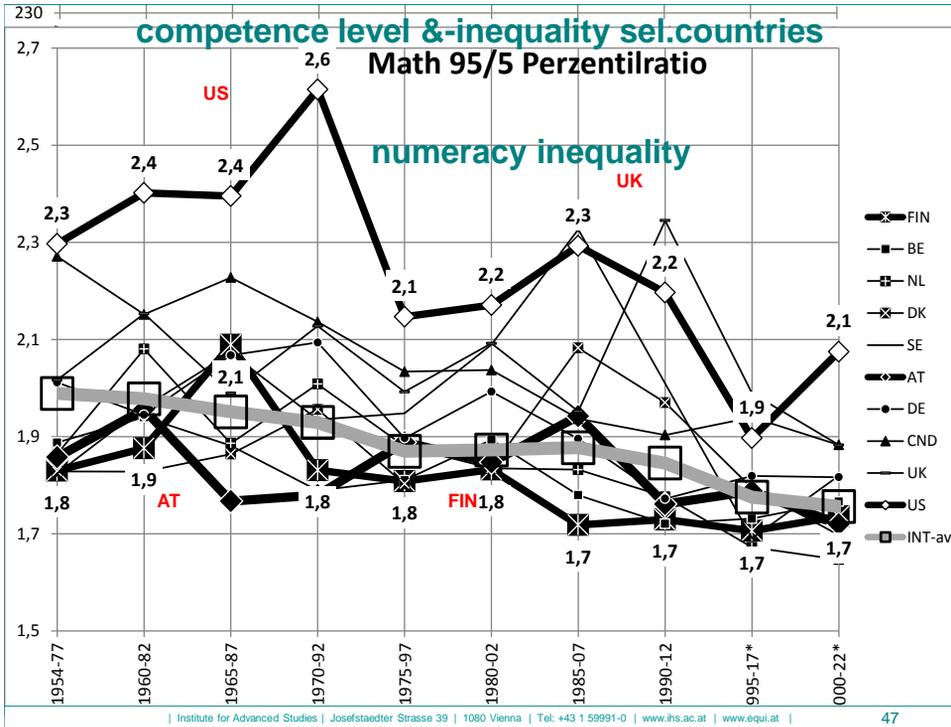
### competence level & inequality sel.countries



### competence level & inequality sel.countries reading score







■ counting scores (+/-1) and index scores (+/- 2 or 3) at upper (lower) margin

## summary

- PISA tracking variables misleading, as traditional tracking between schools is not displayed, ,openly tracked' countries appear with low levels of tracking (within schools)
- cross-section: comprehensive structures include ,covert' tracking, there seems to be a relationship between tertiary education and ,covert tracking', and between VET and ,open' tracking
- selected countries: Finland exceptionally positiv, Nordic countries different; ,liberal' countries negativ, ,continental' countries also different (NL, BE good; DE, AT mixed, medium)
- marked ,openly' differentiated systems as well as VET provide similar scores and degrees of inequality as low differentiated comprehensive systems (unfavourable: ,covertly' differentiated comprehensive systems)

## Material

- [www.equi.at/dateien/IHS-PIAAC.pdf](http://www.equi.at/dateien/IHS-PIAAC.pdf)

