

CAN INTERNATIONAL TEST SCORE COMPARISONS INFORM EDUCATIONAL POLICY?

A CLOSER LOOK AT STUDENT PERFORMANCE IN RUSSIA AND ITS NEIGHBORS

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RUSSIA'S PISA PUZZLE

Russians have an international reputation of being good in mathematics, and Russian 8th graders perform quite well on the TIMSS mathematics test.

However, Russian 15 year-olds do very poorly on the PISA math test when compared to students in other countries.

Is this a question of poor schooling? Of social class differences between students taking the PISA test and students in other comparable countries?

GOALS AND STRATEGY

In this report, we dig into the puzzle by

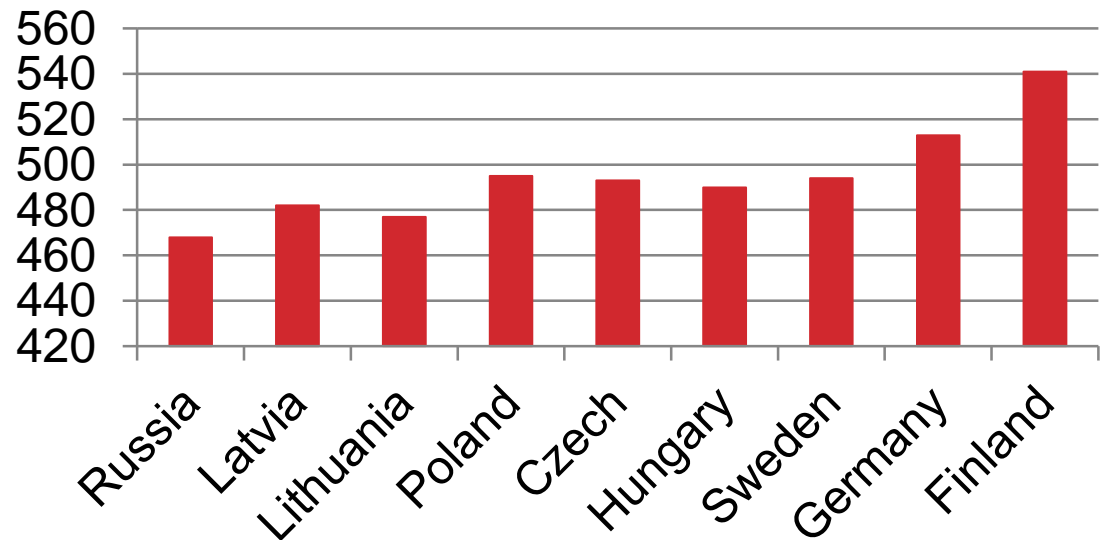
- 1) comparing Russian PISA scores in 2009 by social class with similar students in other countries;
- 2) compare changes in Russian PISA scores in 2000-2009 with changes in other countries;
- 3) compare PISA performance of Russian in Latvia and Russia;
- 4) Compare changes in PISA scores with changes in TIMSS scores over the past 10 years.

COMPARISON COUNTRIES

Overall Average PISA 2009 Math Scale Scores

Russia	468	Sweden	494
Latvia	482	Germany	513
Lithuania	477	Finland	541
Poland	495		
Czech	493		
Hungary	490		

PISA 2009, Math



WHY IS IT IMPORTANT TO DIVIDE BY SOCIAL CLASS?

We know that students bring very different cultural capital to school when they enter kindergarten or the first grade.

These differences are not overcome by schools, and there is a real question to what degree they can be or whether schools are even organized to overcome cultural capital differences between students.

Even in educational systems where the differences between students of different social class background are less (Russia is one of them), we are not sure whether this is due to greater equality of cultural capital before children enter school or because schools have equalized learning in school.

In any case, even in such systems, the differences are still large in the math scores for students in higher and lower social class.

THERE IS NO SINGLE GOOD MEASURE OF STUDENT SOCIAL CLASS

We used books in the home as our measure of social class, for several reasons:

1. Books in the home represent a good measure of family cultural capital that the student brings to school at entry.
2. Both PISA and TIMSS use similar categories of BH and most students answered this question;
3. Unlike BH, various categories of mother's education could have different status meaning in different countries.
4. When we add ME or parents' highest education or the PISA social class index to the BH-PISA test score correlation, the correlation coefficient changes little.
5. Thus, using other measures of social class would have little effect on our results.

RUSSIAN PISA SAMPLE IS NOT SO DIFFERENT FROM COMPARISON COUNTRY SAMPLES, BUT FINLAND AND SWEDEN HAVE HIGHER SES (%)

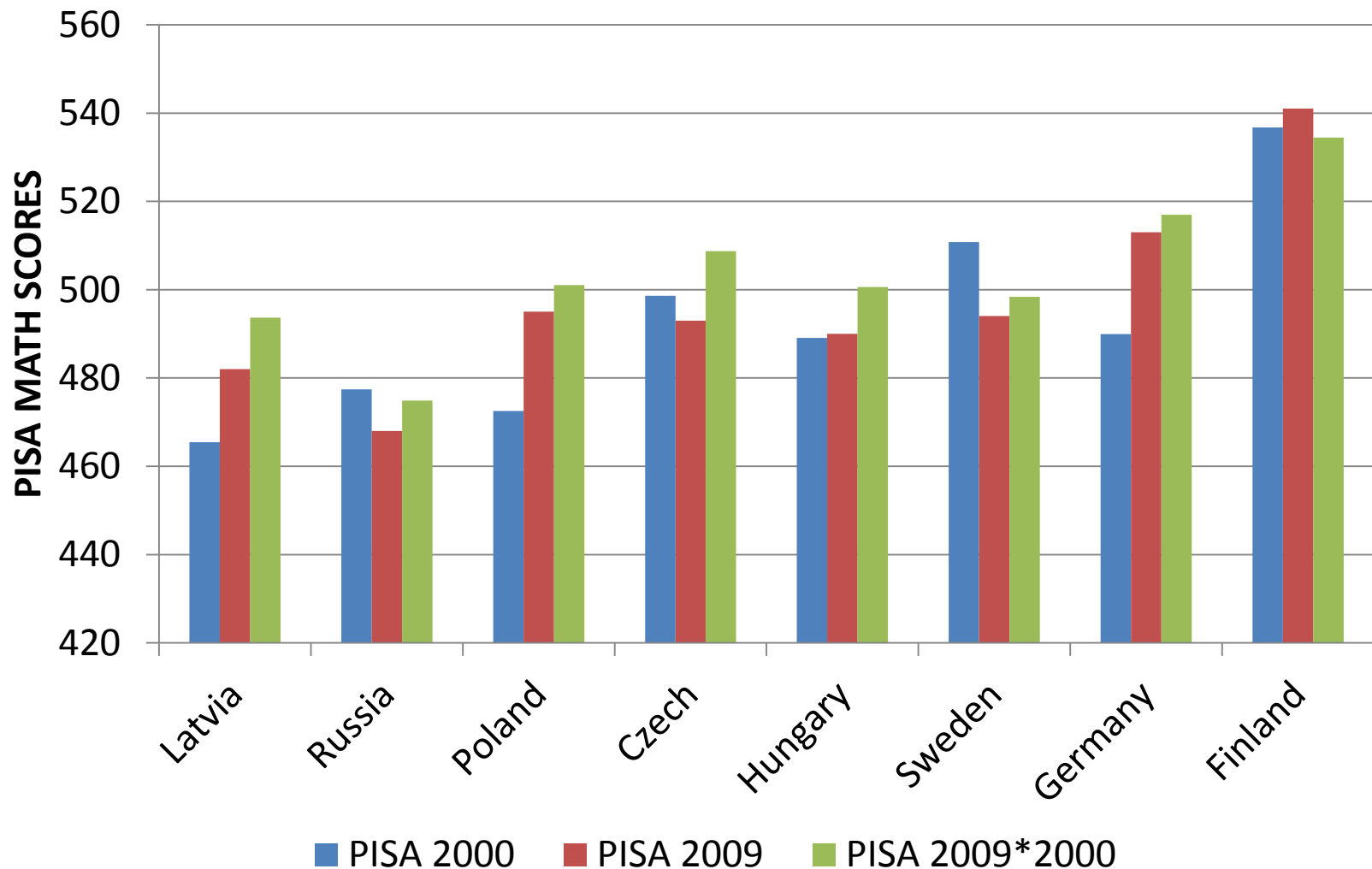
Number of Books in the Home	Rus sia	Latvia	Lithua nia	Po land	Czech	Hun gary	Swe den	Germa ny	Fin land
0-10 books	8.3	8.0	14.9	10.0	8.6	8.9	7.5	12.2	5.8
11-25 books	17.6	14.3	20.5	20.0	14.7	12.9	9.7	13.4	10.8
26-100 books	34.7	36.5	33.3	34.2	35.4	27.2	29.9	29.1	33.5
101-200 books	17.9	19.9	15.7	17.6	19.4	18.7	19.7	19.0	23.3
201-500 books	13.5	13.3	9.8	11.5	14.8	17.7	20.6	16.2	20.2
> 500 books	7.9	8.0	5.8	6.5	7.0	14.7	12.6	10.1	6.4

ADJUSTING 2009 TEST SCORES FOR OUR COMPARISON COUNTRIES USING RUSSIAN SAMPLE WEIGHTS MAKES LITTLE CHANGE

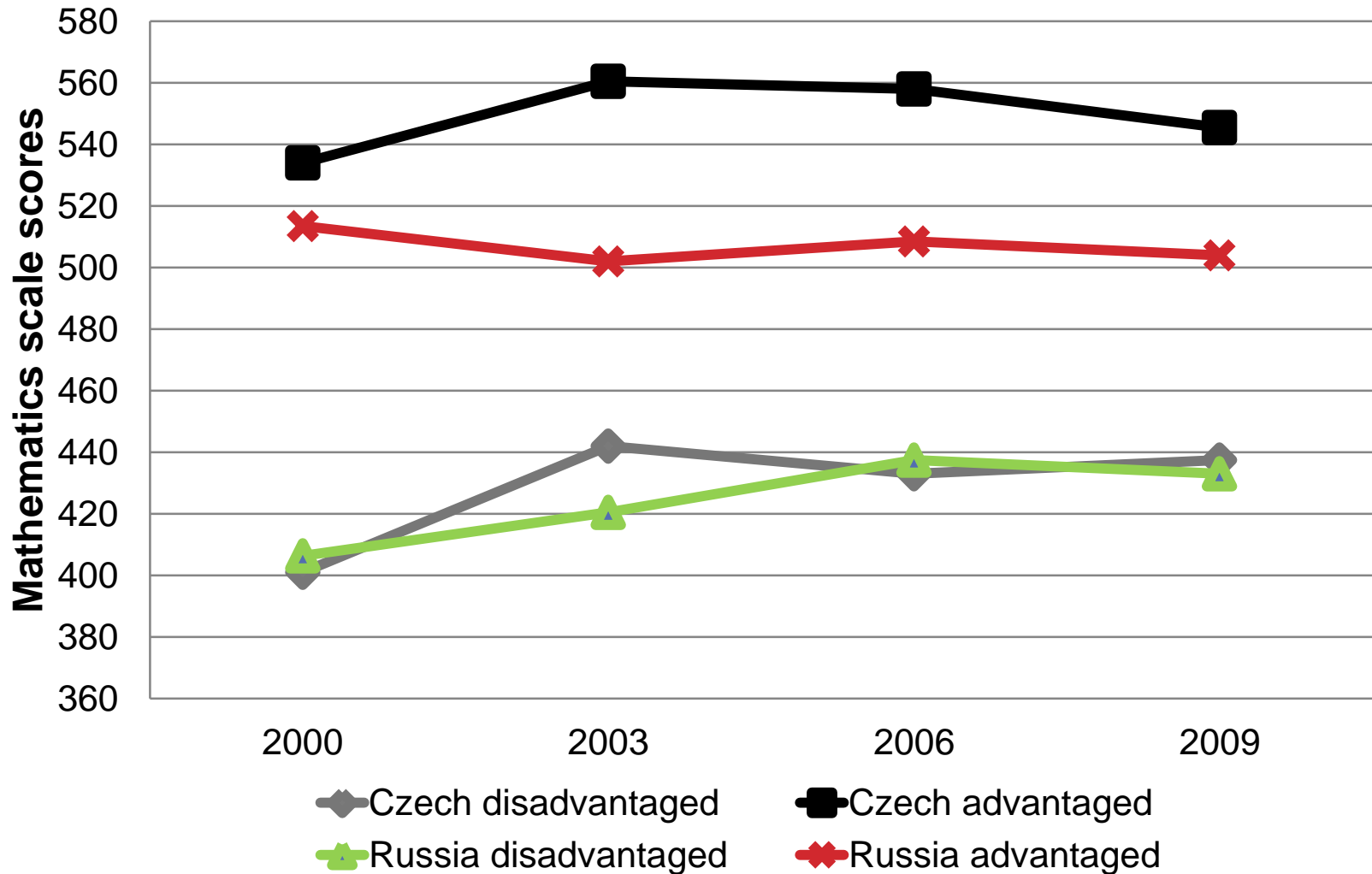
	Rus sia	Lat via	Lithua nia	Po land	Czec h	Hun gary	Swe den	Germ any	Fin land
Math	468	482	477	495	493	490	494	513	541
Math Adjus ted	468	480	485	499	491	481	484	512	535

So Russian students' average score in the PISA 2009 math test substantially lower than in comparison countries even when adjusted for the BH distribution across countries.

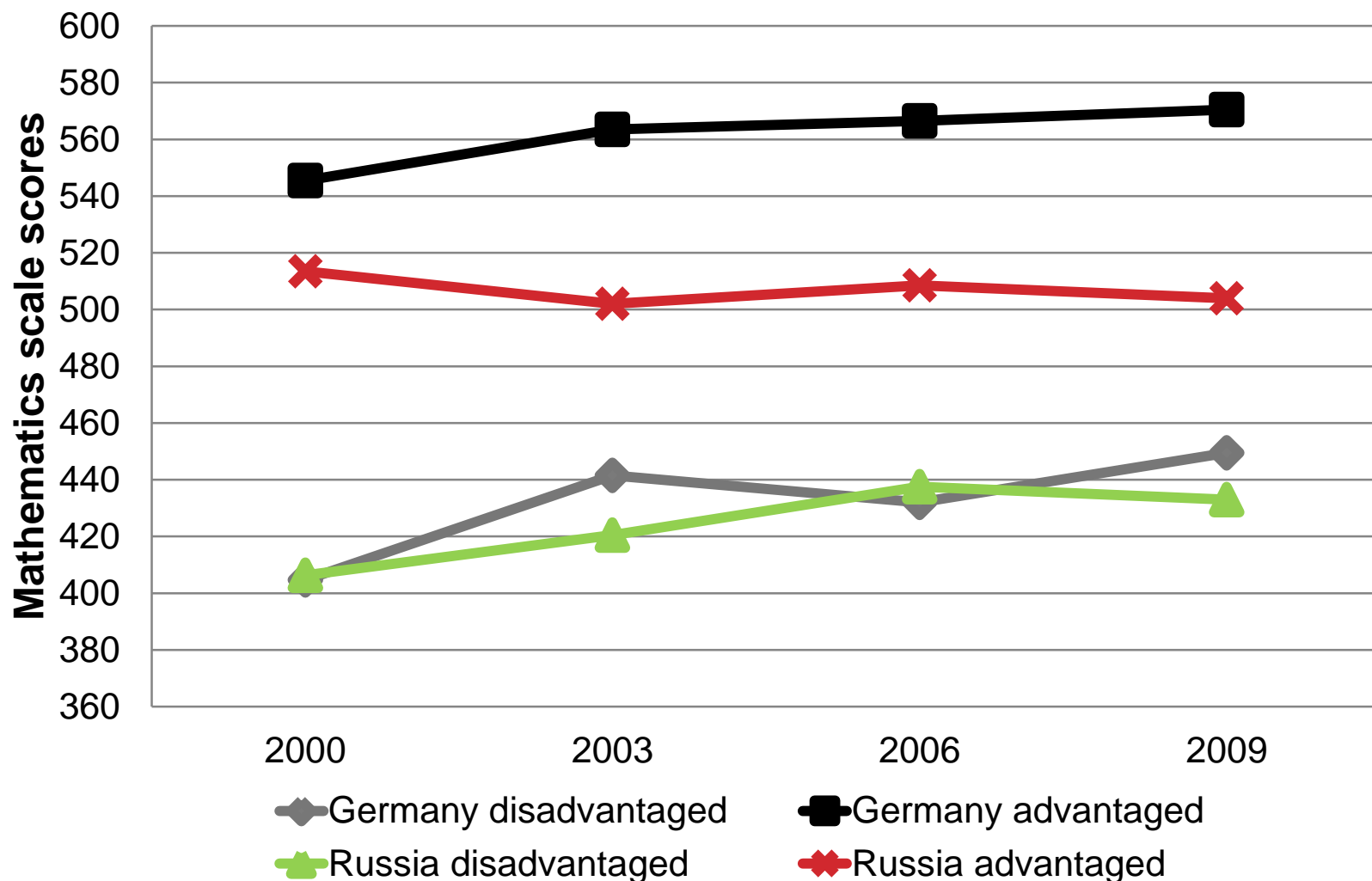
THE SAMPLES ALSO CHANGE OVER TIME, SO WE CAN ADJUST THE PISA MATH SCORES FOR CHANGES IN THE SAMPLES IN 2000-2009



AVERAGE PISA MATH SCORES DID NOT RISE IN RUSSIA, BUT LOWER SOCIAL CLASS GROUPS IN RUSSIA DID RELATIVELY BETTER THAN HIGHER SOCIAL CLASS GROUPS



LOWER SOCIAL CLASS RUSSIAN STUDENTS MADE GAINS ON PISA IN 2000-2009, BUT NOT HIGHER SOCIAL CLASS GROUPS



DO RUSSIANS IN RUSSIAN SCHOOLS IN LATVIA SHOW A DIFFERENT PATTERN OF GAINS? YES.

We can distinguish Russian students in Russian language schools in Latvia from Latvian students in Latvian language schools for the 2003, 2006, and 2009 PISA test.

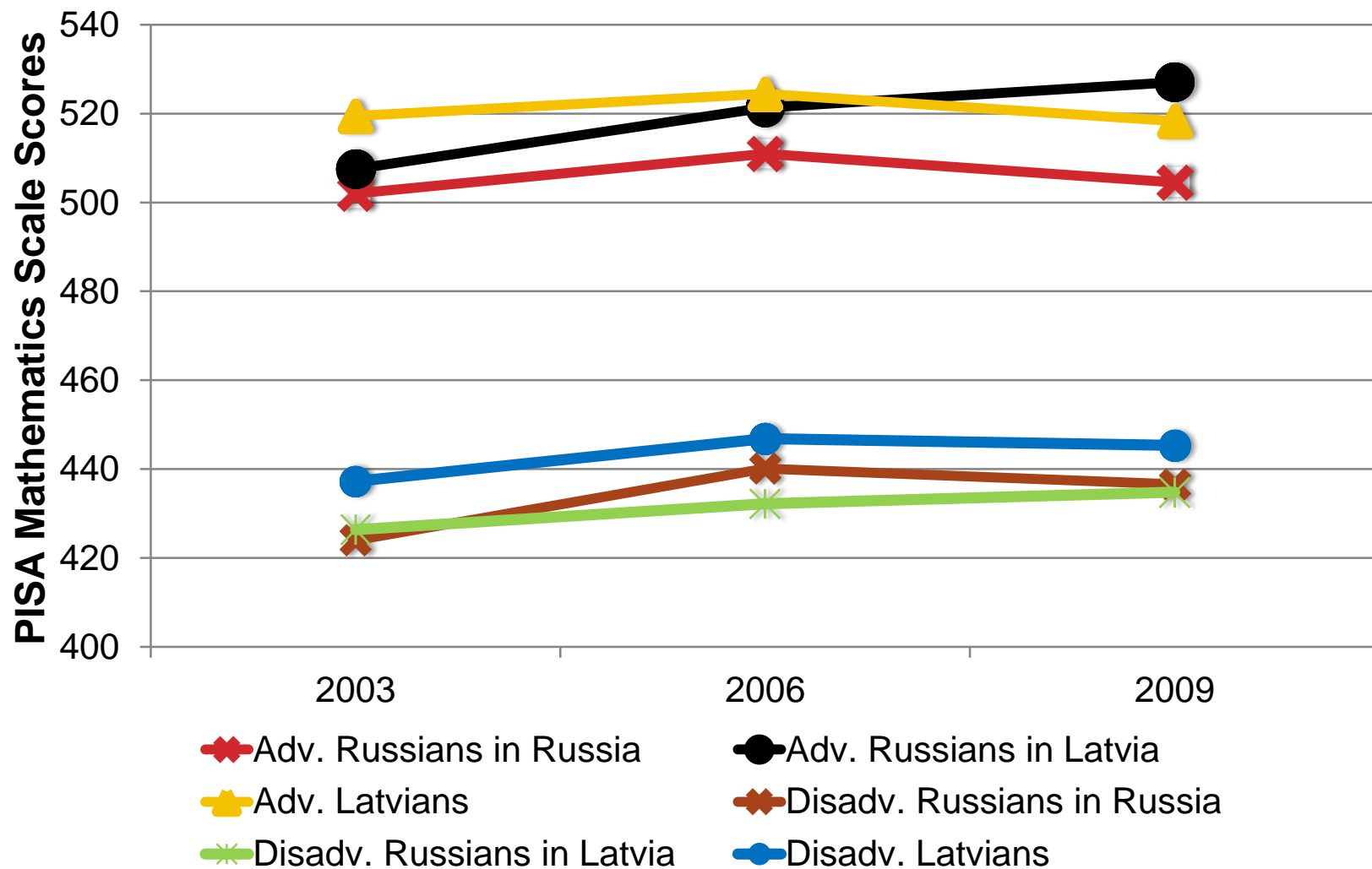
Socially advantaged Russian students in Russian language schools in Latvia showed large gains in the PISA mathematics test in 2003-2009 and scored higher in 2009 than social advantaged Latvian students and much higher than socially advantaged Russian students in Russia.

Disadvantaged Russians in Russian language schools in Latvia scored the same as Russians in Russia in 2009, made about the same gains in 2003-09, and both groups of disadvantaged Russian students scored lower than disadvantaged Latvian students.

Is the Latvian curriculum more geared to the PISA test? Perhaps

Does teaching in Latvian classrooms, even in Russian language schools, put more emphasis on gains for advantaged students than teaching in Russia? Perhaps.

COMPARING RUSSIAN STUDENTS' PISA MATH SCORE GAINS IN RUSSIA AND LATVIA, BY SOCIAL CLASS



IN 1999-2011, RUSSIAN 8TH GRADE STUDENTS HAVE AVERAGED AS HIGH OR HIGHER THAN STUDENTS IN OUR COMPARISON COUNTRIES

As in PISA, disadvantaged Russian students have done relatively better compared to students in Latvia, Lithuania, Czech Republic, Hungary, Sweden, and Finland (countries that took the TIMSS at least twice in this period) than advantaged Russian students.

But advantaged Russian students have also done relatively well. Advantaged Hungarian students have generally done better than Russian students (until 2011).

The changes over time in 1999/2000-2007 have been quite different on the PISA math test than on the TIMSS test. In 1999/2000-2009, they have been almost the same for Russia. All social class groups moved in the same direction on both tests.

We can make comparisons for only a few countries that took both tests in this period—Czech Republic and Hungary in 1999/2000-2007 and Hungary and Finland in 1999/2000-2009.

The next table shows the Russia comparison with Hungary and Czech Republic in 1999/2000-2007

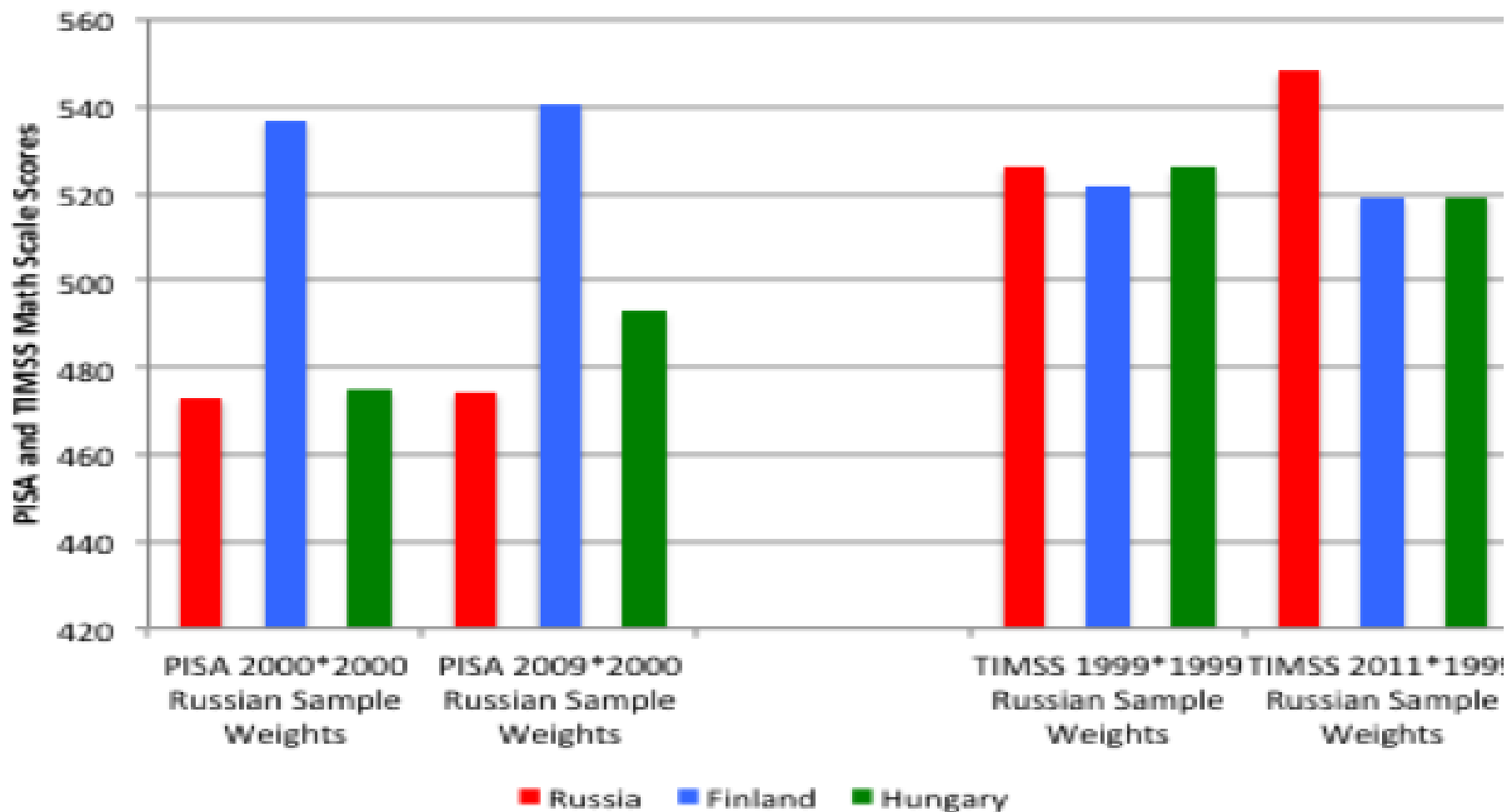
IN 1999/2000-2007, ALMOST NO AGREEMENT IN PATTERN OF GAINS ON PISA AND TIMSS

Social Class Groups	TIMSS 1999	TIMSS 2007	Change (Scale points)	PISA 2000	PISA "2007"	Change (Scale points)	TIMSS-PISA Agreement
Czech Republic							
Group 1 (Lowest)	448	451	3	384	417	33	NO
Group 2	472	469	-3	414	452	38	NO
Group 3	506	506	0	468	492	23	NO
Group 4	532	527	-5	501	525	24	NO
Group 5/6 (Higher/Highest)	539	543	4	533	553	20	NO
National Avg.	520	504	-16	498	504	6	NO
Hungary							
Group 1 (Lowest)	429	431	2	390	398	9	NO
Group 2	467	469	2	412	432	20	NO
Group 3	513	510	-3	453	473	20	NO
Group 4	548	538	-10	485	499	14	NO
Group 5/6 (Higher/Highest)	564	560	-4	530	543	13	NO
National Avg.	532	517	-15	488	491	3	NO
Russia							
Group 1 (Lowest)	460	467	7	407	428	22	NO
Group 2	485	484	-1	432	444	12	NO
Group 3	517	511	-6	457	464	7	YES
Group 4	539	533	-6	484	491	7	YES
Group 5/6 (Higher/Highest)	556	540	-16	512	509	-3	NO
National Avg.	526	512	-14	478	473	-5	NO

IN 1999/2000-2009, IF WE ADJUST FOR CHANGES IN THE SOCIAL CLASS COMPOSITION OF THE PISA AND TIMSS SAMPLES, THE RUSSIAN AND HUNGARIAN AVERAGES GO IN OPPOSITE DIRECTIONS, AND RUSSIA IS HIGH ON THE TIMSS AND LOW ON THE PISA

Country	TIMSS 1999	TIMSS “2009” Using 1999 Sample Proporti ons	Differenc e -1999- “2009” Reweigh ted	PISA 2000	PISA 2009 Using 2000 Sample Proporti ons	Differen ce 2000- 2009 Reweig hted
Finland	520	520	0	536	538	2
Hungary	532	526	-6	488	504	16
Russia	526	534	8	478	477	-1

IF WE USE THE RUSSIAN SAMPLE WEIGHTS FOR PISA 2000 FOR THE PISA TEST AND THE RUSSIAN 1999 SAMPLE WEIGHTS FOR THE TIMSS TEST FOR ALL THREE COUNTRIES, THE DIFFERENCES ARE CLEAR



SOME MODEST CONCLUSIONS I

Russian students do not do well in mathematics as measured by the PISA test compared to 8 neighboring countries, many of them who used to use a curriculum and school organization very similar to Russia's.

The gains in PISA math have been greater for socially disadvantaged students than for advantaged Russian students, and disadvantaged Russian students do relatively better compared to disadvantaged students in comparison countries.

We show that this is not the case for advantaged Russian students in Russian language schools in Latvia. This raises interesting issues about math curriculum differences and teaching strategies in those schools compared to Russian schools.

SOME MODEST CONCLUSIONS II

Russian students do relatively much better on the TIMSS test, although that test also shows much larger gains for Russian disadvantaged students over the past ten years than for advantaged students.

This suggests that Russian disadvantaged students are improving their math performance much more than advantaged students on both tests.

Russian policy makers have to decide whether the PISA test or the TIMSS test is more accurately measuring the kinds of math skills they want their students to learn.

FUTURE RESEARCH EMERGING FROM THIS STUDY

1. We should investigate the curriculum and the teaching emphasis in Latvia's Russian language schools and how they have been influenced by Latvian practices.
2. The low PISA scores should also be researched by undertaking a randomized trial in a sample of Moscow schools testing several alternative interventions in a PISA-like test. All students would be given a baseline PISA-like test at the beginning of the year.

For example, one group of students would then be taught with an altered curriculum including PISA-like math problems.

For example, before the end of year second test, another group would be told that how well they do on the second test will affect something about their academic future,

For example, for a third group of students, test monitors observing the second test would make sure that all students try to answer the questions without random marking.