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Abstract: Conventional wisdom has been that educational aspects of human capital in the former Communist countries were largely an asset going into the transition. However, it has also been widely perceived that the type of education in the Communist countries (with emphases on memorization at the expense of analytical and critical thinking, and perhaps premature specialization if not over-specialization) may be ill-suited for the needs of a market economy. This study analyzes trends in four cross-country surveys of education performance: the Trends in International Mathematics and Sciences Study (TIMSS); the International Adult Literacy Survey (IALS); the Progress in International Reading Literacy Study (PIRLS); and the Program for International Student Assessment (PISA). Salient "quantity" of education indicators (enrollment and expenditure trends) are also assessed and compared with the "quality" of education indicators from results of the cross-national performance surveys.

Finally, drawing from both sets of indicators, transition countries were rated and ranked according to overall (measurable) educational deficiencies or education gaps. From a limited sample of sixteen transition countries (for which data existed for a majority of the twelve indicators used to rate the deficiencies), four countries stand out as the most vulnerable: Albania; Armenia; Macedonia; and Romania.

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Summary
This paper attempts to synthesize and interpret the findings from a handful of cross-country assessments of the quality of education in the transition region. The conventional wisdom has been that educational aspects of human capital in the former Communist countries were largely an asset going into the transition. However, it has also been widely perceived that the type of education in the Communist countries (with emphases on memorization at the expense of analytical and critical thinking, and perhaps premature specialization if not over-specialization) may be ill-suited for the needs of a market economy.

We analyzed trends in four cross-country surveys of education performance: the Trends in International Mathematics and Sciences Study (TIMSS); the International Adult Literacy Survey (IALS); the Progress in International Reading Literacy Study (PIRLS); and the Program for International Student Assessment (PISA). Participation in the surveys among students in the transition countries remains limited. Hence, part of this analysis is also to revisit the salient enrollment and expenditure trends in the region and to compare them with the results of the cross-national performance surveys. To what extent can some of the quantity of education indicators be used as proxies for the quality of education?

TIMSS. Overall, the students sampled in fourteen transition countries included in this survey performed very well in 2003 by international standards. Eighth grade students in the Northern Tier CEE countries as well as in Russia performed roughly at OECD standards in math and science, and above the intermediate benchmark defined as the minimum acceptable level ("where students can recognize, apply and communicate basic math and scientific knowledge in straightforward situations."). All the other transition countries included in the surveys except Macedonia performed at or near the intermediate benchmark. This includes Bulgaria, Serbia & Montenegro, and Romania in the Southern Tier CEE, and Armenia and Moldova in Eurasia. Macedonia is the only transition country of the fourteen that lags notably behind the minimum threshold; its students performed closest to students in Iran, and not much better than students in Indonesia and Lebanon.

TIMSS trends over time (from 1995 to 2003) are limited to nine transition countries. Good progress has been made in performance scores in Lithuania and Latvia from 1995 to 2003. However, notable backsliding has occurred in four countries. Bulgaria has showed the biggest slide (it was the best performer of the fourteen countries in 1995). Macedonia, Russia, and Slovakia also witnessed backtracking during this time period as well.

IALS. Only four Northern Tier CEE countries are included in the IALS assessments of "functional literacy" which took place from 1994-1998. In three of the four Northern Tier CEE countries (Poland, Slovenia and Hungary), only 26-36% of the adult population sampled scored at least the minimum level of "3", and hence by IALS definition were able to at least minimally cope with the demands of advanced society. Adults in the Czech Republic, in contrast, had scored slightly above the OECD average. Of the three subject areas, adults in all four transition countries scored much lower on prose (or the knowledge and skills needed to understand and use information from texts, including editorials, news stories, poems, and fiction), higher on document literacy (the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transport schedules, maps, tables, and

graphics), and highest on quantitative literacy (the knowledge and skills required to apply arithmetic operations, either alone or sequentially, to numbers in printed materials). Adults in the OECD countries scored much more balanced results across the three subject areas, at least on average.

PIRLS. Most of the fourth grade students of the eleven transition countries included in PIRLS scored on par with OECD standards in 2001 according to PIRLS measures of reading literacy (which included "literary" and "informative"). In fact, only students in Macedonia lagged considerably behind the OECD threshold, and performed not much better than students in Colombia and Iran. In contrast to the mixed gender results in the TIMSS, girls consistently outperformed boys across all the eleven transition countries. This gender gap also held true in the OECD.

PISA. There are roughly three levels of outcomes in the transition sample of eleven countries in the PISA tests in 2003: (1) the five Northern Tier CEE countries are all OECD standard; (2) Russia followed by Bulgaria, Romania and Serbia & Montenegro perform at a middle level, well below OECD standards, comparable to Thailand; and (3) Macedonia and Albania much lower score still, comparable to Tunisia, Indonesia, Brazil. Unfortunately, Russia to date is the only Eurasian country to take part in the PISA.

In general, students aged fifteen years across the transition performed best in science, worst in reading, and somewhere in between on math in PISA. In contrast, in the OECD countries, the scores across the three areas were comparable, at least on average. Girls outperformed boys in general in the transition countries. This was also the trend in OECD.

Larger communities have generally outperformed smaller communities in most of the transition countries sampled. These urban-rural disparities also appear in the OECD countries though they are not as great. Urban-rural disparities in PISA performances are particularly large in Bulgaria, followed by Hungary, Albania, and Romania.

Close to 20% of the students polled in the OECD countries claimed to be hindered either "somewhat" or "a lot" as a result of poor heating or cooling or lighting. Students in the four Northern Tier CEE countries included in the survey fared better; i.e., fewer assert that they are hindered by these constraints, ranging from only 2-3% in Hungary and the Czech Republic to 10% in Poland to almost 15% in Latvia. The Southern Tier leaders of Romania and Bulgaria are about OECD average on this score. In contrast, a much higher percentage of students in Macedonia and particularly in Russia and Albania contend that they are hindered by these constraints, roughly one-half of students in Russia and Macedonia. Students hindered by poor heating, cooling, and/or lighting systems, with two exceptions (in Poland and Romania), performed worse in the PISA tests than "non-hindered" students.

The data show that a lack of instruction materials pose a considerably larger constraint than poor heating, cooling, and lighting for students surveyed in the transition countries. Results range from 12% of students hindered in Hungary to 65% in Russia as a result of a lack of instruction materials. A very high percentage of students surveyed in Macedonia, Romania, Latvia, and

Albania also contended that a lack of instruction material was an obstacle. In addition, performance has suffered more from this constraint than poor heating, etc.

Enrollment trends revisited. Secondary school enrollments have generally suffered more during the transition than enrollments at other levels of schooling. Most of the drop in secondary enrollments, however, has occurred in Eurasia where enrollments overall have fallen substantially, from almost 70% in 1989 to 50% in 2002. Secondary school enrollments are higher today in CEE than when the transition began. In addition, when one disaggregates secondary school enrollments between general secondary and vocational/technical secondary, one finds that most of the drop in secondary school enrollments has been due to a significant drop in vocational or technical school enrollments, again mostly in Eurasia.

A reduction in the proportion of vocational enrollments relative to general enrollments from 1989 to 2002 occurred in twenty-two of the twenty-five countries for which data are available. In general, a drop in this ratio occurred in the CEE countries because vocational and technical enrollments remained relatively stable as general secondary enrollment rates increased. In contrast, the proportion of vocational and technical to general secondary dropped in Eurasia due primarily to a more than proportionate decrease in vocational and technical enrollments than a more moderate decline in general secondary enrollments.

In 1989, the large majority of transition countries had higher enrollments in vocational and technical schools than in general secondary schools: seventeen countries vs. eight. Most of the countries with a higher proportion of vocational schools are in CEE (and conversely, most of the Eurasian countries, seven countries, had general enrollment rates higher than vocational rates in 1989). The Southern Tier CEE countries had the highest proportion of vocational enrollment to general; six to seven times more vocational secondary enrollments in Macedonia, Croatia, and Romania than general secondary enrollments in 1989.

By 2002, there was much more balance between the number of countries where vocational enrollment exceeded general secondary (fourteen countries) and the number of countries where general secondary enrollments exceeded vocational (thirteen). There was a larger proportionate drop in vocational enrollments in CEE than in Eurasia from 1989 to 2002, reflecting in part that there was a larger proportion of vocational enrollments in CEE in 1989.

Quality vs. Quantity. We regressed the results from the PISA surveys on six quantity of education indicators to see how closely they correlate. Are any of the quantity of education indicators notably better than others as proxies for quality? Most of the correlations are weak, the "fit" between quantity and quality indicators are poor ones. The best fit between quantity and quality of education indicators is with higher education enrollment rates. Here, there exists a clear and consistent relationship between tertiary enrollments and PISA test results: the greater is the tertiary enrollment, the better are the test results. The r-square is 0.64, and there are no obvious outliers. This is not to suggest causality from one to the other. Rather, countries that have education systems which invest more in higher education are also those that are more likely to produce a higher quality, more relevant education overall (i.e. not confined to higher education).

Education gaps. We analyzed which countries appeared to be particularly vulnerable on each education indicator, quantity plus quality, and ranked the countries accordingly. There are many data gaps, particularly for the quality of education indicators. Hence, the overall education deficiencies per country were assessed by calculating the vulnerabilities as a percent of the indicators in which data are available. There were a total of twelve indicators. However, for only two countries, the Czech Republic and Hungary, were there data available for each of these twelve indicators. Seven other countries had data available for ten or eleven indicators. At the other extreme, three countries, Bosnia-Herzegovina, Uzbekistan, and Kazakhstan, had data for only four of the twelve indicators. Given the wide range of available data per country, we produced two lists of vulnerable countries: those with the highest proportion of vulnerable indicators (regardless of the number of indicators per country being tracked); and the most vulnerable countries from a smaller country sample consisting of those countries which have data for a majority (seven or more) of the twelve indicators.

From the full sample of twenty-seven countries, ten were found to have at least 50% of education indicators deemed vulnerable. Four are CEE countries: Bosnia-Herzegovina; Albania, Macedonia, and Romania. Six are Eurasian countries: Turkmenistan, Tajikistan, Armenia, Azerbaijan; Uzbekistan, and Georgia. From the limited sample of sixteen countries (which have data for a majority of the twelve indicators), four countries stand out as the most vulnerable: Albania; Armenia; Macedonia; and Romania.

Finally, it is important to underscore that there remain numerous data gaps; many "missing pieces to the puzzle." Most Eurasian countries are not currently included in any of the cross-national performance tests, though a number more are scheduled to be included in the next couple years. Even still, the test results among the four cross-national assessments are not readily interchangeable. Moreover, we have even less data of trends over time. Only TIMSS and PISA tests have surveyed students from a handful of countries more than once, and the results provide only clues of possible trends over time, creating as many questions as answers.

Introduction and Methodology[1]

The primary objective of this paper is to analyze the quality of education in the transition region. Much empirical analysis has focused on the "quantity" of education, such as enrollment and education expenditure trends, in no small part because most of the available empirical evidence pertains to the quantity rather than the quality of education. This paper attempts to synthesize the findings from a handful of cross-country assessments which in turn attempt to measure progress across students and/or adults worldwide towards achieving certain academic standards and perhaps more importantly, progress towards preparing students for employment in the global market economy.

The conventional wisdom has been that educational aspects of human capital in the former Communist countries were largely an asset going into the transition. The priority under the communist system for universal education was high and hence so were enrollments; performances in various global forums in the sciences and math among students from behind the Iron Curtain were impressive. However, it has also been widely perceived that the type of education in the Communist countries (with emphases on memorization at the expense of analytical and critical thinking, and perhaps premature specialization if not over-specialization) may be ill-suited for the needs of a market economy.

Below, we analyze trends in four cross-country surveys on education performance: the Trends in International Mathematics and Sciences Study (TIMSS); the International Adult Literacy Survey (IALS); the Progress in International Reading Literacy Study (PIRLS); and the Program for International Student Assessment (PISA). Participation in the surveys among transition countries remains limited, though it is increasing. Most of the transition countries included are in Central and Eastern Europe (CEE) and few are in Eurasia (where one might expect the quality of education may be the most troublesome). Hence, part of this analysis is also to revisit the salient enrollment and expenditure trends in the region and to compare them with the results of the cross-national surveys. To what extent can some of the quantity of education indicators be used as proxies for the quality of education? Or similarly, how meaningful are the quantity of education indicators? To what extent can we extrapolate the limited evidence from the quality of education surveys to countries not yet included in these surveys?

Table 1 shows the transition countries that have participated in the four surveys to date, as well as countries scheduled to participate in the near future (in 2006 and 2007). Sixteen transition countries have so far been included in at least one of the surveys. By 2007, twenty-five transition countries will have participated in at least one survey; i.e., all but Turkmenistan and Tajikistan. This is not to suggest, as should be evident in the analyses to follow, that the various surveys are necessarily readily inter-changeable.

Table 2 shows the complete sample of countries worldwide included in the surveys to date. Sample sizes range from twenty countries in the IALS (all OECD countries), to fifty-five countries in the TIMSS. In general, the developing countries are under-represented in these surveys even more so than the transition countries.

[1] Many thanks to Luba Fajfer of E&E/DGST for her very helpful feedback and insights on earlier drafts of this research.

Table 3 provides the basic parameters of each of the four surveys. TIMSS is designed to test academic achievement in the areas of mathematics (numbers, fractions, algebra, and geometry) and the sciences (including chemistry, the life sciences, and physics) amongst students in approximately grade eight. TIMSS more directly assesses student achievement than it does "real world" applicability. That is, it primarily tests a student's ability to retain and recall information learned during instruction. The International Association for the Evaluation of Educational Achievement (IEA) conducts the assessment every four years. The IEA is an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement since 1959. To date, there exist TIMSS results from 1995, 1999, and 2003. The next round will be completed in 2007. The 2003 round surveyed the achievements of 49 countries—36 of which had also participated in either the 1995 and 1999 rounds. TIMSS has assessed the student performance of fourteen countries in the E&E transition region. Of these, seven belong to the Northern Tier CEE, four to the Southern Tier CEE, and three to Eurasia.

PIRLS, also administered by the IEA, focused on two aspects of reading literacy (literary and informative) in students in the fourth grade in 2001. The target group is the youngest of all four cross-country assessments. PIRLS assessments took place in thirty five countries worldwide, including eleven transition countries. The next round will take place in 2006.

The IALS study was conducted by the OECD and focused on adults' ability to utilize information to function in the context of advanced, complex societies. IALS defines literacy as the ability to understand and employ printed information in daily activities, at home, at work, and in the community, to achieve one's goals and to develop one's potential. It attempts to measure functional literacy in three areas: prose, document, and quantitative. Prose literacy is defined as the knowledge and skills needed to understand and use information from texts, including editorials, news stories, poems, and fiction. Document literacy is defined as the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms, transport schedules, maps, tables, and graphics. Quantitative literacy is defined as the knowledge and skills required to apply arithmetic operations, either alone or sequentially, to numbers in printed materials. For each area, IALS scores are grouped into four levels—level four representing the highest level of literacy and level one representing the lowest.[2] IALS defines literacy level three as the minimum level required to function in advanced, complex societies. As such, our attention will be focused on the percentage of respondents scoring at or above this level. The one and only IALS assessment was

[2] Level 1 – Indicates a person with very poor skills, where the person may, for example, be unable to determine the correct amount of medicine from printed information.
Level 2 – Respondents can deal only with material that is simple, clearly laid out, and in which the tasks involved are not too complex. It denotes a weak level of skill, but more hidden than level 1. It identifies people who can read, but test poorly. They may have developed coping skills to manage everyday literacy demands, but their low level of proficiency makes it difficult for them to face novel demands, such as learning new job skills.
Level 3 – Is considered a suitable minimum for coping with the demands of everyday life and work in complex, advanced society. It denotes roughly the skill level required for successful secondary school completion and college entry. Like higher levels, it requires the ability to integrate several sources of information and solve complex problems.
Level 4 – describes respondents who demonstrate command of higher-order information processing skills.

carried out between 1994 and 1998 and tested the literacy of adults aged 16 to 65 in twenty countries. Of these, only four belong to the E&E transition region and all are in the Northern Tier CEE.

The PISA study, also conducted by the OECD, also adopts the IALS' broad definition of literacy. In particular, PISA attempts to focus on how well students, aged approximately fifteen, use knowledge in reading, mathematics, and science to meet real-world challenges. The OECD conducts the assessment every three years. Assessments have already been administered in both 2000 and 2003; the next round will be completed in 2006.[3] Forty-five countries have participated in at least one of the PISA surveys. Of these, eleven belong to the transition region—five from the Northern Tier CEE, five from the Southern Tier CEE, and Russia. Only five E&E countries participated in both 2000 and 2003.

Findings

TIMSS. *Figures 1-4* and *Tables 4* and *5* show the primary results from TIMSS. Overall, the students sampled in fourteen transition countries included in this survey performed very well in 2003 by international standards. Students in the Northern Tier CEE countries as well as in Russia performed roughly at OECD standards in math and science, and above the intermediate benchmark defined as the minimum acceptable level ("where students can recognize, apply and communicate basic math and scientific knowledge in straightforward situations.") (*Table 4* and *Figures 1* and *2*). All the other transition countries included in the surveys except Macedonia performed at or near the intermediate benchmark. This includes Bulgaria, Serbia & Montenegro, and Romania in the Southern Tier CEE, and Armenia and Moldova in Eurasia.

Macedonia is the only transition country of the fourteen that lags notably behind the minimum threshold; its students performed closest to students in Iran, and not much better than students in Indonesia and Lebanon. Of the fifty-five countries worldwide included in at least one of the surveys, South Africa and Ghana lag the most and far below standards in the fourteen transition countries, including Macedonia. However, only two of the relatively low–income transition countries (Armenia and Moldova) have so far been included in the TIMSS.

On average, boys outperform girls in both the math and science in the TIMSS tests in the OECD countries (*Table 5* and *Figure 3*). This is the pattern in the United States as well. This gender gap in the OECD countries is larger in science than in math. The pattern is more mixed in the fourteen transition countries. While boys outperform girls in science in ten of the fourteen transition countries, girls outperform boys in math in ten transition countries. In many cases, the differences are likely not very significant. The largest overall gaps exist in the transition countries at both ends of the performance spectrum.

[3] Subsequent to the PISA 2000 round which involved predominately OECD countries, the assessment was repeated between 2001 and 2002 in eleven non-OECD countries in an exercise entitled PISA+. OECD officially publishes these results with those from PISA 2000.

That is, in the transition countries which score the highest (in Hungary and the Czech Republic in particular), boys outperform girls by a relatively large amount, while in the countries which score the lowest (Macedonia and Armenia in particular), the gap is also large, albeit reversed: girls outperform boys.

Figure 4 shows the limited data of TIMSS trends over time in nine transition countries (and in the U.S.), comparing the 1995 survey with 1999 and the most recent, 2003. Good progress has been made in performance scores in Lithuania and Latvia from 1995 to 2003. However, notable backsliding has occurred in four countries. Bulgaria has showed the biggest slide (it was the best performer of the fourteen countries in 1995). Macedonia, Russia, and Slovakia also witnessed backtracking during this time period as well. This is particularly striking for Macedonia since it was the worst performer of the transition sample in 1995.

IALS. The key IALS results are shown in *Table 6* and *Figures 5* and *6*. In three of the four Northern Tier CEE countries (Poland, Slovenia and Hungary), only 26-36% of the population sampled in 1994-1998 scored at least the minimum level of "3", and hence by IALS definition were able to at least minimally cope with the demands of advanced society. The Czech Republic, in contrast, has a score that slightly exceeded the OECD average; in the Czech Republic, 58% of the population surveyed tested above the minimum acceptable threshold. In general, the results are striking in how low the percentage of the population virtually everywhere is "functionally literate"; roughly half of the population in the OECD and also in the U.S. failed to attain this minimum threshold. The best scores were found in Sweden (75% above the threshold) and Norway (69%).

In the OECD (and including in the U.S.), the results according to the three subject areas--prose, document, and quantitative—were roughly even (*Figure 6* and *Table 6*). In contrast, the results were much more imbalanced in the four transition countries; that is, much more favorable results in quantitative tests and much weaker and weakest in prose.

The conclusions from the IALS are limited not only because of the small transition country sample, but also because the 1994-1998 findings are now notably dated, particularly so in the context of the context of much transformation in the region.

PIRLS. (*Table 7* and *Figures 7* and *8*). Most of the eleven transition countries scored on par with OECD standards; overall, better results than shown in the IALS. In fact, only Macedonia lagged considerably behind the OECD threshold, and not much better than results in Colombia and Iran. In contrast to the mixed results in the TIMSS, girls consistently outperformed boys across all the eleven transition countries as well as in the OECD (and including the U.S.).

PISA. *Tables 8-11* and *Figures 9-17* show the PISA results. From *Figure 9*, there are roughly three levels of outcomes in the transition sample: (1) the five Northern Tier CEE countries are all OECD standard (and Hungary and Poland do better here than in the 1994-1998 IALS, perhaps because science scores in PISA are pulling up the

performance, and/or perhaps because performances have improved from 1994-1998 to 2003); (2) Russia followed by Bulgaria, Romania and Serbia & Montenegro perform at a middle level, well below OECD standards, comparable to Thailand; and (3) Macedonia and Albania much lower score still, comparable to Tunisia, Indonesia, Brazil. Unfortunately, Russia to date is the only Eurasian country to take part in the PISA.

Figure 10 and *Table 8* show the scores disaggregated by the three domains or areas: reading, math, and science. In general, students across the transition perform best in science and worst in reading. In contrast, in the OECD countries, the scores across the three areas are comparable, at least on average.

Females outperform males in general in the transition country sample (*Figure 11* and *Table 9*). This is also the trend in OECD. The gender gap is greatest in the transition sample where the overall scores are the lowest, i.e., in Albania and Macedonia. Of the three areas, this gender gap is the largest in reading (i.e., in all eleven transition countries, females outperform males in reading). In math and science, females outperform males in a majority of the countries; in six out of eleven in math and in seven out of eleven in science.

PISA tests have taken place in 2000 and 2003 in only five transition countries: four Northern Tier CEE countries (Latvia, Hungary, Poland, and the Czech Republic) and Russia (*Figure 12*). Some gains in performance were made in the four Northern Tier CEE countries from 2000-2003, particularly in Latvia followed by Poland. Performance in Russia held steady between 2000 and 2003. By way of contrast, some backsliding occurred in the U.S. in this period.

Figure 13 and *Table 10* show PISA results differentiated by community size. These results, i.e., roughly show the extent of urban-rural disparities. Larger communities (that is, with population more than 15,000) have generally outperformed smaller communities (with population less than 15,000) in most of the transition countries sampled. These urban-rural disparities also appear in the OECD countries though they are not as great. In the transition country sample, the urban-rural disparity is the largest in Bulgaria, followed by Hungary, Albania, and Romania. This trend does not exist in the U.S., however, where i.e., smaller communities outperform larger communities. Nor does it hold true in Macedonia, the lone exception among the transition country sample.

These findings by community size hold whether one averages the three areas or whether one looks at each area separately. In other words, of the eleven transition countries, only in Macedonia do smaller communities score higher than larger communities in each of the three areas: in reading, math and science.

Table 11 and *Figures 14-17* summarize efforts to assess the magnitude and impact of key infrastructure constraints to learning. Specifically, how much have students sampled in PISA been constrained in their performance by poor conditions in school buildings, poor heating/cooling and/or lighting systems, and by a lack of instruction materials? Close to 20% of the students polled in the OECD countries claimed to be hindered either

"somewhat" or "a lot" as a result of poor heating or cooling or lighting (*Figure 14*). Students in the four Northern Tier CEE countries included in the survey fare better; i.e., fewer assert that they are hindered by these constraints, ranging from only 2-3% in Hungary and the Czech Republic to 10% in Poland to almost 15% in Latvia. The Southern Tier leaders of Romania and Bulgaria are about OECD average on this score. In contrast, a much higher percentage of students in Macedonia and particularly in Russia and Albania contend that they are hindered by these constraints, roughly one-half of students in Russia and Macedonia.

Figure 15 assesses whether these constraints manifest in poorer test results. For each country, performance among students claiming to be hindered was compared with performance among students claiming not to be hindered. Students hindered by poor heating, cooling, and/or lighting systems, with two exceptions (in Poland and Romania), performed worse than "non-hindered" students. The largest differential was found in Macedonia; i.e., these constraints of poor heating or cooling or lighting had the biggest detrimental impact in Macedonia.

The data show that a lack of instruction materials pose a considerably larger constraint than poor heating, cooling, and lighting for students surveyed in the transition countries (*Figure 16*). Moreover, this finding is the reverse of that among students in the OECD countries on average. Results range from 12% of students hindered in Hungary to 65% in Russia. A very high percentage of students surveyed in Macedonia, Romania, Latvia, and Albania also contended that a lack of instruction material was an obstacle. In addition, performance has suffered more from this constraint than poor heating, etc. (*Figure 17*). Hindered students consistently perform worse with this constraint than non-hindered students; the detrimental impact is particularly evident in Macedonia, Bulgaria, Poland, and Hungary.

Quality of education indicators compared. One question to consider, particularly given the limited countries involved, is to what extent might the results of the four cross-country surveys (i.e., the TIMSS; IALS, PIRLS, and PISA) be inter-changeable? To what extent can one be used as a proxy for another? If, for example, Moldova students score poorly on one test, how precarious might it be to infer that Moldovan students would likely score poorly on another? One preliminary way to get at this issue is to measure the correlation between two different sets of scores. We find some surprising results when we do so. Despite similar conceptual bases, the correlation between results in PISA and IALS is very low (an r-square of 0.37; *Figure 18*). Perhaps this reflects a changing situation over time. In contrast, PISA results and TIMSS scores correlate quite well even though these surveys don't particularly mesh well conceptually. This relatively good fit holds when one compares results of transition country students only (r-square of 0.79; *Figure 19*) and similarly with the larger worldwide sample (r-square of 0.74; *Figure 20*).

Enrollment trends revisited. Secondary school enrollments have generally suffered more during the transition than enrollments at other levels of schooling (*Figures 21-24*). Most

of the drop in secondary enrollments, however, has occurred in Eurasia where enrollments overall have fallen substantially, from almost 70% in 1989 to 50% in 2002. Secondary school enrollments are higher today in CEE than when the transition began. In addition, when one disaggregates secondary school enrollments between general secondary and vocational/technical secondary, one finds that most of the drop in secondary school enrollments has been due to a significant drop in vocational or technical school enrollments, again mostly in Eurasia (*Figures 25* and *26*).

Figures 27-32 and *Tables 12-14* show secondary school enrollment trends (total, general, and vocational/technical) for all of the Southern Tier CEE and Eurasian countries individually. They show that the sub-regional (average) trends mask considerable diversity. Total secondary enrollments in the Southern Tier CEE countries range from Croatia and Bulgaria at 85% to Albania and Bosnia-Herzegovina at 50%. In Eurasia, total secondary enrollments range from Belarus and Russia at 70% to Tajikistan and Turkmenistan at less than 30%.

Moreover, some countries rank very differently in enrollment levels when one compares vocational/technical enrollments with general enrollments. Most striking is Albania. Albania, alongside Bulgaria, has the highest general secondary enrollment rate in the Southern Tier CEE countries, yet the lowest secondary school enrollment rate in vocational/technical schools. Croatia has the highest vocational enrollment rate in the Southern Tier CEE, yet is among the laggards in general secondary school enrollment. Armenia has among the highest general secondary school enrollment in Eurasia, but also among the lowest vocational/technical enrollments rates.

Table 15 looks at the composition of secondary school enrollments more systematically. What was the mix of vocational to general enrollments rates in 1989? What is the proportion roughly today (2002 most recent data)? How has it changed from 1989 to 2002? Overall, there is a great deal of diversity of results among the countries. Perhaps the most evident general trend is the reduction in the proportion of vocational enrollments relative to general enrollments from 1989 to 2002. This occurred in twenty-two of the twenty-five countries for which data are available.

In 1989, the large majority of transition countries had higher enrollments in vocational and technical schools than in general secondary schools: seventeen countries vs. eight. Most of the countries with a higher proportion of vocational schools are in CEE (and conversely, most of the Eurasian countries, seven countries, had general enrollment rates higher than vocational rates in 1989). The Southern Tier CEE countries had the highest proportion of vocational enrollment to general; six to seven times more vocational secondary enrollments in Macedonia, Croatia, and Romania than general secondary enrollments in 1989.

By 2002, there was much more balance between the number of countries where vocational enrollment exceeded general secondary (fourteen countries) and the number of countries where general secondary enrollments exceeded vocational (thirteen). There was a larger proportionate drop in vocational enrollments in CEE than in Eurasia from

1989 to 2002, reflecting in part that there was a larger proportion of vocational enrollments in CEE in 1989.

The meaning of these trends needs to be explored. Can one generalize to say that a proportionate drop in vocational and technical school enrollments is a good thing given the overspecialization that took place prior to communism's collapse? Is this trend a necessary part of the transition to a market-oriented democracy? To what extent does the quality and appropriateness of vocational and technical training differ across countries? Are there key differences between vocational schools and technical schools? We are not aware of an effort which has attempted to systematically address these questions.

Quality vs. quantity. We regressed the results from the PISA surveys on six quantity of education indicators to see how closely they correlate (*Figures 33-39*). Are any of the quantity of education indicators notably better than others as proxies for quality? The six indicators are: basic or primary school enrollment; total secondary school enrollment; general secondary enrollment; vocational/technical enrollment; tertiary or higher education enrollment; and public spending on education as % of GDP.

Most of the correlations are weak, the "fit" between quantity and quality indicators are poor ones. Perhaps surprisingly, the poorest fit is between general school enrollments and the PISA scores (an r-square of 0.05); countries with roughly the same general enrollment rates have very different PISA scores (Albania vs. Hungary, e.g.). Vocational enrollment rates correlate somewhat better, though the fit is still poor. However, when one combines the two secondary school enrollment rates, one finds a reasonable fit (tempered by two significant outliers: Macedonia and Albania). In general, the greater is the total secondary enrollment, the better are the PISA test results.

Basic enrollment figures do not correlate very closely with PISA results; a very low r-square. However, the same two outliers, Macedonia and Albania, emerge. This may suggest that the primary and secondary education systems in Macedonia and Albania are more inefficient than the norm among the transition countries.

In addition, the amount a government spends on education does not correlate very well with PISA test results. The efficiency and targeting of expenditures may be more important than the volume of spending.

The best fit between quantity and quality of education indicators is with higher education enrollment rates. Here, there exists a clear and consistent relationship between tertiary enrollments and PISA test results: the greater is the tertiary enrollment, the better are the test results. The r-square is 0.64, and there are no obvious outliers. This is not to suggest causality from one to the other. Rather, countries that have education systems which invest more in higher education are also those that are more likely to produce a higher quality, more relevant education overall (i.e. not confined to higher education).

Education gaps. Finally, in a similar vein (albeit in a less sophisticated mode) to previous "hot spots" analyses conducted by the E&E Bureau,[4] we analyzed which countries appeared to be particularly vulnerable on each education indicator, quantity plus quality, and ranked the countries accordingly. *Table 17* summarizes the results and includes threshold definitions of vulnerability. There are many data gaps, particularly for the quality of education indicators. Hence, the overall education deficiencies per country were assessed by calculating the vulnerabilities as a percent of the indicators in which data are available. There were a total of twelve indicators: enrollments at all levels, education expenditures; the quality of education survey indicators, as well as a proxy indicator to measure "brain drain" (*Table 16* and *Figure 40*).[5] However, for only two countries, the Czech Republic and Hungary, was there data available for each of these twelve indicators. Seven other countries had data available for ten or eleven indicators. At the other extreme, three countries, Bosnia-Herzegovina, Uzbekistan, and Kazakhstan, had data for only four of the twelve indicators. Given the wide range of available data per country, it seemed appropriate to produce two lists of vulnerable countries: those with the highest proportion of vulnerable indicators (regardless of the number of indicators per country being tracked); and the most vulnerable countries from a smaller country sample consisting of those countries which have data for a majority (seven or more) of the twelve indicators.

From the full sample of twenty-seven countries, ten were found to have at least 50% of education indicators deemed vulnerable. Four are CEE countries: Bosnia-Herzegovina; Albania, Macedonia, and Romania. Six are Eurasian countries: Turkmenistan, Tajikistan, Armenia, Azerbaijan; Uzbekistan, and Georgia. From the limited sample of sixteen countries (which have data for a majority of the twelve indicators), four countries stand out as relatively vulnerable: Albania; Armenia; Macedonia; and Romania.

We provide a visual summary of the education profiles of two of these four vulnerable countries: Macedonia (*Figures 41* and *42*) and Albania (*Figures 43* and *44*). Macedonia's enrollment trends are relatively favorable (*Figure 41*). There has been little deterioration in enrollment numbers. However, the pre-primary enrollment rate in Macedonia is only 27%, well below regional standards (Eurasia: 32%; Southern Tier CEE: 52%; and Northern Tier CEE: 72%). In addition, tertiary enrollment is very low in Macedonia relative to Northern Tier CEE standards (23% vs. 50%), though not Southern Tier CEE and Eurasian averages (24% and 26% respectively).

Macedonia falls far short by various standards from the PISA assessments (*Figure 42*). The performance of its students is dwarfed by OECD standards, across the three subject areas (and most saliently, reading), and by gender (most saliently, males). A high percentage of students in Macedonia are hindered by school infrastructure (heating, cooling, and/ lighting systems), and particularly by a lack of instructional materials;

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[4] See USAID/EE/DGST, *Social Issues Critical for Sustainability of Reform: Education Sector Discussion Paper* (August 2003).

[5] The "brain drain" proxy, drawn from UNESCO, measures the change of the research and development personnel per million inhabitants between two time periods, 1994-1996 vs. 1999-2001.

almost half of the students surveyed found themselves hindered by a lack of instructional materials (vs. 17% of students surveyed in the OECD countries).
Enrollment trends in Albania are troublesome (*Figure 43*). Secondary school enrollment rates have dropped significantly since 1989, from almost 80% to 50%. All of this drop is attributed to vocational and technical enrollments plummeting (while general secondary enrollment rates increased modestly). Pre-primary enrollment rate is only 34%, and the tertiary enrollment rate is only 14%.

Albanian students scored very poorly on the PISA test, even worse than students in Macedonia. Over 50% of students surveyed are hindered by heating, cooling, and/or lighting; 57% are hindered by a lack of instruction materials. Large disparities exist by gender (males lag considerably) and by subject areas (Albanian's score much poorer on reading than on math and science), and by community size (performance of rural students are far below those of urban students).

One last observation from this rack-up of education gaps merits explicit attention. It is striking how little quantitative information we have on a number of transition countries. Of a total of twelve indicators, we have data for only four indicators in the case of Bosnia-Herzegovina, Uzbekistan, and Kazakhstan; five in the case of Turkmenistan, Tajikistan, Azerbaijan, and Croatia; and six in the case of Georgia, Ukraine, and Belarus. In eight of the twelve Eurasian countries, we have no more than half of the indicators available. Moreover, the data gaps may very likely be a reasonable proxy for relatively unreliable indicators where data do exist.

Table 1. E&E Countries Participating in Cross-National Student Assessments

	TIMSS				IALS	PISA			PIRLS	
	1995	1999	2003	2007	(94-98)	2000	2003	2006	2001	2006
Albania						x				
Armenia			x	x						
Azerbaijan								x		
Belarus										x
Bosnia-Herzegovina				x						
Bulgaria	x	x	x	x		x		x	x	x
Croatia								x		
Czech Republic	x	x		x	x	x	x	x	x	
Estonia			x					x		
Georgia				x						x
Hungary	x	x	x		x	x	x	x	x	x
Kazakhstan								x		
Kyrgyzstan								x		
Latvia	x	x	x	x		x	x	x	x	x
Lithuania	x	x	x	x				x	x	x
FYR Macedonia		x	x			x			x	x
Moldova		x	x	x					x	x
Poland					x	x	x	x		x
Romania	x	x	x	x		x		x		x
Russia	x	x	x	x		x	x	x	x	x
Serbia & Montenegro				x			x	x		
Slovakia	x	x	x	x			x	x	x	x
Slovenia	x	x	x	x	x			x	x	x
Ukraine				x						
Uzbekistan				x						
Total (25 Countries)	9	11	12	14	4	8	7	16	10	13

TIMSS 2007 is in its preliminary stages, countries listed are those that have expressed interest in participating.

Table 2. Countries Participating in Cross-National Assessments

PISA 2000	PISA 2003	IALS	TIMSS 2003	TIMSS 1999	TIMSS 1995	PIRLS
Albania	Australia	Australia	Argentina	Argentina	Australia	Argentina
Argentina	Austria	Belgium	Armenia	Australia	Beligum	Belize
Austia	Belgium	Canada	Australia	Beligum	Bulgaria	Bulgaria
Australia	Brazil	Chile	Bahrain	Bulgaria	Canada	Canada
Belgium	Canada	Czech Republic	Beligum	Canada	Cyprus	Colombia
Brazil	Czech Republic	Denmark	Botswana	Chile	England	Cyprus
Bulgaria	Denmark	Finland	Bulgaria	China-Taipei	Hong King	Czech Rep.
Canada	Finland	Germany	Canada	Cyprus	Hungary	England
Chile	France	Hungary	Chile	England	Iran	France
Czech Republic	Germany	Ireland	Chinese Taipei	Hong King	Israel	Germany
Denmark	Greece	Netherlands	Cyprus	Hungary	Italy	Greece
Finalnd	Hong Kong-China	New Zealand	Egypt	Indonesia	Japan	Hong King
France	Hungary	Norway	England	Iran	S. Korea	Hungary
FYR Macedonia	Iceland	Poland	Estonia	Israel	Latvia	Iceland
Germany	Indonesia	Portugal	Ghana	Italy	Lithuania	Iran
Greece	Ireland	Slovenia	Hong King	Japan	Netherlands	Israel
Hong Kong-China	Italy	Sweden	Hungary	Jordan	New Zeal.	Italy
Hungary	Japan	Switzerland	Indonesia	S. Korea	Norway	Kuwait
Iceland	Korea	UK	Iran	Latvia	Romania	Latvia
Indonesia	Latvia	USA	Israel	Lithuania	Russia	Lithuania
Ireland	Liechtenstein		Italy	Macedonia	Scotland	Macedonia
Israel	Luxembourg		Japan	Malaysia	Singapore	Moldova
Italy	Macao-China		Jordan	Moldova	Slovakia	Morocco
Japan	Mexico		S. Korea	Morocco	Slovenia	Netherlands
Korea	Netherlands		Labanon	Netherlands	South Africa	New Zealand
Latvia	New Zealand		Latvia	New Zealand	Sweden	Norway
Liechtenstein	Norway		Lithuania	Philippines	USA	Russia
Luxembourg	Poland		Macedonia	Romania		Scotland
Mexico	Portugal		Malaysia	Russia		Singapore
Netherlands	Russia		Moldova	Singapore		Slovakia
New Zealand	Serbia & Montenegro		Morocco	Slovakia		Slovenia
Norway	Slovakia		Netherlands	Slovenia		Sweden
Peru	Spain		New Zealand	South Africa		Turkey
Poland	Sweden		Norway	Tunisia		USA
Portugal	Switzerland		Palestine	USA		
Romania	Thailand		Philippines			
Russia	Tunisia		Romania			
Spain	Turkey		Russia			
Sweden	United Kingdom		Saudi Arabia			
Switzerland	USA		Scotland			
Thailand	Uruguay		Serbia			
United Kingdom			Singapore			
USA			Slovakia			
			Slovenia			
			South Africa			
			Spain-Basque			
			Sweden			
			Syria			
			Tunisia			
			USA			
			Yemen			

Table 3. Cross-National Testing Assessments

	IALS International Adult Literacy Survey	**PISA** Program for International Student Assessment	**TIMSS** Trends in International Mathematics and Sciences Study	**PIRLS** Progress in International Reading and Literacy Study
Countries	**20 Countries (4 E&E)** Northern Tier CEE Czech Republic, Hungary, Poland, Slovenia.	**45 Countries (11 E&E)** Northern Tier CEE Czech Republic, Hungary, Latvia, Poland, Slovakia. Southern Tier CEE Albania, Bulgaria, FYR Macedonia, Romania, Serbia-Montenegro. Eurasia Russia.	**55 Countries (14 E&E)** Northern Tier CEE Czech Republic, Estonia, Hungary, Latvia, Lithuania, Slovakia, Slovenia. Southern Tier CEE Bulgaria, FYR Macedonia, Romania, Serbia. Eurasia Armenia, Moldova, Russia.	**35 Countries (11 E&E)** Northern Tier CEE Czech Republic, Hungary, Latvia, Lithuania, Slovakia, Slovenia. Southern Tier CEE Bulgaria, FYR Macedonia, Romania. Eurasia Moldova, Russia.
Topics	• Prose Literacy • Document Literacy • Quantitative Literacy	• Reading • Mathematics • Science	• Mathematics • Science	• Reading Literacy
Years	1994-1998 (1 Survey)	2000 & 2003	1995, 1999, & 2003	2001
Ages	Adults 16-65	~ 15 years old	~ 8th Grade	~ 4th Grade

Table 4. TIMSS

	1995			1999			2003		
	Math	Science	Total	Math	Science	Total	Math	Science	Total
Czech Republic	564	574	569	520	539	530	-	-	-
Estonia	-	-	-	-	-	-	531	552	542
Hungary	527	537	532	532	552	542	529	543	536
Latvia	488	476	482	505	503	504	505	512	509
Lithuania	472	464	468	482	488	485	502	519	511
Slovakia	534	532	533	534	535	535	508	517	513
Slovenia	494	514	504	-	-	-	493	520	507
Bulgaria	527	545	536	511	518	515	476	479	478
FYR Macedonia	-	-	-	447	458	453	435	449	442
Romania	474	474	474	472	472	472	475	470	473
Serbia	-	-	-	-	-	-	477	468	473
Armenia	-	-	-	-	-	-	478	468	473
Moldova	-	-	-	469	459	464	460	472	466
Russia	524	523	524	526	529	528	508	514	511
OECD Average	531	533	532	522	526	524	518	527	523

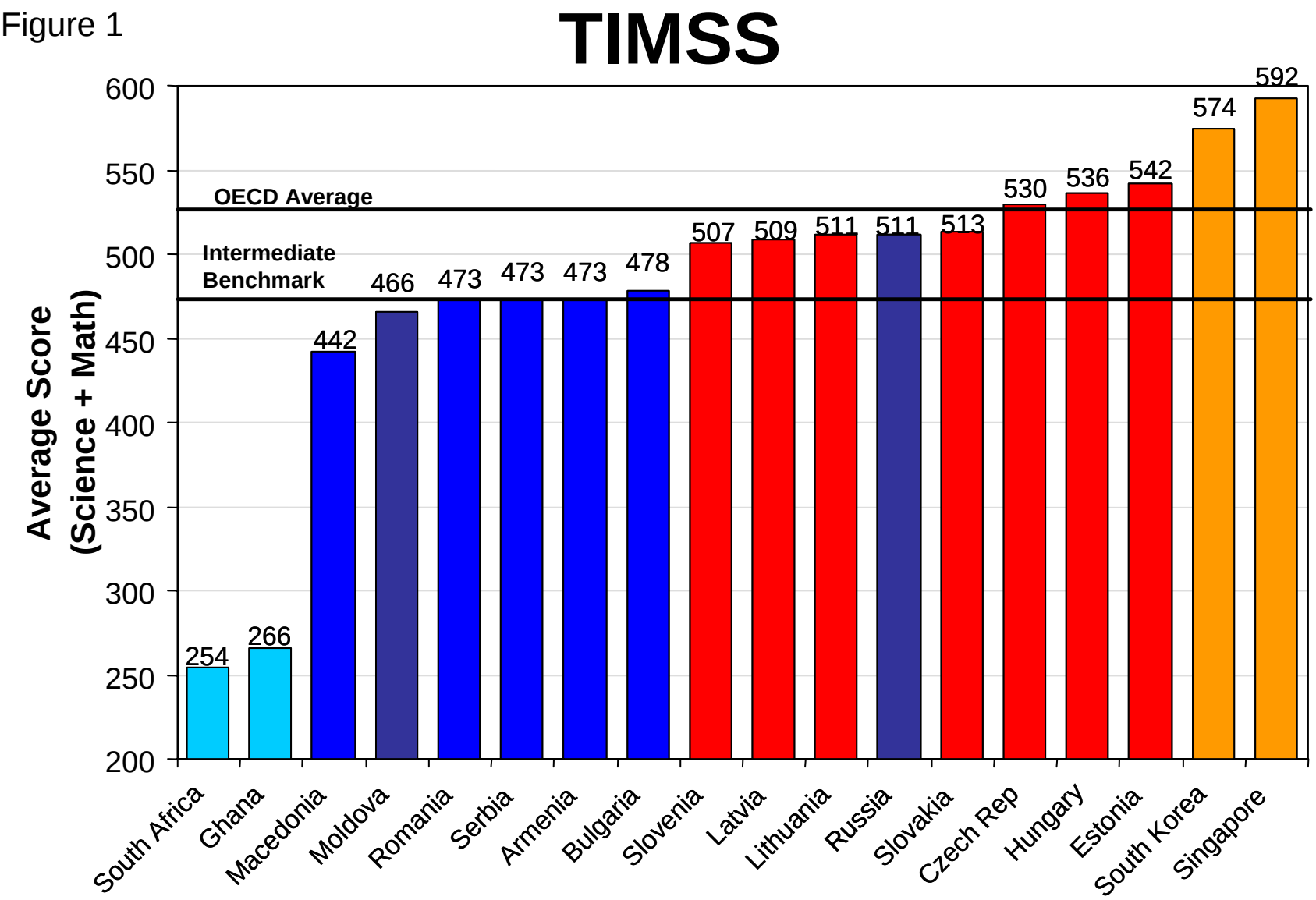
Mullis, I.V.S., M.O. Martin, E.J. Gonzalez, S.J. Chrostowski (2004), *TIMSS 2003 International Science Report: Findings from IEA's* Trends in International Mathematics and Science (2004).

Table 5. TIMSS by Gender

	Math		Science		Total	
	Male	Female	Male	Female	Male	Female
Czech Republic	528	512	557	523	543	518
Estonia	530	532	551	554	541	543
Hungary	533	526	556	530	545	528
Latvia	506	511	516	509	511	510
Lithuania	499	503	522	516	511	510
Slovakia	508	508	525	508	517	508
Slovenia	491	495	524	517	508	506
Bulgaria	477	476	487	470	482	473
FYR Macedonia	431	439	445	454	438	447
Romania	473	477	474	465	474	471
Serbia	473	480	471	465	472	473
Armenia	473	483	458	468	466	476
Moldova	455	465	468	477	462	471
Russia	507	510	519	508	513	509
OECD	518	515	534	520	526	518
United States	507	502	536	519	522	511

Mullis, I.V.S., M.O. Martin, E.J. Gonzalez, S.J. Chrostowski (2004), *TIMSS 2003 International S*
Findings from IEA's Trends in International Mathematics and Science (2004).

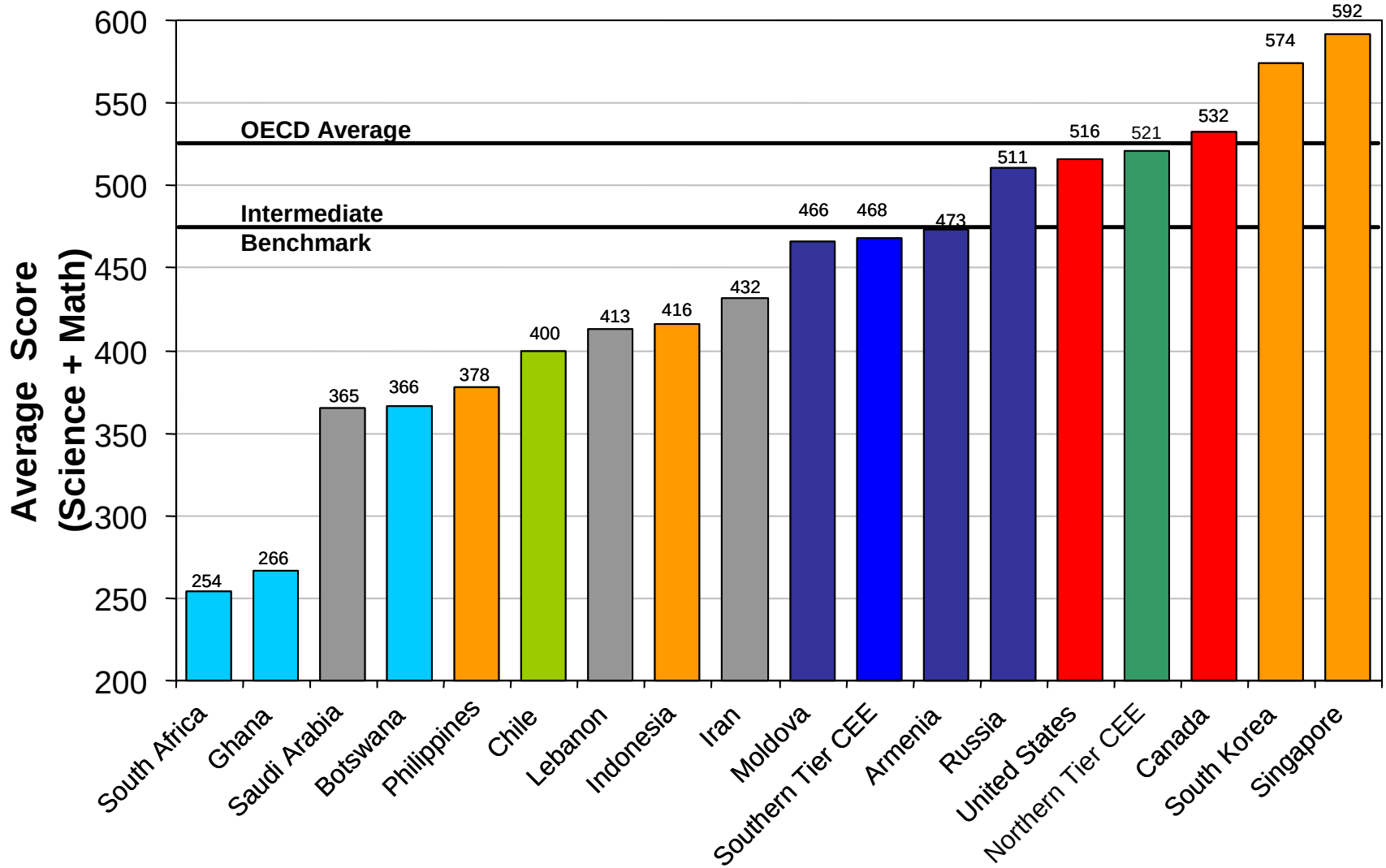
Figure 1



Average scale score is the average of the math and science domains. All countries use results from TIMSS 2003, except the Czech Republic which uses TIMSS 1999 results. The 2003 OECD average was 527. The intermediate international benchmark is defined as scores at or above 475. IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004).

Figure 2

TIMSS

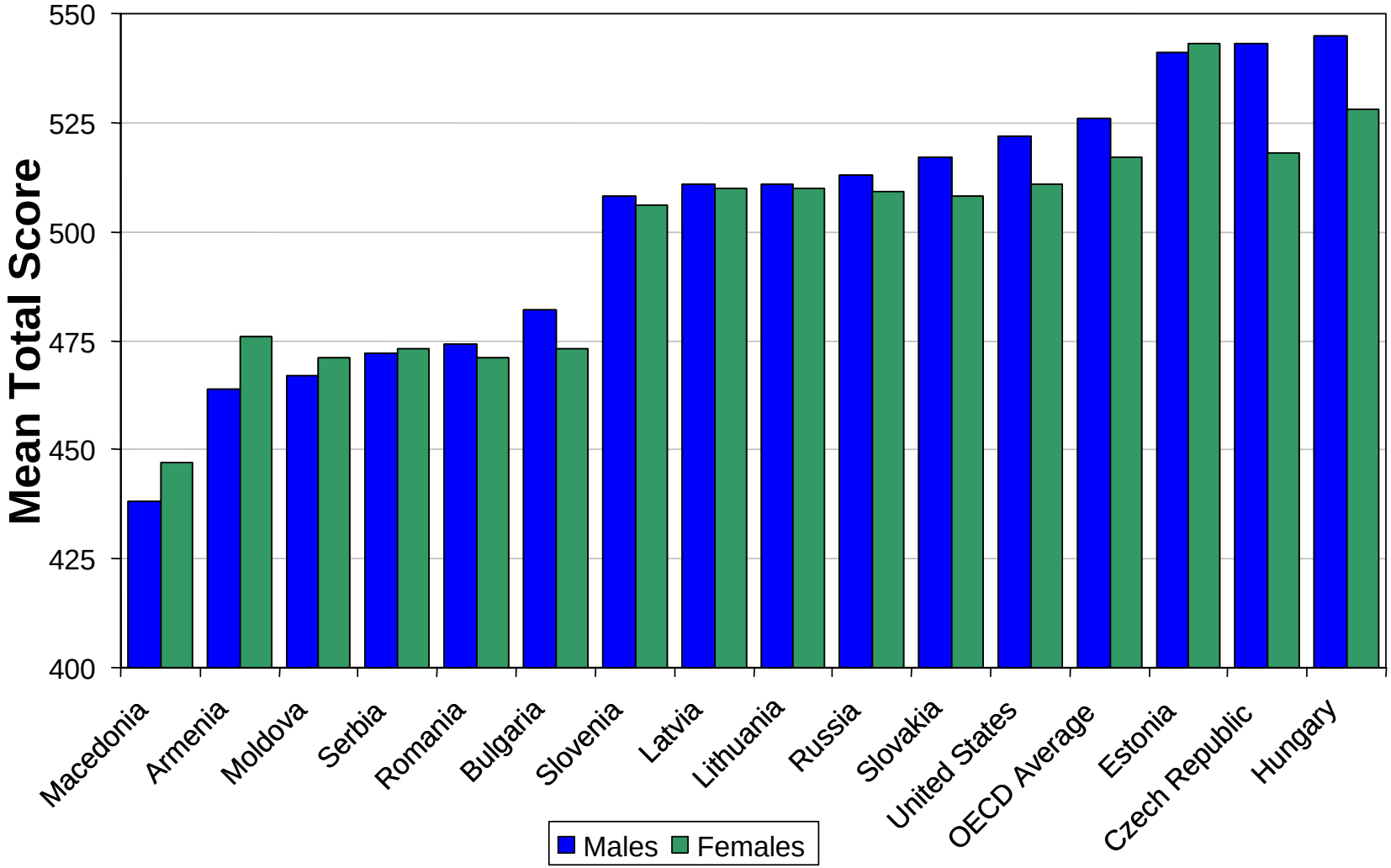


Average scale score is the average of the math and science domains. All countries use results from TIMSS 2003, except the Czech Republic (included in Northern Tier CEE average) which uses TIMSS 1999 results. The 2003 OECD average was 527. The intermediate international benchmark is defined as students who can apply basic mathematical knowledge in straightforward situations. IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004).

Figure 3

TIMSS

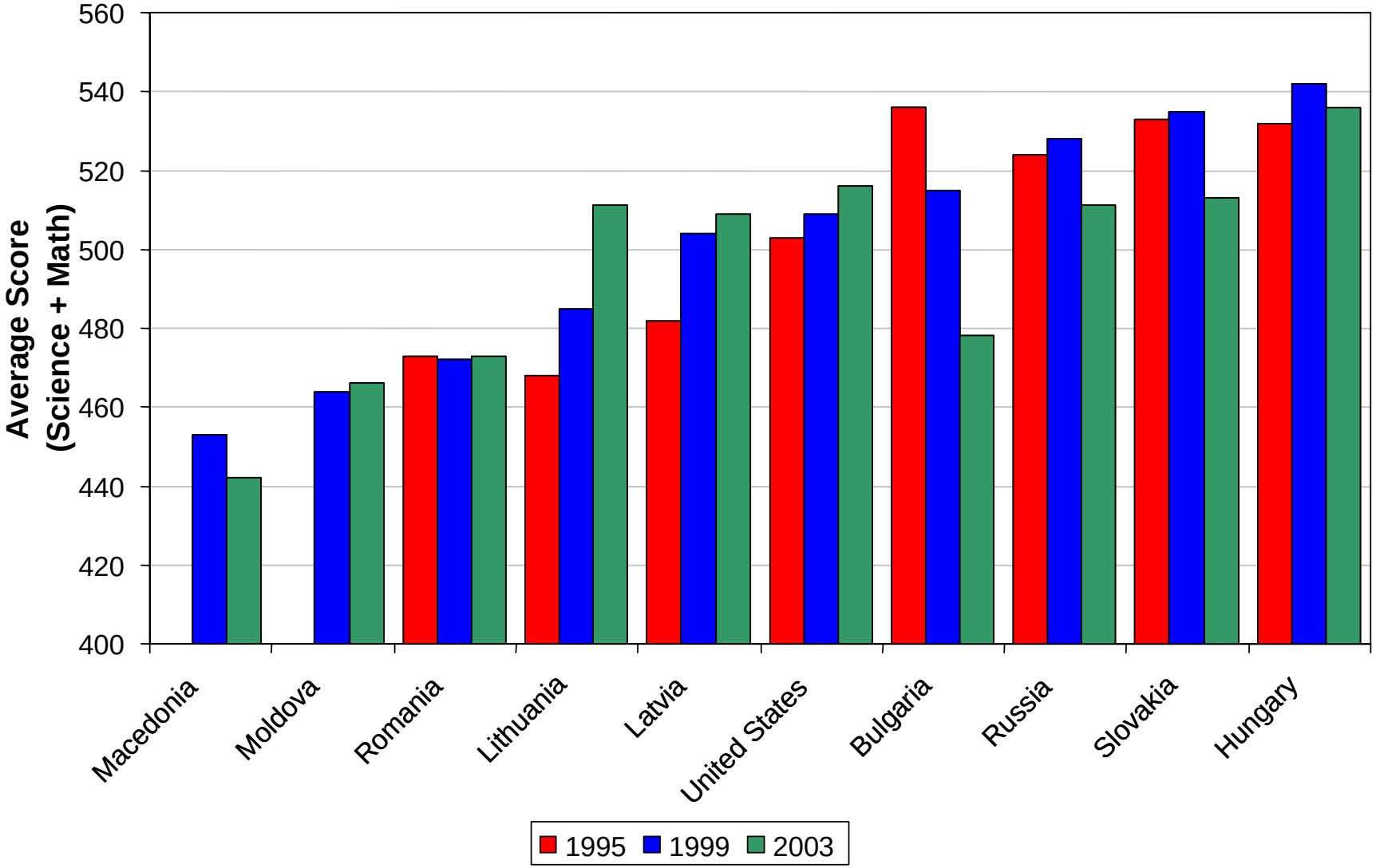
(Performance by Gender)



Average scale score is the average of the math and science domains. All countries use results from TIMSS 2003, except the Czech Republic which uses TIMSS 1999 results.
IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004).

Figure 4

TIMSS Trends



Average scale score is the average of the math and science domains. The 2003 OECD Average was 527. IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004).

Table 6. IALS: Percent Students at Each Literacy Level

Prose Literacy

	Level 1	Level 2	Level 3	Level 4	Level 3+4
Poland	42.6	34.5	19.8	3.1	22.9
Slovenia	42.2	34.5	20.1	3.2	23.3
Hungary	33.8	42.7	20.8	2.6	23.4
Czech Republic	15.7	38.1	37.8	8.4	46.2
OECD Average	19.7	30.3	35.4	14.5	49.9
United States	20.7	25.9	32.4	21.1	53.5

Document Literacy

	Level 1	Level 2	Level 3	Level 4	Level 3+4
Poland	45.4	30.7	18	5.8	23.8
Slovenia	40.9	31.8	22	5.3	27.3
Hungary	32.9	34.2	25	8	33
Czech Republic	14.3	28	38.1	19.6	57.7
OECD Average	19.9	27.3	34.4	18.5	52.9
United States	23.7	25.9	31.4	19	50.4

Quantitative Literacy

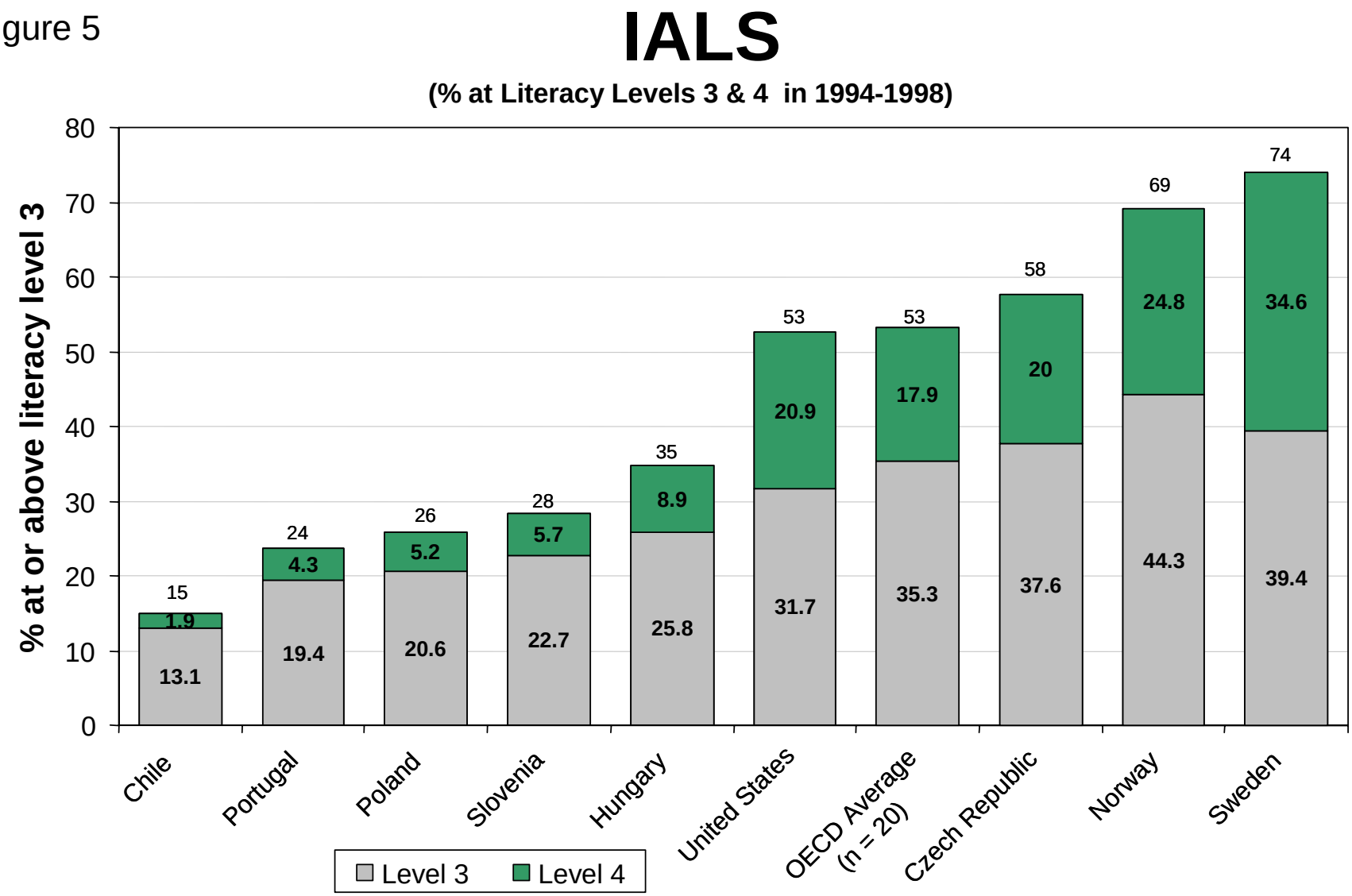
	Level 1	Level 2	Level 3	Level 4	Level 3+4
Poland	39.1	30.1	23.9	6.8	30.7
Slovenia	35	30.4	26	8.6	34.6
Hungary	20.5	31.6	31.7	16.1	47.8
Czech Republic	8.9	22.3	37	31.9	68.9
OECD Average	17.4	26	36	20.7	56.7
United States	21	25.3	31.3	22.5	53.8

Total Average Literacy

	Level 1	Level 2	Level 3	Level 4	Level 3+4
Poland	42.4	31.8	20.6	5.2	25.8
Slovenia	39.4	32.2	22.7	5.7	28.4
Hungary	29.1	36.2	25.8	8.9	34.7
Czech Republic	13	29.5	37.6	20	57.6
OECD	19	27.8	35.3	17.9	53.1
United States	21.8	25.7	31.7	20.9	52.6

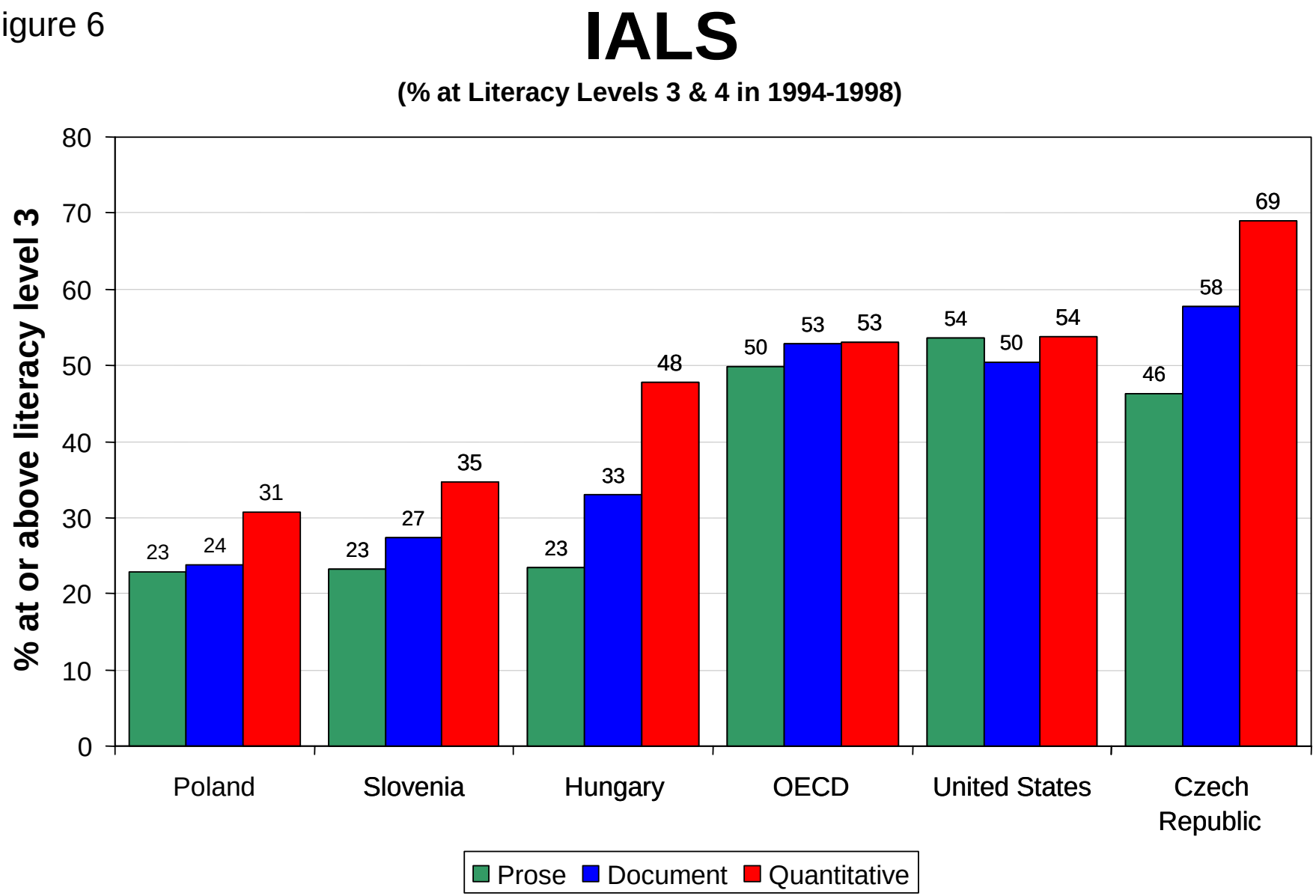
OECD and Statistics Canada, *Literacy in the Information Age: Final Report of the International Adult Literacy Survey* (2000).

Figure 5



Measures the percentage of 16 to 65 year olds who test at each literacy level. Measured as the mean score all of 3 tested areas: prose literacy, document literacy, and quantitative literacy. Score of Level 3 or above denotes ability to cope with demands of complex, advanced society.
OECD, *International Adult Literacy Survey* (2000).

Figure 6



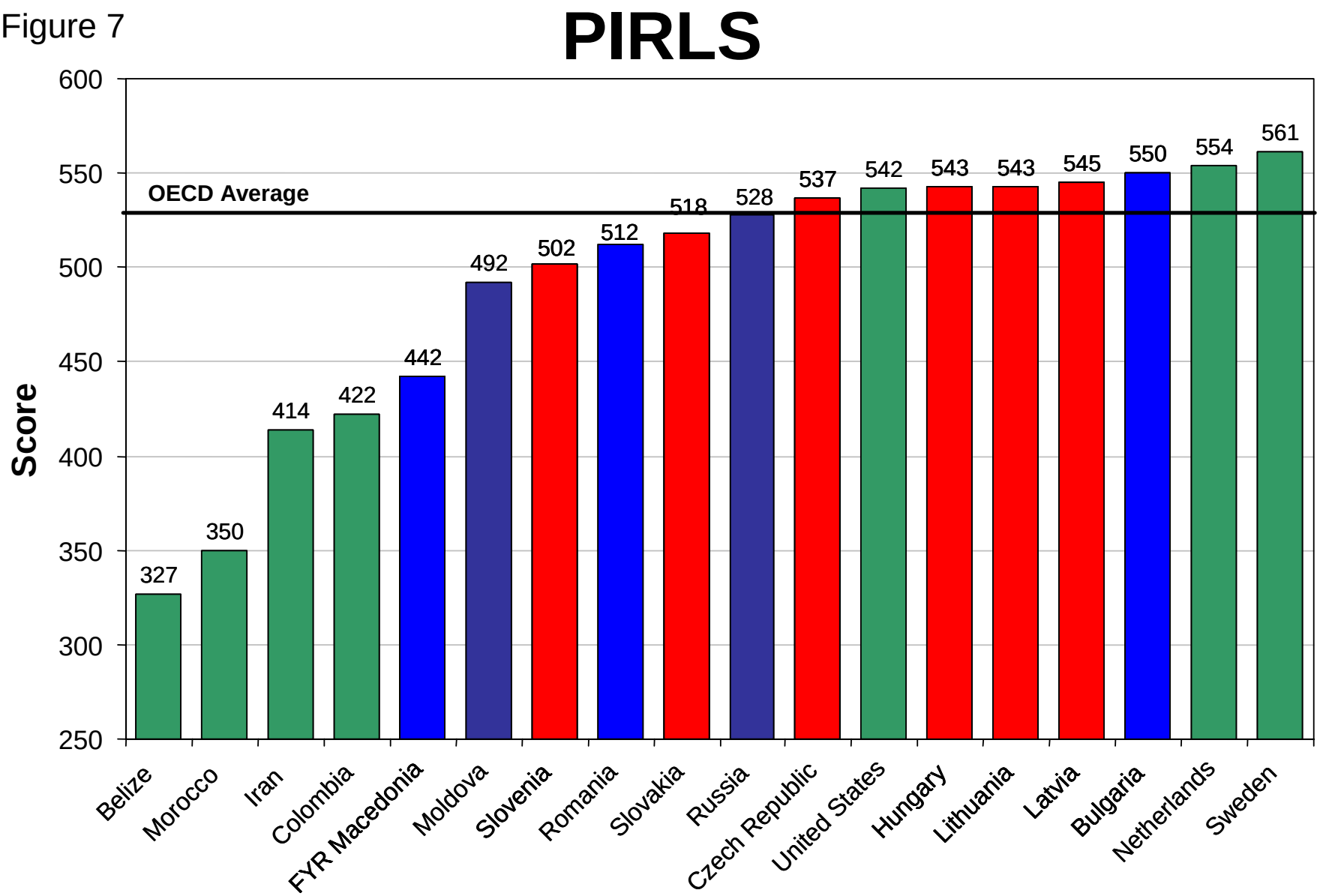
Measures the percentage of 16 to 65 year olds who test at each literacy level. Score at or above Level 3 denotes ability to cope with demands of complex, advanced society.
OECD, *International Adult Literacy Survey* (2000).

Table 7. PIRLS

	Reading for Literary Mean	Reading for Informational Mean	Total Reading Literacy Mean
Czech Republic	535	536	537
Hungary	548	537	543
Latvia	537	547	545
Lithuania	546	540	543
Slovak Republic	512	522	518
Slovenia	499	503	502
Bulgaria	550	551	550
FYR Macedonia	441	445	442
Romania	512	512	512
Moldova	480	505	492
Russia	523	531	528
OECD	-	-	530
United States	550	533	542

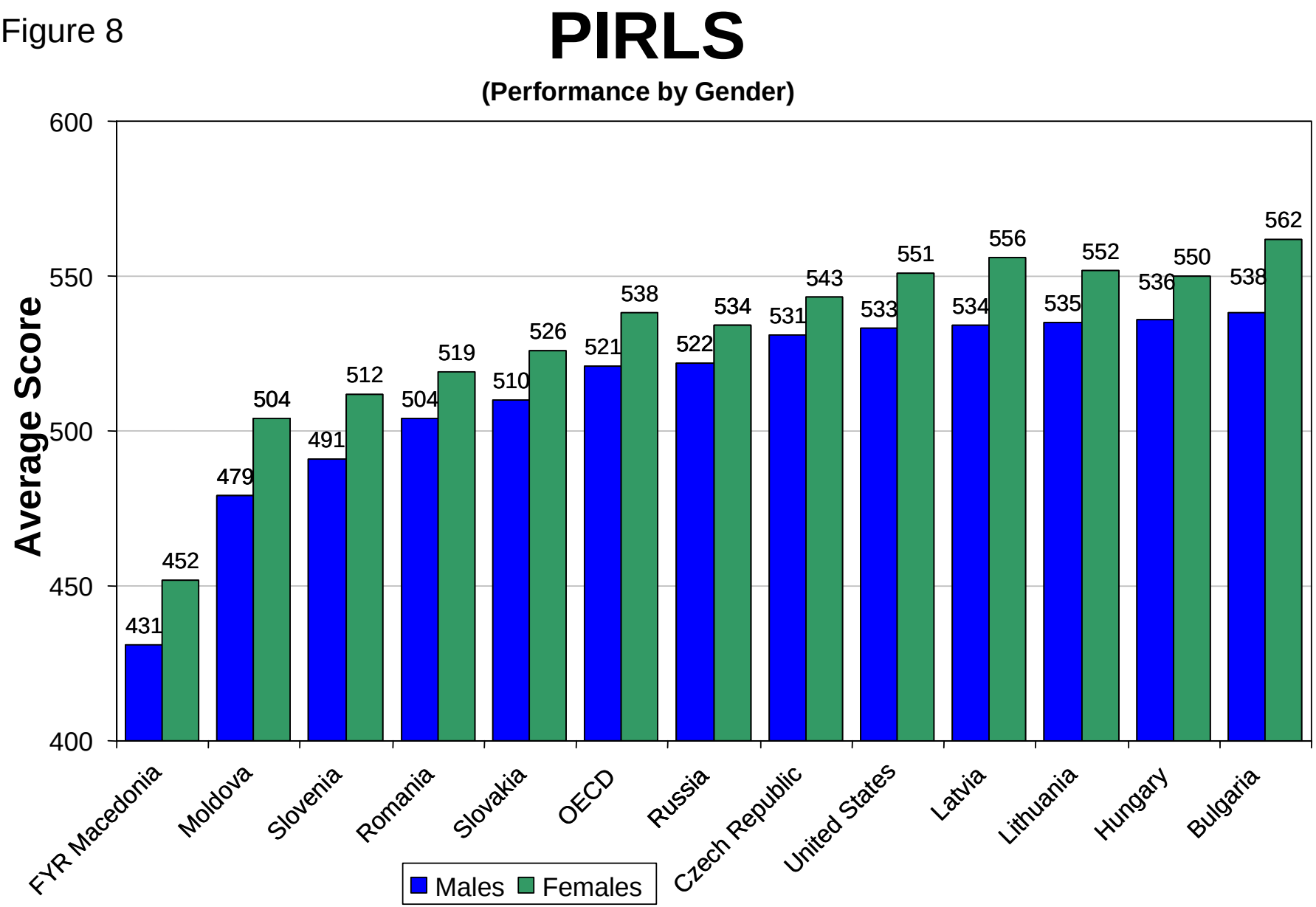
Mullis, I.V.S., M.O. Martin, E.J. Gonzalez, Kennedy, Ann (2004), PIRLS *2001 International* IEA's Study of Reading Literacy Achievement in Primary School in 35 Countries

Figure 7



PIRLS assesses students at approximately grade 4, except Slovenia which tested students in grade 3. The OECD average was 530. IEA, *PIRLS 2001 International Report* (2003).

Figure 8



PIRLS assesses students at approximately grade 4, except Slovenia which tested students in grade 3. IEA, *PIRLS 2001 International Report* (2003).

Table 8. PISA

	2000				2003			
	Reading	Math	Science	Average	Reading	Math	Science	Average
Czech Republic	492	498	511	500	489	516	523	509
Hungary	480	488	496	488	482	490	503	492
Latvia	458	463	460	460	491	483	489	488
Poland	479	470	483	477	497	490	498	495
Slovakia	-	-	-	-	469	498	495	487
Albania	349	381	376	369	-	-	-	-
Bulgaria	430	430	448	436	-	-	-	-
FYR Macedonia	373	381	401	385	-	-	-	-
Romania	428	425	441	431	-	-	-	-
Serbia	-	-	-	-	412	437	436	428
Russia	462	478	460	467	442	468	489	466
OECD	501	500	501	501	494	500	500	498
United States	504	494	500	499	495	483	491	490

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Table 9. PISA by Gender

	Reading		Math		Science		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Czech Republic	473	504	524	509	526	520	508	511
Hungary	467	498	494	486	503	504	488	496
Latvia	470	509	483	485	487	491	480	495
Poland	477	516	483	487	501	494	487	499
Slovakia	453	486	507	489	502	487	487	487
Albania	319	378	372	390	366	387	352	385
Bulgaria	407	455	428	432	446	451	427	446
FYR Macedonia	349	399	381	384	393	409	374	397
Romania	421	434	420	430	434	448	425	437
Serbia	390	433	437	436	434	439	420	436
Russia	428	456	473	463	494	485	465	468
OECD	485	517	506	495	501	501	497	504
United States	479	511	486	480	494	489	486	493

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Table 10. PISA by Community Size

	Reading		Math		Science		Total	
	Small	Large	Small	Large	Small	Large	Small	Large
Czech Republic	474	496	494	536	500	542	490	525
Hungary	434	491	413	505	425	517	424	502
Latvia	478	500	469	497	475	502	474	500
Poland	479	514	479	514	485	529	481	519
Slovakia	452	477	473	516	469	513	465	502
Albania	303	384	333	404	337	396	324	395
Bulgaria	368	441	352	466	379	475	366	461
FYR Macedonia	380	371	396	382	418	402	398	385
Romania	371	446	406	444	420	457	399	449
Serbia	386	415	411	444	410	445	402	435
Russia	416	454	444	483	465	503	442	480
OECD	483	500	487	507	484	509	484	505
United States	503	496	489	471	501	478	497	482

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

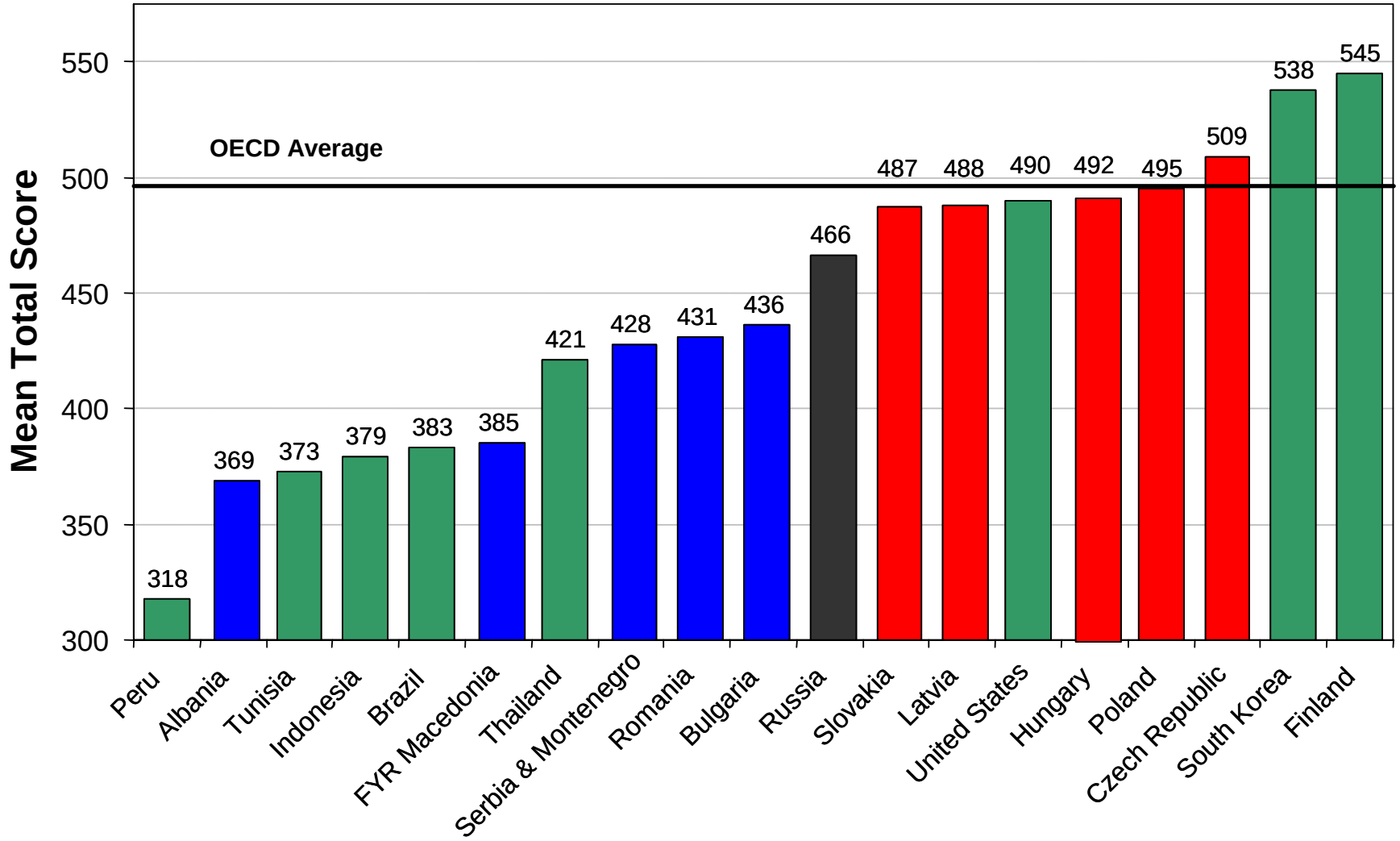
Table 11. PISA: Factors Affecting Student Perforı

	Poor Buildings				Lack of Instruction Materials				Poor Heating			
	% Hindered Some	% Hindered A Lot	Hindered Average	Not-Hindere Average	% Hindered Some	% Hindered A Lot	Hindered Average	Not-Hindere Average	% Hindered Some	% Hindered A Lot	Hindered Average	Hindered A Lot Average
Czech Republic	4.5	0	507	495	15.4	2.6	496	506	2.5	0	476	499
Hungary	5.4	0.6	447	494	9.5	2.2	455	489	1.7	0.6	443	493
Poland	26.7	9.4	497	468	21.3	5.3	447	488	3.7	6.4	479	474
Albania	19.8	2.6	356	370	41.1	15.7	366	368	40.3	10.7	364	373
Bulgaria	14	5.3	441	435	23.7	8	409	452	15	4.2	430	437
Latvia	20.7	3.3	452	463	39.7	13.9	457	465	13.5	1	460	464
FYR Macedonia	15.8	8.8	359	385	39.6	6	361	408	25.9	1.3	335	396
Romania	30	0.6	429	432	45.1	2.9	433	438	17.5	2.2	454	431
Russia	28.3	7.9	453	471	39.9	25	458	480	34.3	15.1	450	473
OECD	16.9	3.9	483	502	12.7	4	471	504	15.7	3.2	489	503

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 9

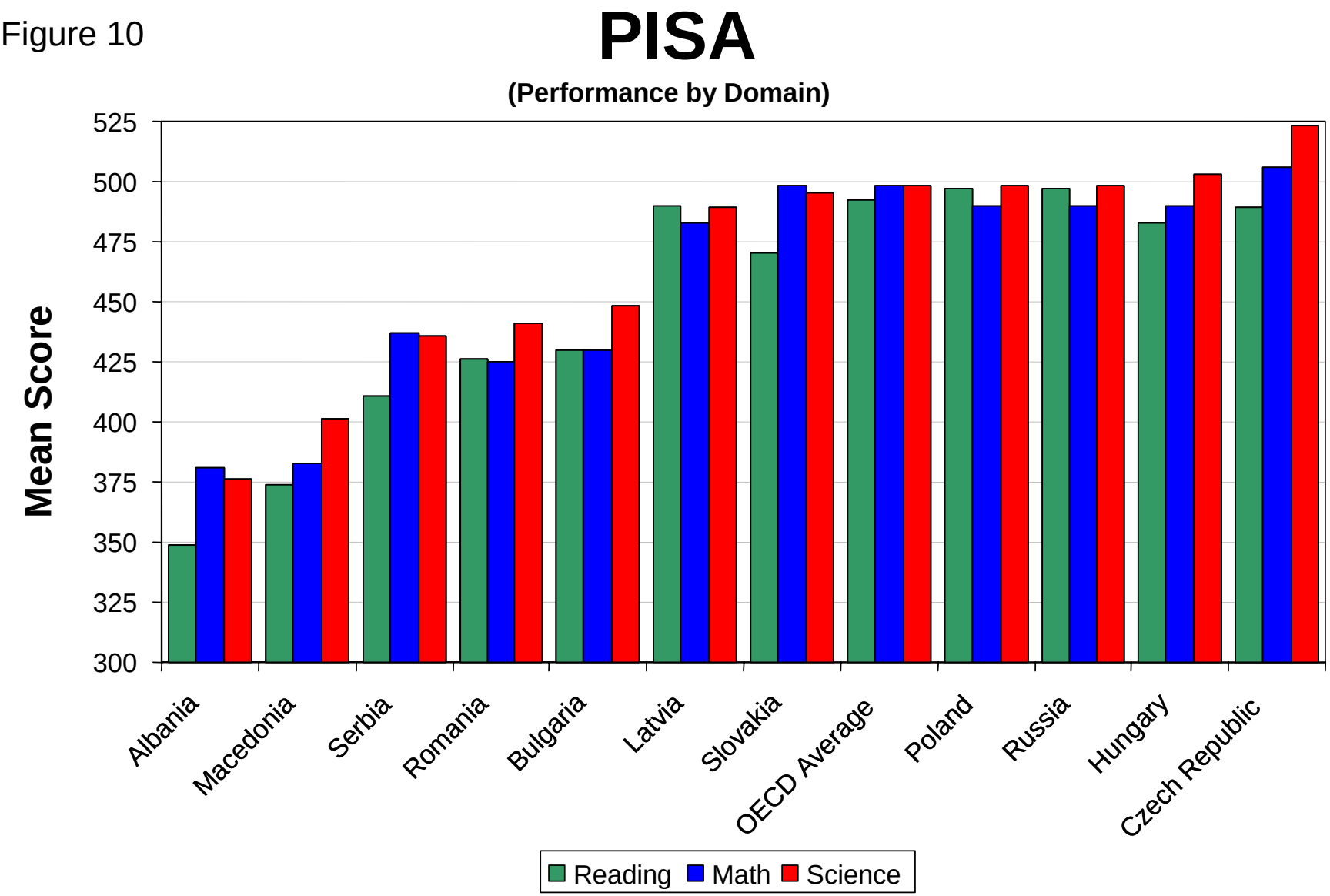
PISA



Mean total score is the average of the reading, math, and science domains. Results taken from most recently administered assessment available. Albania, FYR Macedonia, Romania, and Bulgaria use PISA 2000; Serbia & Montenegro, Russia, Slovakia, Latvia, Hungary, Poland, Czech Republic, the OECD, and all non-E&E, excepting Peru, countries use PISA 2003.

OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000 (2003).* OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 10



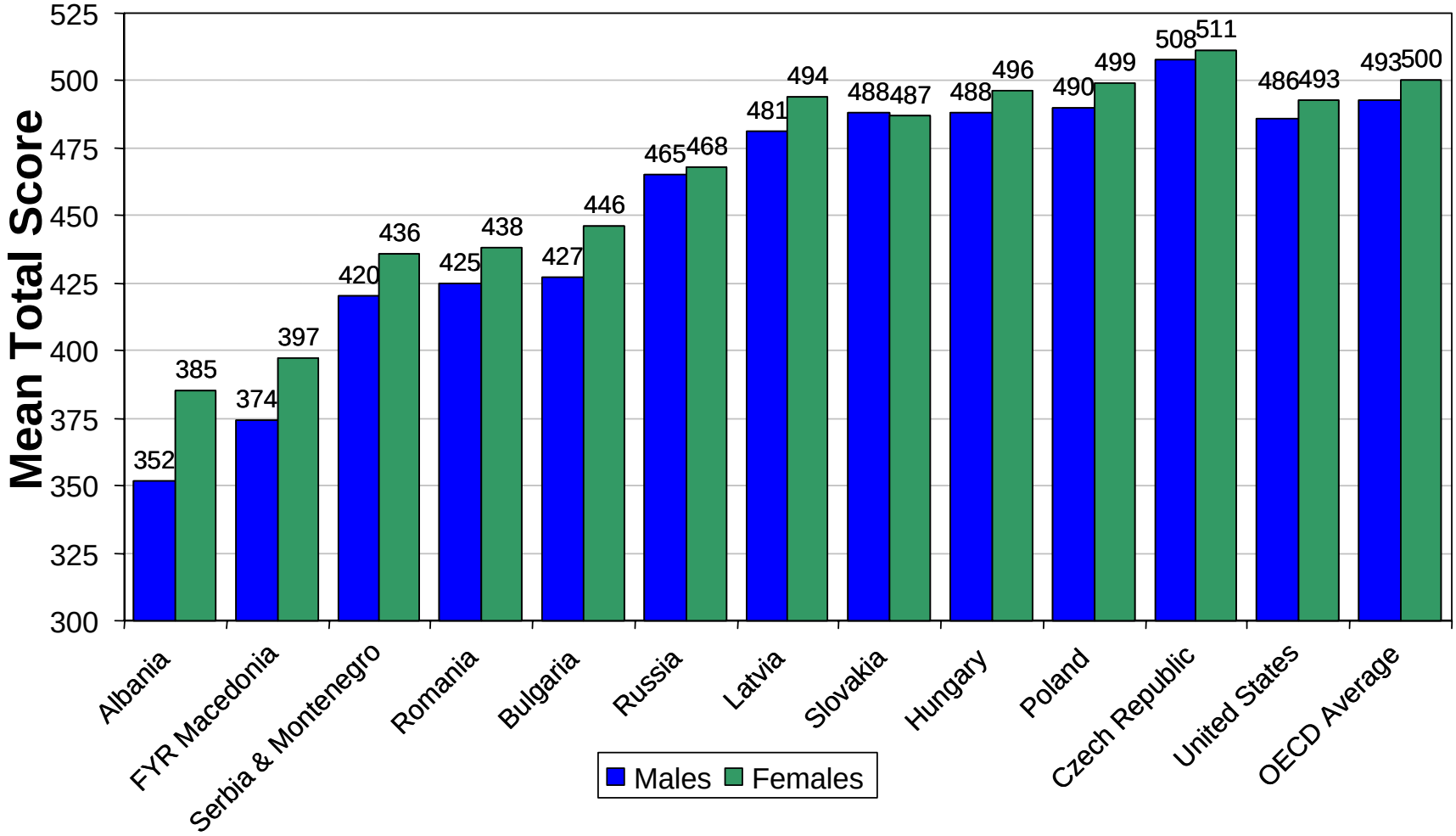
Results taken from most recently administered assessment available. Albania, FYR Macedonia, Romania, and Bulgaria use PISA 2000; Serbia & Montenegro, Russia, Slovakia, Latvia, Hungary, Poland, Czech Republic, and the OECD countries use PISA 2003.

OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000 (2003).* OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 11

PISA

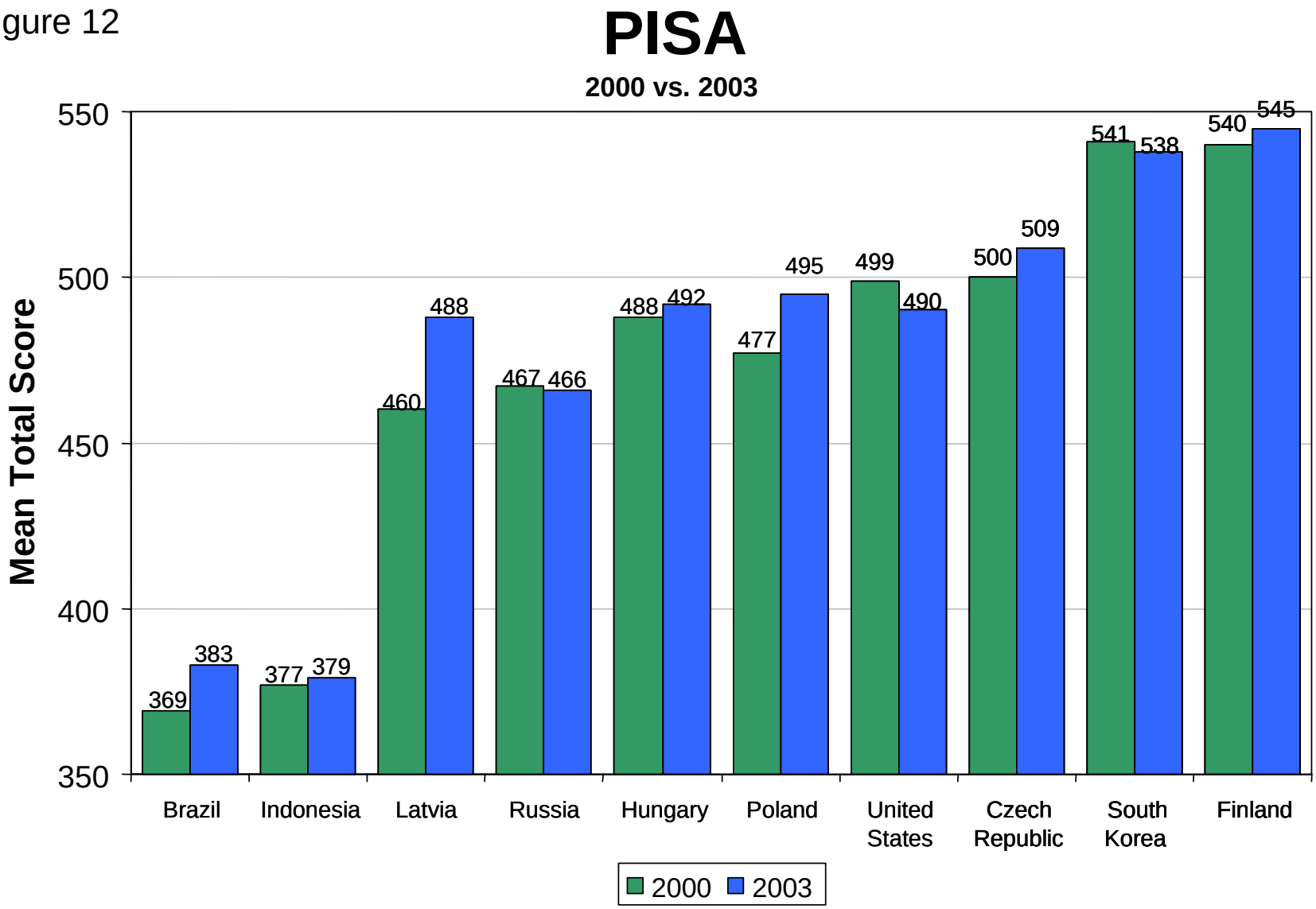
(Performance by Gender)



Mean total score is the average of the reading, math, and science domains. Results taken from most recently administered assessment available. Albania, FYR Macedonia, Romania, and Bulgaria use PISA 2000; Serbia & Montenegro, Russia, Slovakia, Latvia, Hungary, Poland, Czech Republic, the OECD, and all non-E&E countries use PISA 2003.

OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000 (2003).* OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 12



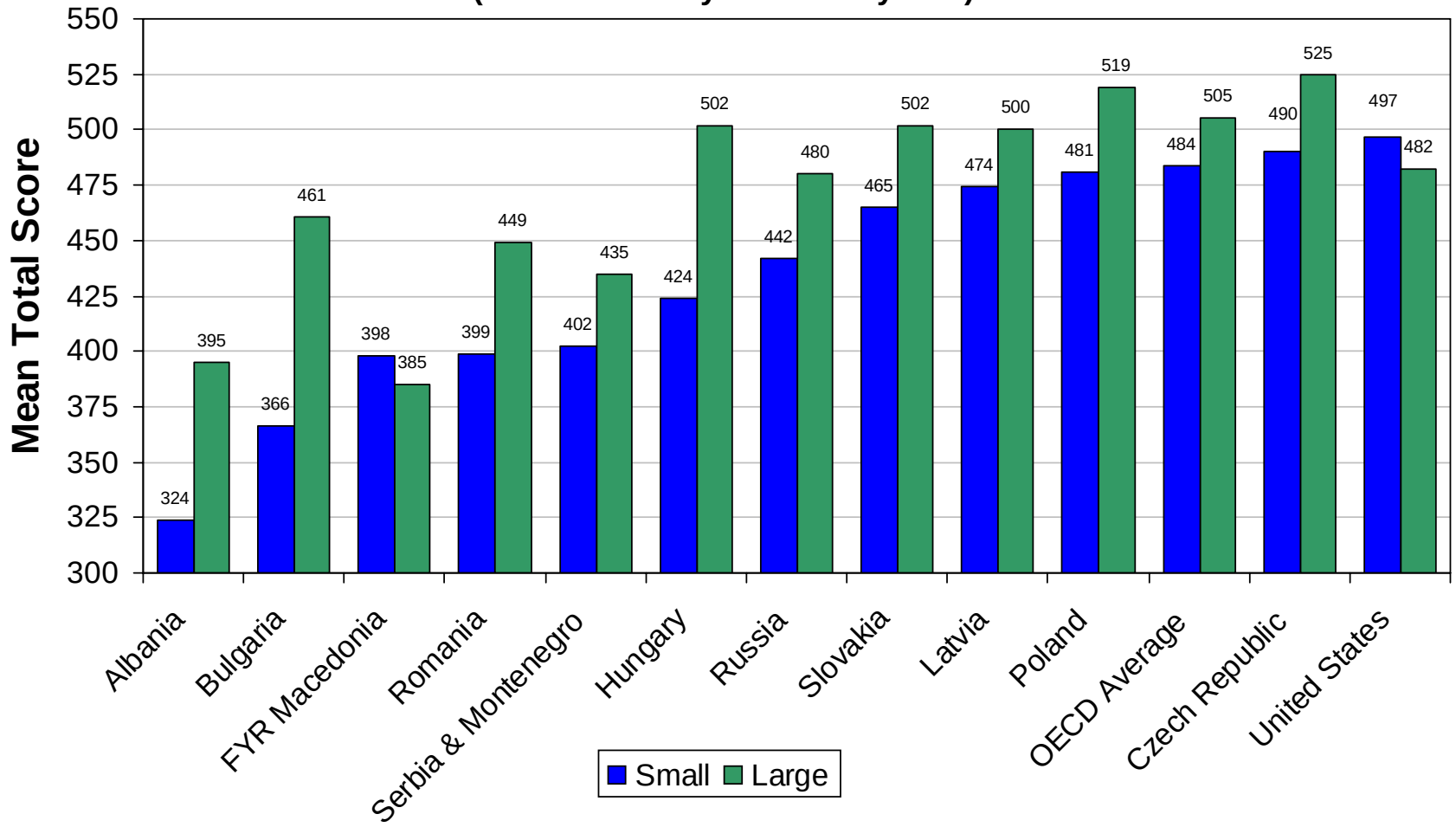
Mean total score is the average of scores on the reading, math, and science domains.

OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000 (2003).* OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 13

PISA

(Performance by Community Size)



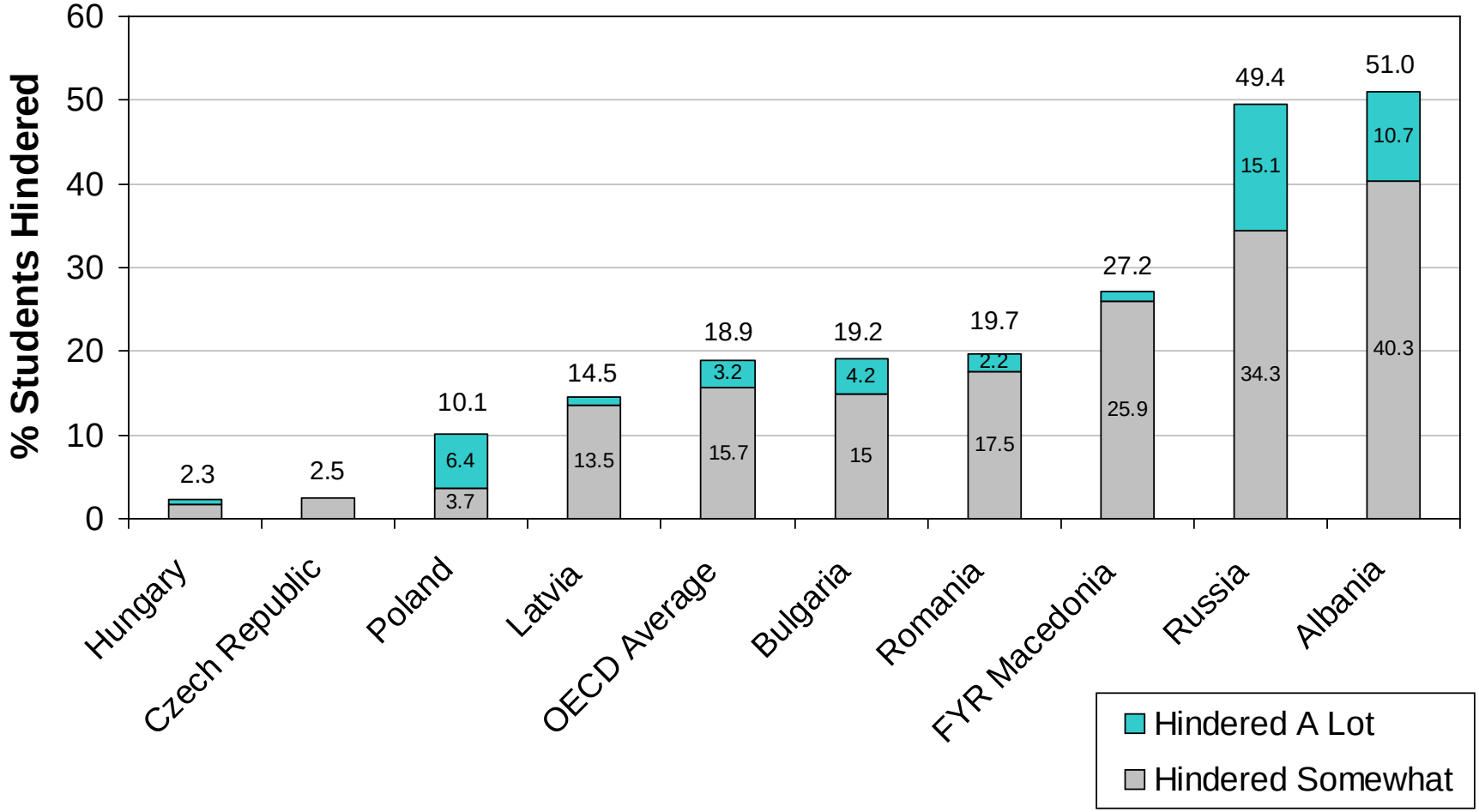
Small community defined by population less than 15,000; Large community defined by population more than 15,000. Mean total score is the average of the reading, math, and science domains. Results taken from most recently administered assessment available. Albania, FYR Macedonia, Romania, and Bulgaria use PISA 2000; Serbia & Montenegro, Russia, Slovakia, Latvia, Hungary, Poland, Czech Republic, the OECD, and all the US countries use PISA 2003.

OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000 (2003).* OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 14

PISA

(% Students Hindered by Poor Heating, Cooling, and/or lighting systems)



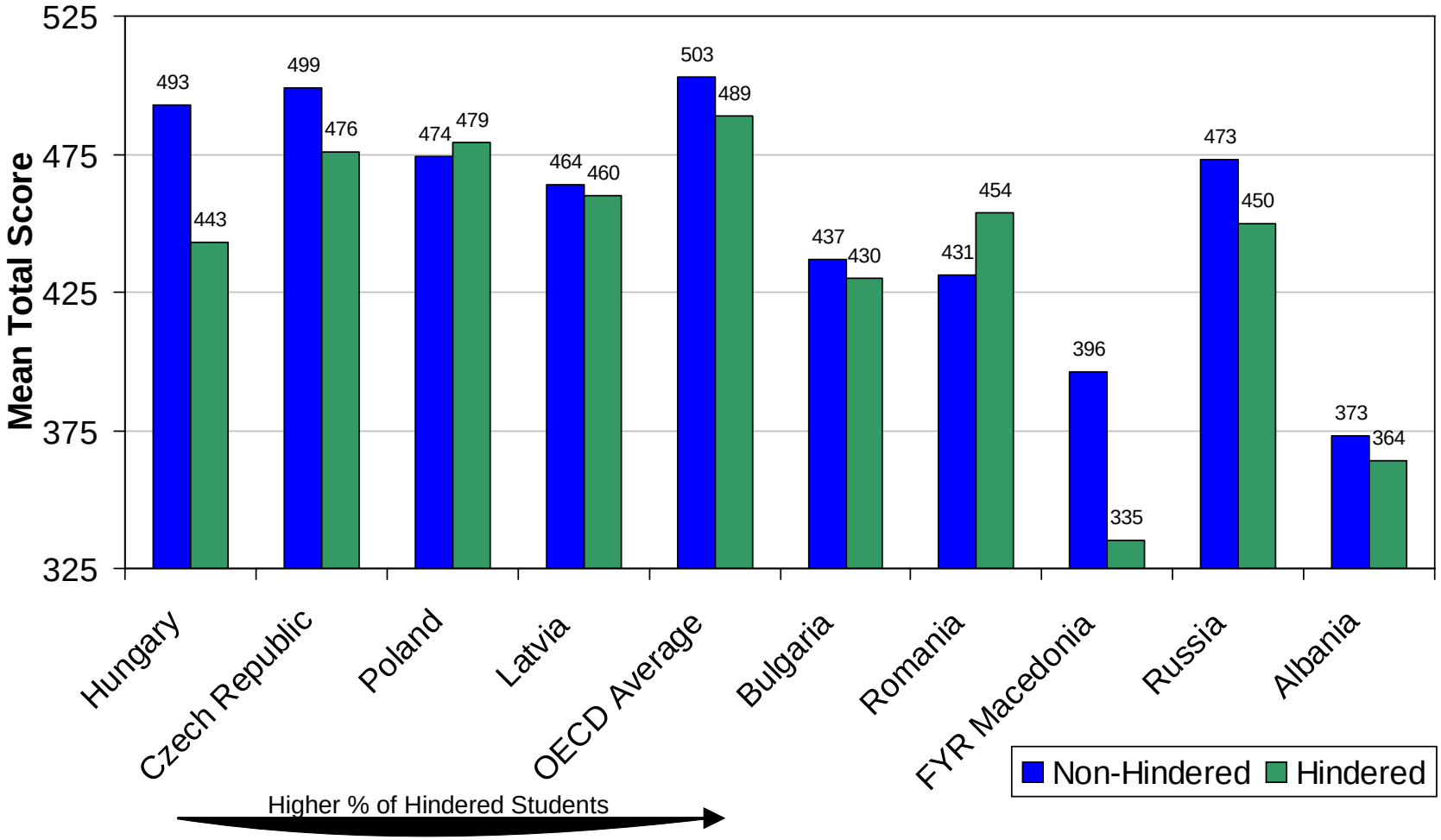
Data collected from school questionnaire distributed in conjunction with student assessment. Schools asked the question: "In your school, how much is the learning of 15-year-old-students hindered by poor heating, cooling, and/or lighting systems?"

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004). Data generated from http://pisaweb.acer.edu.au/oecd/oecd_pisa_data.html.

Figure 15

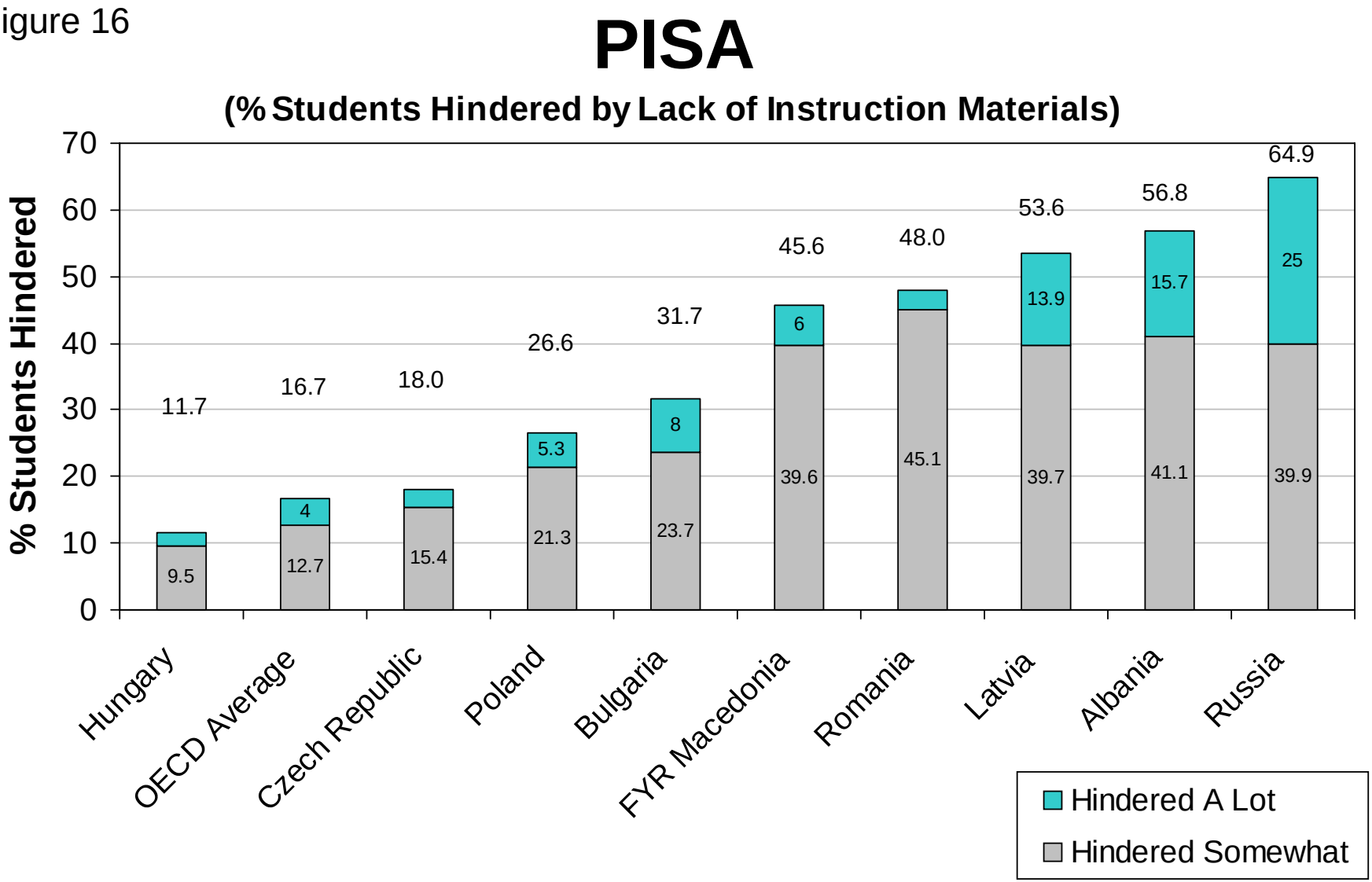
PISA

(Performance by Adequacy of Heating/Cooling/Lighting Systems)



Non-hindered includes students where, according to school surveys, learning is affected by poor heating/cooling/lighting systems either not at all or a little; hindered includes those students where learning is affected either some or a lot. OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004). Data generated from http://pisaweb.acer.edu.au/oecd/oecd_pisa_data.html.

Figure 16



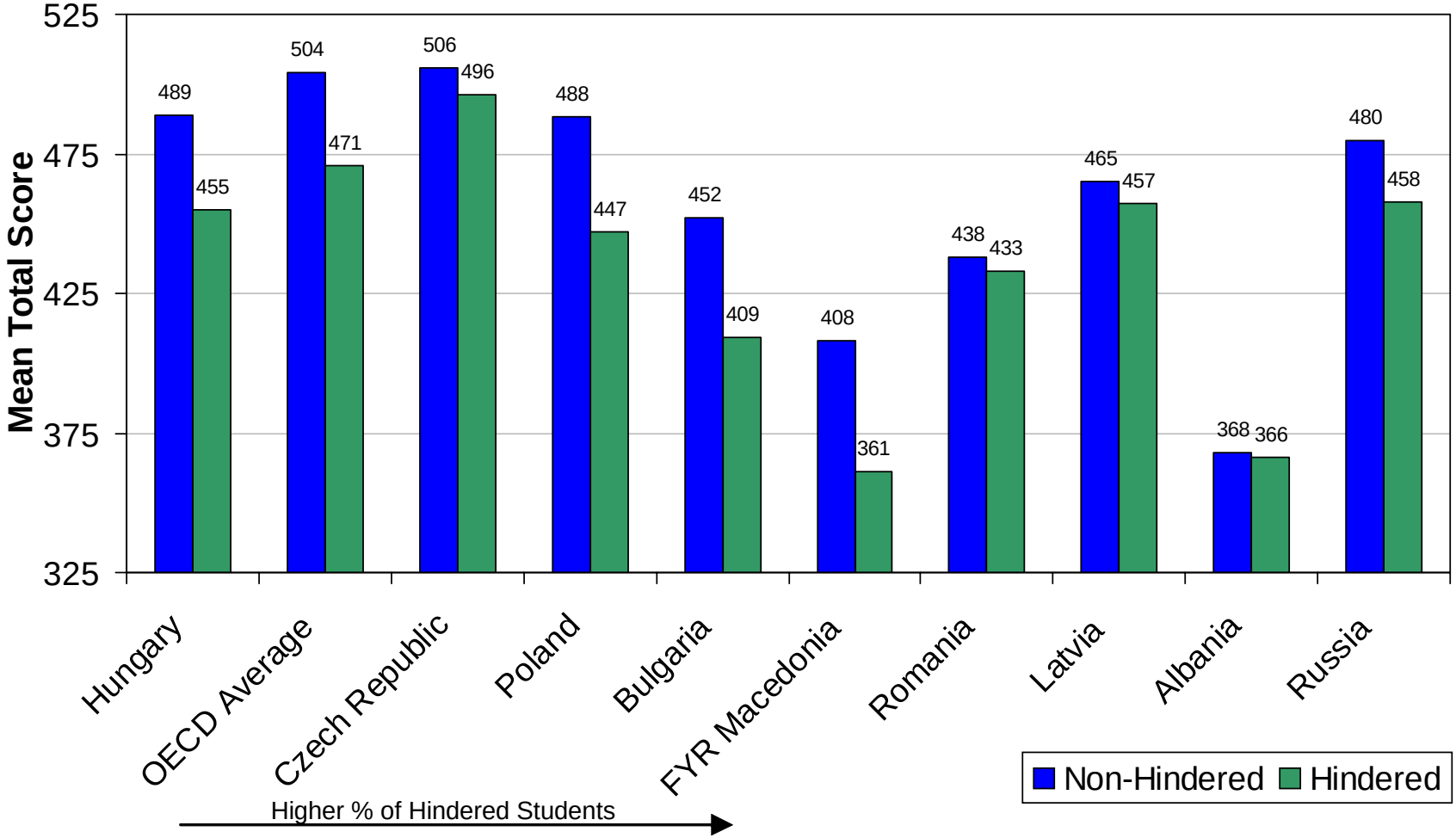
Data collected from school questionnaire distributed in conjunction with student assessment. Schools asked the question: "In your school, how much is the learning of 15-year-old-students hindered by lack of instructional material (e.g. textbooks)?"

OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004). Data generated from http://pisaweb.acer.edu.au/oecd/oecd_pisa_data.html.

Figure 17

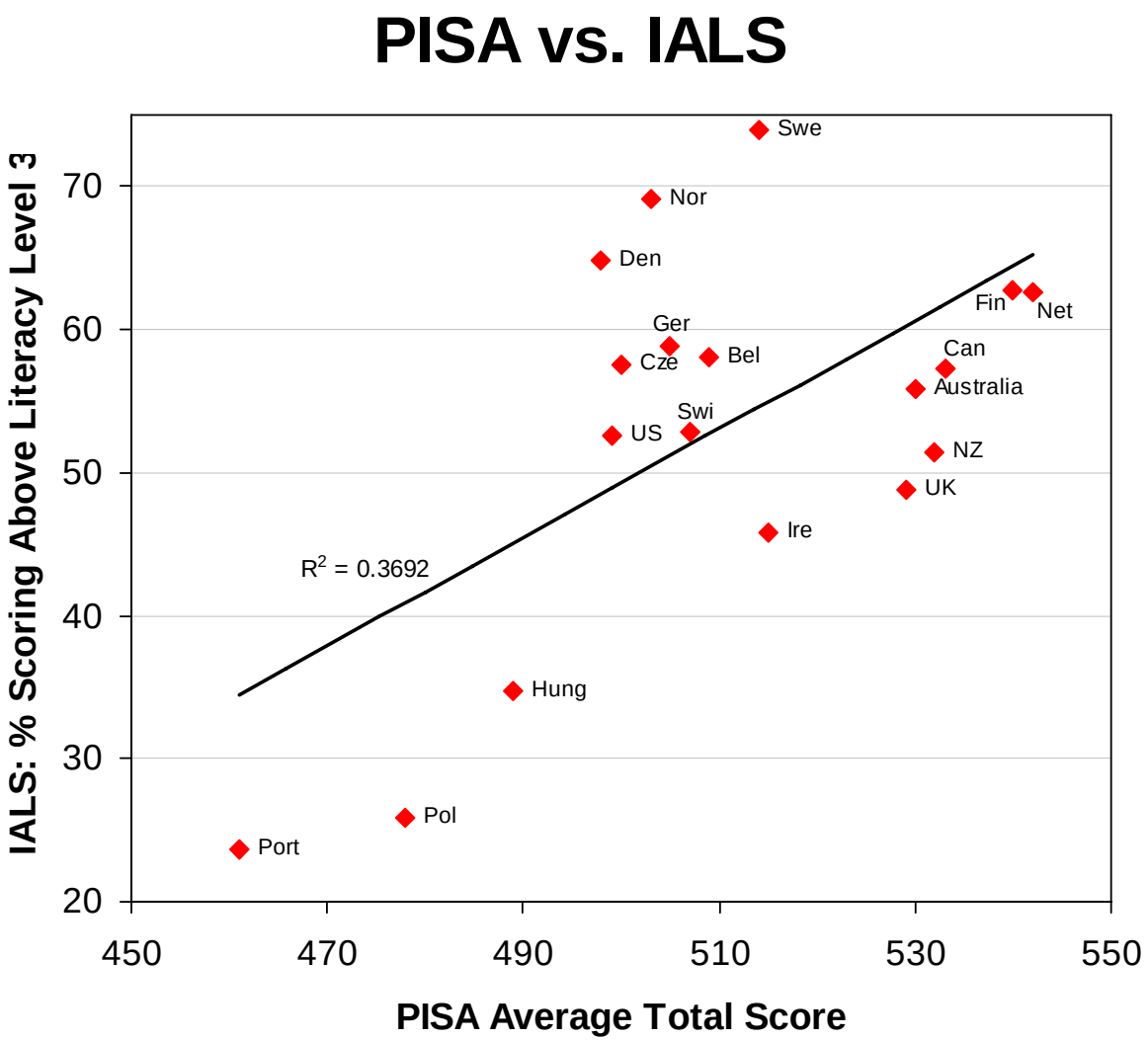
PISA

(Performance by Adequacy of Insructional Materials)



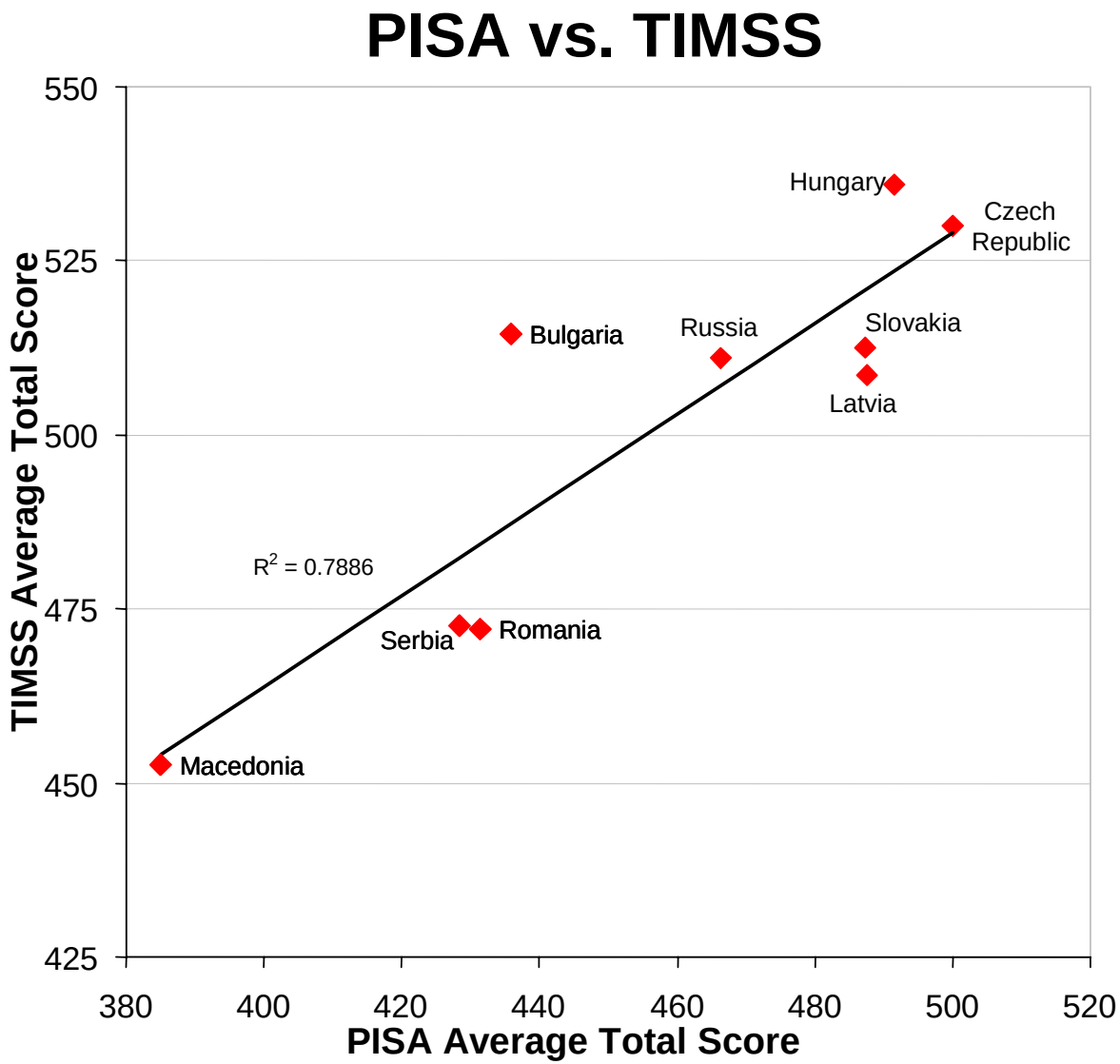
Non-hindered includes students where, according to school surveys, learning is affected by instructional material inadequacies either not at all or a little; hindered includes those students where learning is affected either some or a lot. OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004). Data generated from http://pisaweb.acer.edu.au/oecd/oecd_pisa_data.html.

Figure 18



OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000* (2003). OECD, *First Results from PISA 2003* (2004). OECD, *International Adult Literacy Survey* (2000).

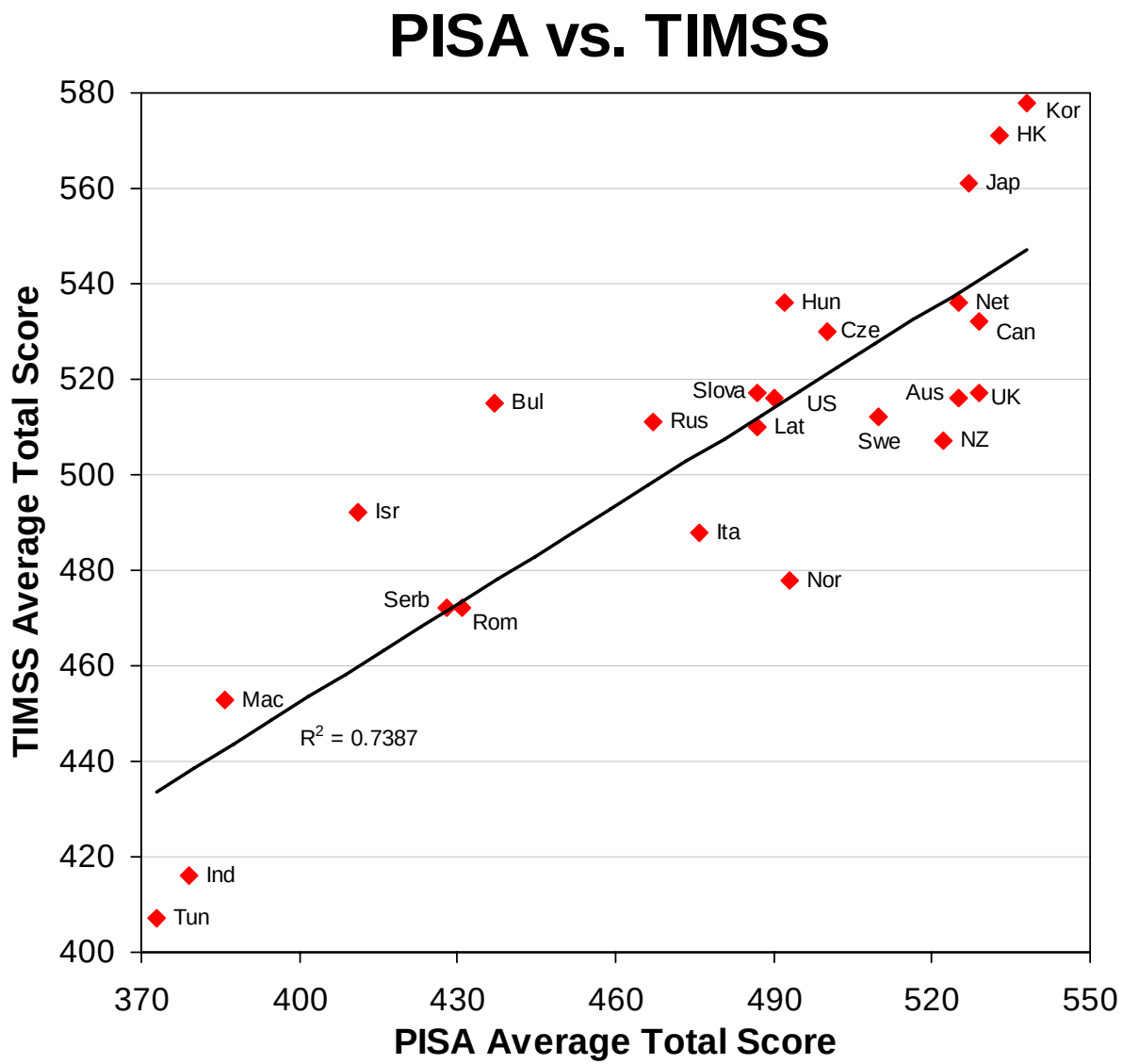
Figure 19



Average total score is the average of the 3 domains tested by PISA and the 2 tested by TIMSS. Bulgaria, Czech Republic, Macedonia, and Romania use TIMSS 1999 and PISA 2000 results; Hungary, Latvia, Russia, Serbia, and Slovakia use TIMSS 2003 and PISA 2003.

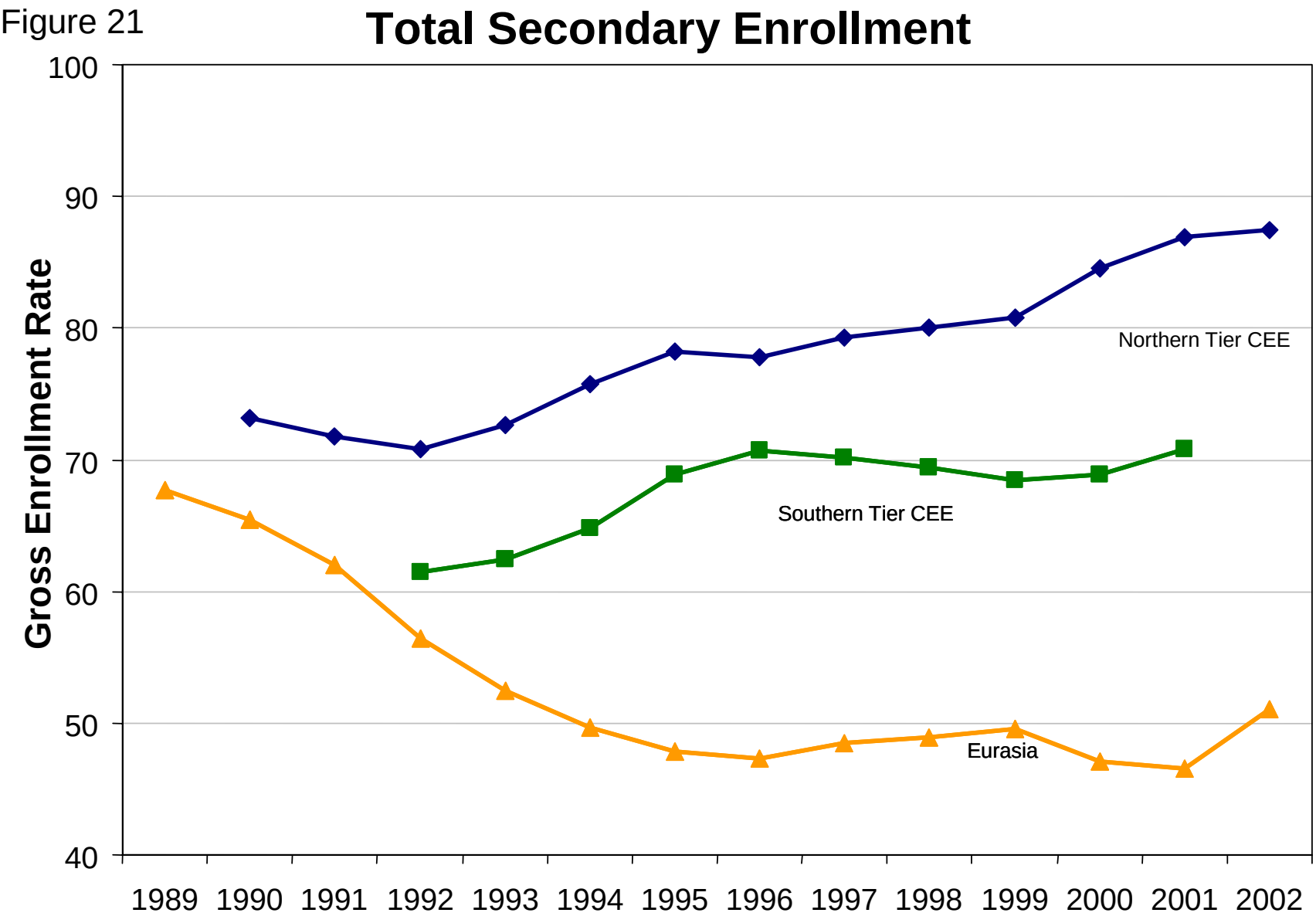
IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004). OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000* (2003). OECD, *First Results from PISA 2003* (2004).

Figure 20



IEA, *TIMSS 2003 International Mathematics Report* (2004). IEA, *TIMSS 2003 International Science Report* (2004). OECD, *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000* (2003). OECD, *First Results from PISA 2003* (2004).

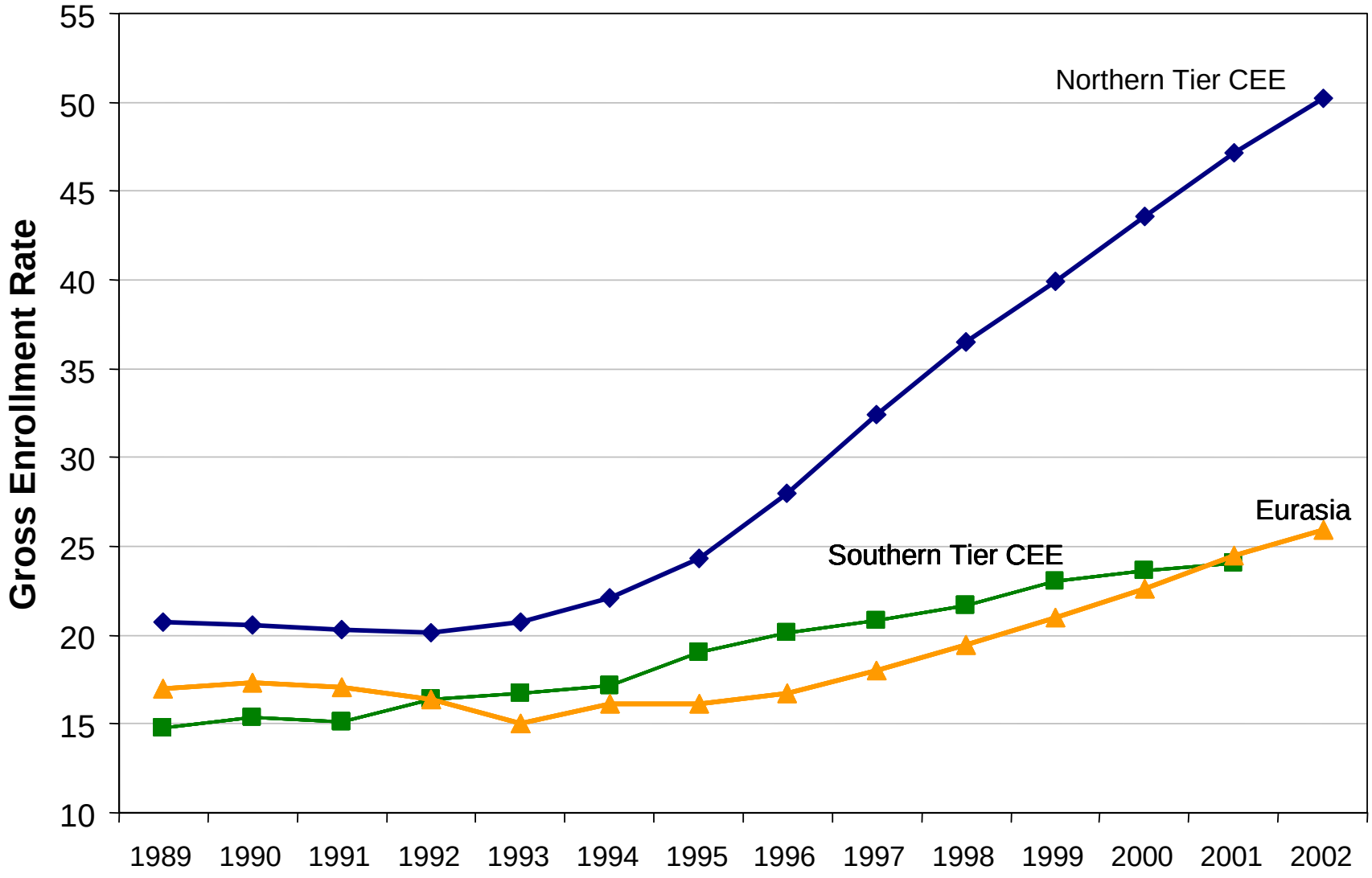
Figure 21



Northern Tier CEE excludes Slovenia because of incomplete data; Southern Tier CEE excludes Bosnia-Herzegovina and Serbia & Montenegro. For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 22

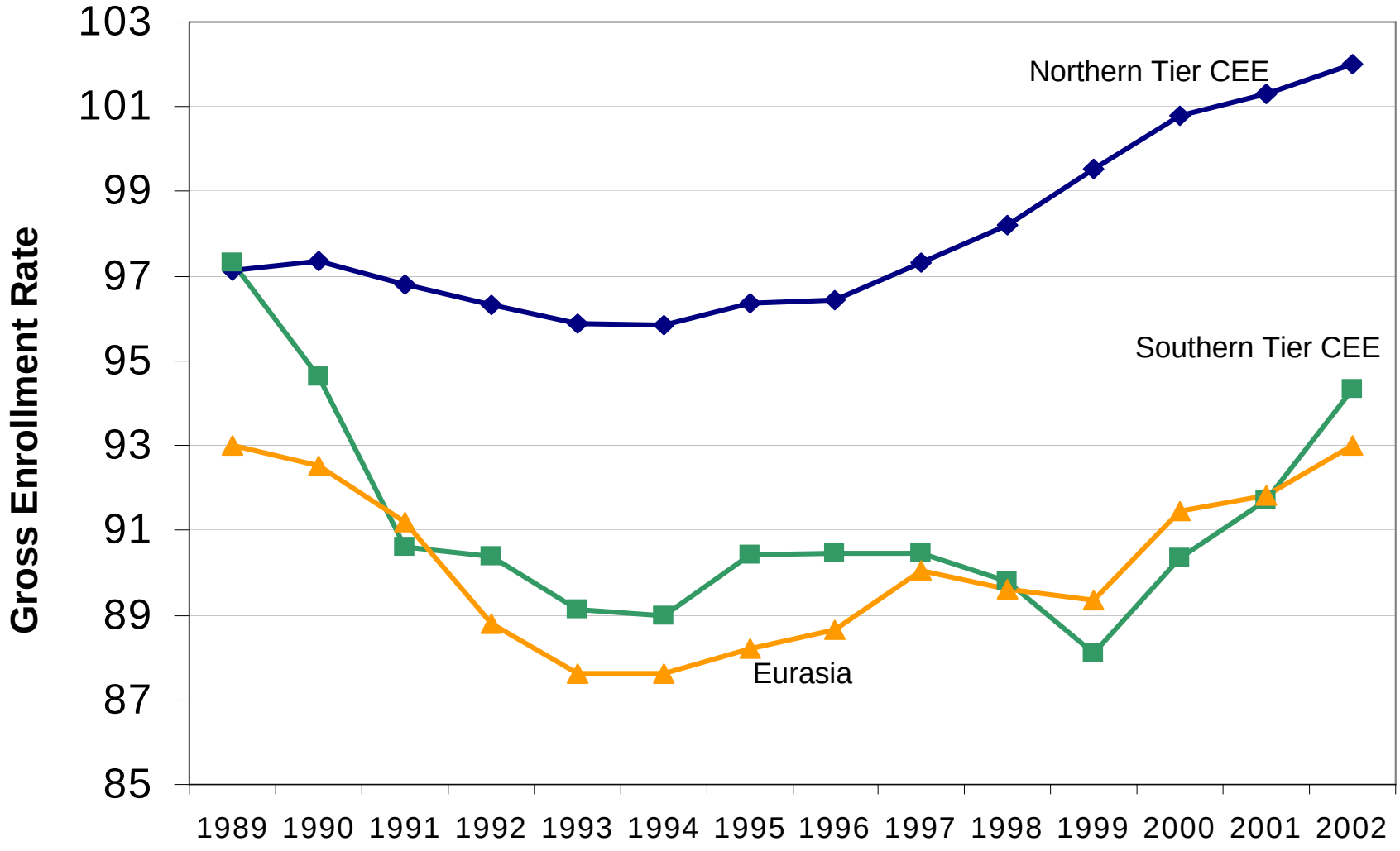
Higher Education Enrollment



Bosnia-Herzegovina enrollment rates between 1993 and 1996 interpolated from 1993 and 1997 data.. For 1989-1995: % 18-22 year old population enrolled; For 1996-2002: % 19-23 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 23

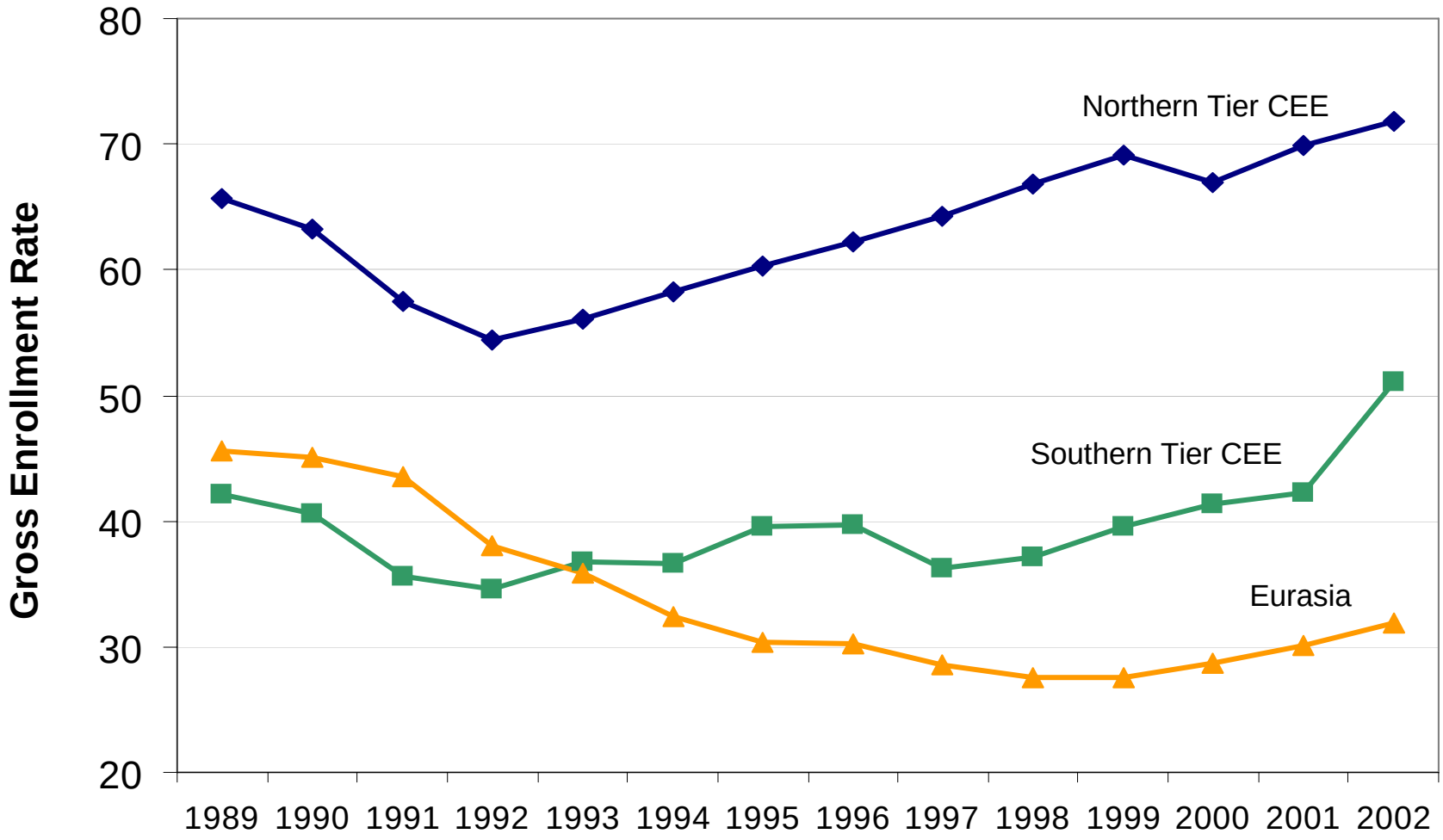
Primary Enrollment



UNICEF, *Social Monitor* (2004).

Figure 24

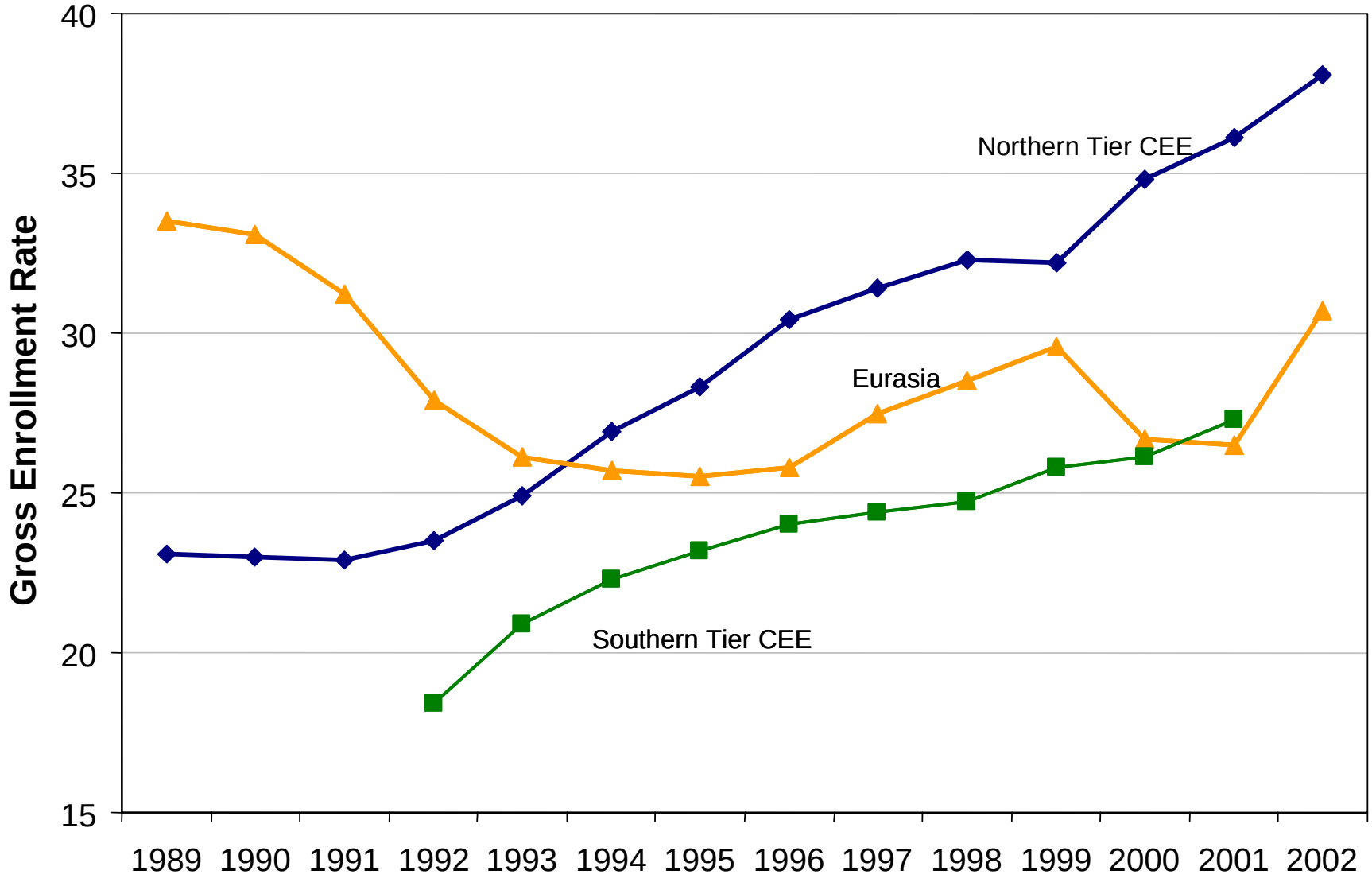
Pre-Primary Enrollment



UNICEF, *Social Monitor* (2004).

Figure 25

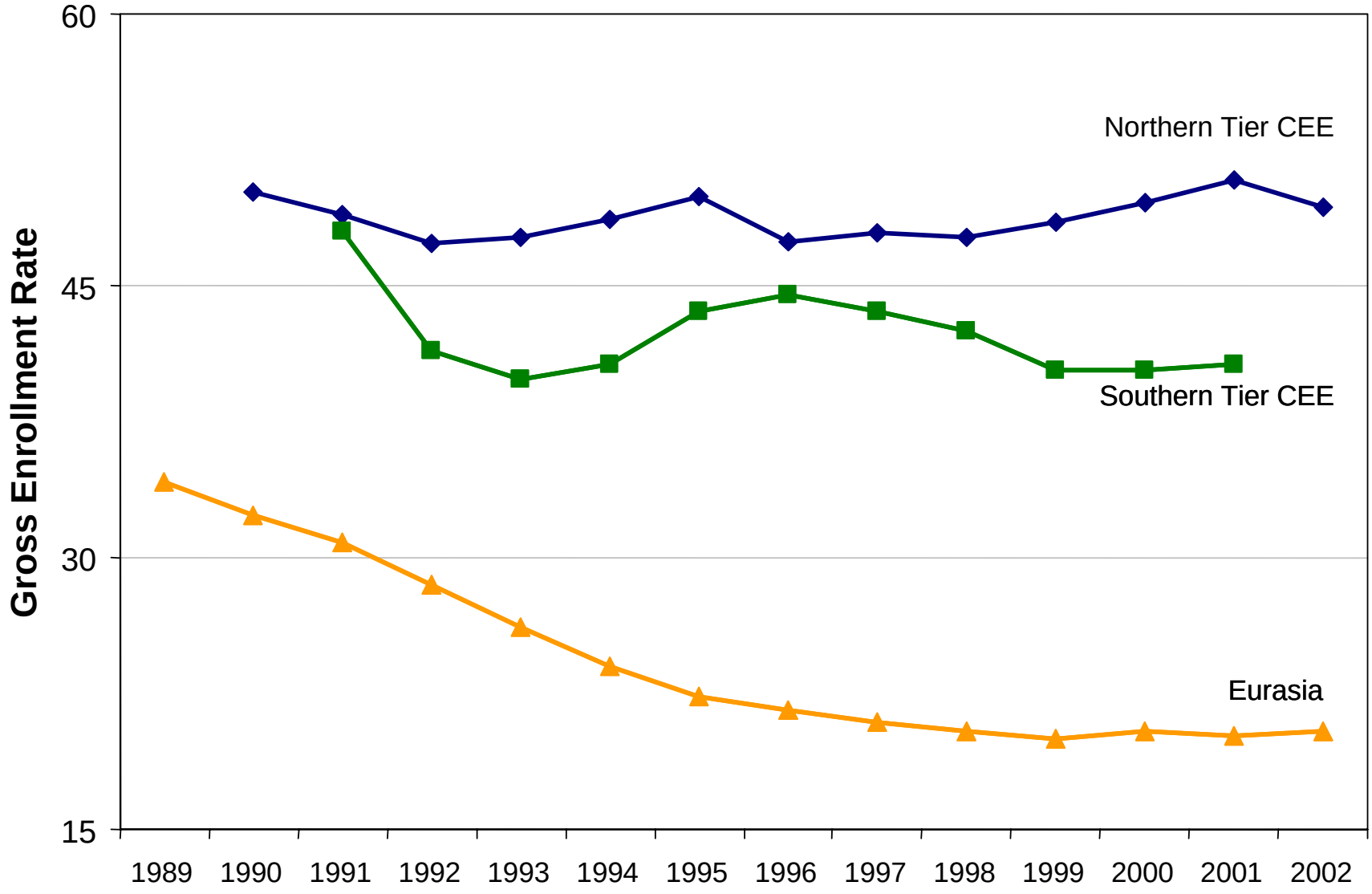
General Secondary Enrollment



Northern Tier CEE excludes Slovenia because of incomplete data; Southern Tier CEE excludes Bosnia-Herzegovina. For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 26

Vocational/Technical Enrollment



Northern Tier CEE excludes Slovenia because of incomplete data; Southern Tier CEE excludes Bosnia-Herzegovina and Serbia & Montenegro. For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Table 12. Total Secondary Enrollments

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Poland	90.2	89.3	89.3	90.5	92.5	94.9	96.5	97.4	98.3	99.5	101.2	102.9	108.8	111.8
Hungary	72.7	73.5	74	76.6	79.5	82.4	86	89.9	93	95.1	96.3	103.5	105.7	107.6
Slovenia	-	-	-	-	80.5	82.3	84.2	87.2	89.1	93.3	95.6	97.5	99	100.5
Czech Republic	79.2	78.7	74	74.7	78	85	91	72	72.5	71	75.9	86.2	87.9	90.6
Bulgaria	78.2	77	74.2	73	72.2	74.8	76.1	75.4	73.6	73.8	74.1	75.4	79	85.5
Slovakia	79	78.2	78	79.8	81.9	84.9	88.1	89.7	90.4	91.5	80	82.7	88.5	83.8
Croatia	-	-	59.7	66.3	76.4	86.7	103.2	109.2	104.9	98.3	89.8	85.5	83.5	83.1
Estonia	-	57.2	58.2	58.5	61.4	66.6	67.6	70.3	70.7	68.8	74.6	78.6	80.9	79.7
Romania	-	89.9	73.8	65	64.2	66.6	69.2	70.1	70.3	69.6	70.2	72.2	73.2	73.6
Latvia	70.2	66.4	65.2	61.8	62.5	61.8	61.4	64.4	67.8	69.3	74.4	74.7	72.3	71.8
Belarus	77.2	75.6	74.2	72.2	70.2	69.4	67	67.6	70	69.9	71.5	71.2	70.1	71.6
Russia	77.8	74.9	72.2	68.4	66	64.6	65.9	67.1	68.1	68.6	69.7	70.3	69.9	71.5
FYR Macedonia	-	-	-	54.4	54.1	55.3	57	58.7	60.2	62.6	65.5	67.4	69.1	69.6
Serbia and Montenegro	-	-	-	-	-	-	-	-	-	-	57.5	56	55	-
Uzbekistan	69.4	67.1	63.9	57.6	52.9	50.7	48.6	47.7	50.6	53.5	55.9	55.2	53.1	68.4
Lithuania	73.3	68.9	63.9	53.5	52.3	54	56.8	61.1	62.5	64.7	63.1	62.8	64.3	66.7
Kazakhstan	76.1	74.2	70.3	66.2	62.3	58.5	57.1	57.3	57.4	59.8	59.6	52.1	54.5	62
Ukraine	65.6	64.6	63.9	62.3	59.3	58.2	57.4	58.2	57.6	58	59.3	59.3	58.8	60.8
Bosnia-Herzegovina	-	-	-	-	-	-	-	-	-	-	-	51.9	51.5	51.7
Albania	79.2	76.1	58.6	48.9	44.9	40.8	39	39.9	41.8	42.7	42.4	43.8	49	
Armenia	67.5	63.4	58.3	54.1	49.5	45.6	40.4	41.3	41.5	43.2	44.5	42.4	41.1	49.1
Kyrgyzstan	65	63.5	61.5	57.1	49.3	45.7	41.3	41.3	44.2	48.3	50.1	36	36.4	47.5
Georgia	56.6	55.5	48.6	41.4	38	37.4	39.7	42.2	42.1	45.1	44.6	46.2	45.8	45.2
Azerbaijan	62.8	59.5	58.7	52	43.5	38.5	35.3	36.9	40.6	41	41.2	32.9	32.6	42.5
Moldova	67.1	64.3	57.3	43.5	41.6	40.6	40.3	41.7	47.1	45.7	38.5	37.5	37.9	40.1
Turkmenistan	66.8	63.1	59.7	56.6	53.3	47.7	44.1	34.1	30.9	29.5	33.9	31	30.6	27.4
Tajikistan	60.1	59.4	55.6	45.5	42.4	39.5	36.1	32.6	31.3	24.7	26.4	31.4	29.1	26.9
Northern Tier CEE	-	73.2	71.8	70.8	72.6	75.7	78.2	77.8	79.3	80	80.8	84.5	86.9	87.4
Southern Tier CEE	-	-	-	61.5	62.4	64.8	68.9	70.7	70.2	69.4	68.4	68.9	70.8	-
Eurasia (includes CARs)	67.7	65.4	62	56.4	52.4	49.7	47.8	47.3	48.5	48.9	49.6	47.1	46.6	51.1
Central Asian Republics	67.5	65.5	62.2	56.6	52	48.4	45.4	42.6	42.9	43.1	45.2	41.1	40.7	46.5

Gross enrollment rates; general secondary plus vocational/technical enrollments. For 1989-1995: %14-17 year old population enrolled; for 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Table 13. General Secondary Enrollments

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Lithuania	35.5	34.9	33	31.8	31.1	33.6	35.9	40.1	41.1	43.2	37.6	42.2	45.9	48.9
Estonia	37.8	36.7	37.2	38	41	45.9	46.3	47.6	47.7	45.2	44.8	45	46.4	46.8
Poland	20.3	20.9	22.5	24.3	25.9	27.7	29.5	30.3	31.8	33.7	36.2	38.9	42.4	46.0
Latvia	22.1	20.9	20.6	20.8	25.2	27.3	29	37.1	39.1	41.2	43.1	43.1	41	41.6
Albania	24.6	22.4	29	30.8	31.8	31.8	30.9	32.8	35.2	36.4	36.4	37.2	41.3	-
Bulgaria	30.9	29.8	28.9	29.6	30	31.6	32.5	32.2	31.4	32	32.6	33.1	35	38.3
Kazakhstan	32.5	33.3	32	29.5	28	26.6	26.2	30.1	34.5	38.5	39.3	30.6	31.2	37.9
Slovenia	-	-	-	-	19.5	20.1	20.5	21.6	22.7	25.6	29	31.9	35.1	37.5
Armenia	35.9	34.3	32.5	31.3	31.2	30.7	29.1	29.6	30.6	31.8	32.8	32.1	30.5	37.5
Hungary	17.3	17.6	18.2	19.6	20.8	22.1	23.2	24.4	25.7	26.8	27.8	34.3	35.4	36.5
Kyrgyzstan	36.7	36.6	35.5	31.9	27.1	26.1	25.2	27.3	30.9	35.2	37.5	23.5	24.5	36.1
Uzbekistan	36.3	37.1	36	30.8	27.6	27.2	26.3	26.2	28	29.6	30.9	22.7	21.2	34.9
Azerbaijan	34	33.5	33.7	31.7	27.8	25.7	24.6	26.7	30.9	31.5	31.6	23.2	22.5	32.5
Georgia	39.9	39.2	33.7	26	24.1	23.1	25.7	26.4	25.3	26.1	26.5	30.3	31.4	32.0
Ukraine	25.3	25	24.4	23.3	22.8	23.6	24.1	25.5	27.4	29.3	31.1	30.9	30.5	31.4
Russia	24.4	24.7	23.6	22.6	22.3	23.4	24.5	25.7	27.1	28.5	29.1	28.6	28.7	29.5
Slovakia	14.3	15	15.7	16.7	17.8	19	20.5	21.6	22.3	22.6	21.7	23.1	24.9	27.8
Belarus	27.1	26.8	26.2	25.2	24.1	25	24.8	26.6	28.2	27.9	28.9	27.9	26.8	27.7
Moldova	27.4	26.3	22.2	17.1	17.2	17.6	18	19.2	21.7	22.9	21.1	22.7	24.3	27.2
FYR Macedonia	-	-	-	10.6	14.6	15.9	17.3	18	18.8	20.3	22.2	24.1	25.7	27.0
Romania	-	11.5	15.9	17.2	18.6	19.6	20.1	21	21.4	21.4	26.3	26.1	26.3	26.2
Turkmenistan	41.7	40.4	37.5	35.4	34.6	34.5	33.5	23.7	23.8	24.7	28.7	25.1	25.1	21.9
Croatia	-	-	7.8	12.5	18	21.9	25.5	26.9	25.9	24.4	22.9	22.1	21.8	21.6
Tajikistan	40.4	40.3	37.2	29.5	26.9	25.5	23.8	22	22.2	16.3	17.8	22.8	21.1	19.1
Czech Republic	14.1	14.9	13.1	13	12.3	12.7	13.6	11.9	12.4	13.4	14.5	17.3	16.9	18.9
Bosnia-Herzegovina	-	-	-	-	-	-	-	-	-	-	-	16.1	16	16.6
Serbia and Montenegro	-	-	6.2	9.5	12.4	12.8	12.9	13.5	13.7	14	14.2	13.9	13.8	-
Northern Tier CEE	23.1	23	22.9	23.5	24.9	26.9	28.3	30.4	31.4	32.3	32.2	34.8	36.1	38.1
Southern Tier CEE	-	-	-	20.1	22.6	24.2	25.3	26.2	26.5	26.9	28.1	28.5	30	-
Eurasia (includes CARs)	33.5	33.1	31.2	27.9	26.1	25.7	25.5	25.8	27.5	28.5	29.6	26.7	26.5	30.7
Central Asian Republics	37.5	37.5	35.6	31.4	28.8	28	27	25.9	27.9	28.9	30.8	24.9	24.6	30.0

UNICEF, Social Monitor (2004). Gross enrollment rates. For 1989-1995: %14-17 year old population enrolled; for 1996-2002: % 15-18 year old population enrolled.

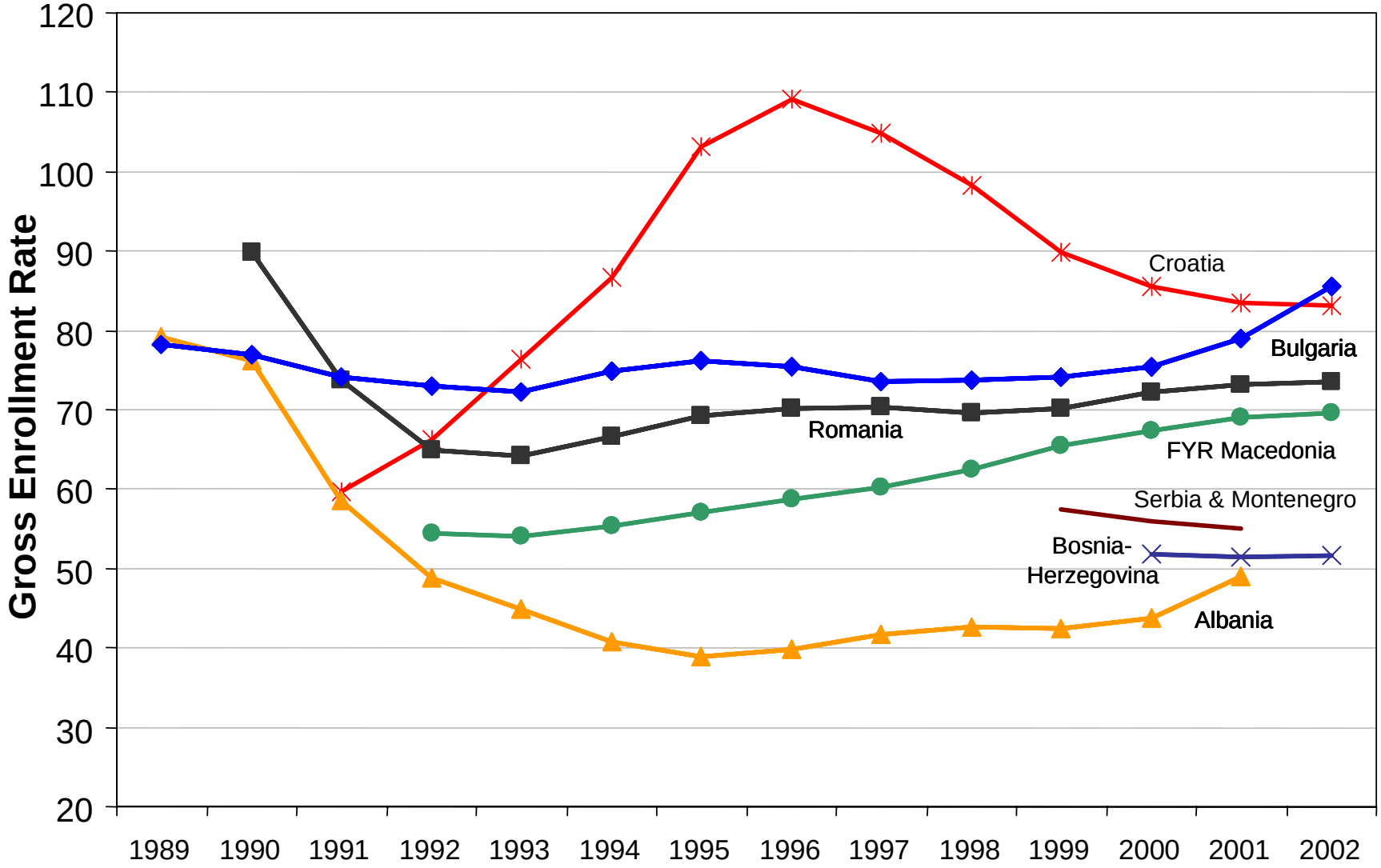
Table 14. Vocational/Technical Enrollments lments

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Czech Republic	65.1	63.9	60.9	61.7	65.7	72.4	77.4	60.1	60.1	57.6	61.3	68.9	71	71.7
Hungary	55.3	55.8	55.8	57	58.8	60.3	62.8	65.5	67.4	68.3	68.5	69.2	70.4	71.1
Poland	69.8	68.4	66.8	66.2	66.5	67.1	67	67.1	66.5	65.7	65	64	66.4	65.7
Slovenia	-	-	-	-	61	62.2	63.6	65.5	66.4	67.7	66.6	65.6	63.9	63
Croatia	-	-	51.9	53.8	58.4	64.8	77.7	82.2	78.9	74	66.9	63.3	61.7	61.5
Slovakia	64.7	63.2	62.4	63.1	64.1	65.9	67.7	68.1	68.1	68.8	58.3	59.6	63.6	56
Romania	-	78.4	57.9	47.7	45.6	47.1	49.1	49	48.9	48.2	43.9	46.1	46.9	47.4
Bulgaria	47.3	47.2	45.4	43.4	42.2	43.1	43.6	43.3	42.2	41.8	41.5	42.3	44.1	47.3
Belarus	50.2	48.8	48	47	46.2	44.4	42.2	41	41.9	42	42.7	43.3	43.3	43.8
FYR Macedonia	58.4	56.5	55.1	43.7	39.5	39.4	39.7	40.8	41.4	42.3	43.3	43.3	43.3	42.5
Russia	53.4	50.2	48.5	45.7	43.6	41.2	41.5	41.4	41	40.1	40.6	41.7	41.1	42
Serbia and Montenegro	-	-	-	-	-	-	-	-	-	-	43.3	42	41.2	-
Bosnia-Herzegovina	-	-	-	-	-	-	-	-	47	-	-	35.8	35.6	35.1
Uzbekistan	33.1	30	27.8	26.8	25.3	23.4	22.3	21.5	22.6	23.9	25	32.5	31.9	33.5
Estonia	-	20.6	21	20.5	20.4	20.7	21.3	22.7	23.1	23.6	29.9	33.6	34.5	32.9
Latvia	48.1	45.6	44.6	41	37.3	34.5	32.4	27.4	28.7	28.1	31.2	31.6	31.3	30.2
Ukraine	40.3	39.6	39.5	39	36.5	34.7	33.4	32.6	30.1	28.7	28.2	28.4	28.3	29.3
Kazakhstan	43.6	40.9	38.3	36.7	34.3	31.9	30.9	27.2	22.9	21.3	20.3	21.5	23.3	24.1
Lithuania	37.8	34	30.9	21.7	21.2	20.4	20.8	21	21.4	21.5	25.5	20.6	18.4	17.7
Georgia	16.8	16.3	14.8	15.4	13.9	14.3	14	15.9	16.9	19	18.1	15.9	14.3	13.2
Moldova	39.7	38	35.1	26.4	24.4	23	22.3	22.5	25.4	22.8	17.4	14.8	13.6	12.9
Armenia	31.6	29	25.8	22.7	18.3	14.9	11.3	11.7	10.9	11.4	11.7	10.3	10.5	11.5
Kyrgyzstan	28.3	26.8	26	25.2	22.2	19.6	16.1	14	13.3	13.1	12.7	12.5	11.9	11.4
Azerbaijan	28.8	26	25	20.3	15.8	12.8	10.7	10.2	9.8	9.5	9.6	9.7	10.1	10
Tajikistan	19.7	19.1	18.4	16	15.5	14	12.3	10.6	9.1	8.4	8.6	8.6	8	7.8
Albania	54.6	53.7	29.6	18.1	13	9	8	7.1	6.6	6.3	6	6.6	7.6	-
Turkmenistan	25.1	22.8	22.2	21.1	18.7	13.2	10.5	10.4	7	4.8	5.2	5.9	5.5	5.5
Northern Tier CEE	-	50.2	48.9	47.3	47.7	48.7	49.9	47.4	47.9	47.7	48.5	49.6	50.8	49.3
Southern Tier CEE	-	-	48	41.4	39.8	40.7	43.6	44.5	43.6	42.5	40.3	40.3	40.7	-
Eurasia (includes CARs)	34.2	32.3	30.8	28.5	26.2	24	22.3	21.6	20.9	20.4	20	20.4	20.2	20.4
Central Asian Republics	29.9	27.9	26.5	25.2	23.2	20.4	18.4	16.8	15	14.3	14.3	16.2	16.1	16.5

UNICEF, Social Monitor (2004). Gross enrollment rates. For 1989-1995: %14-17 year old population enrolled; for 1996-2002: % 15-18 year old population enrolled.

Figure 27

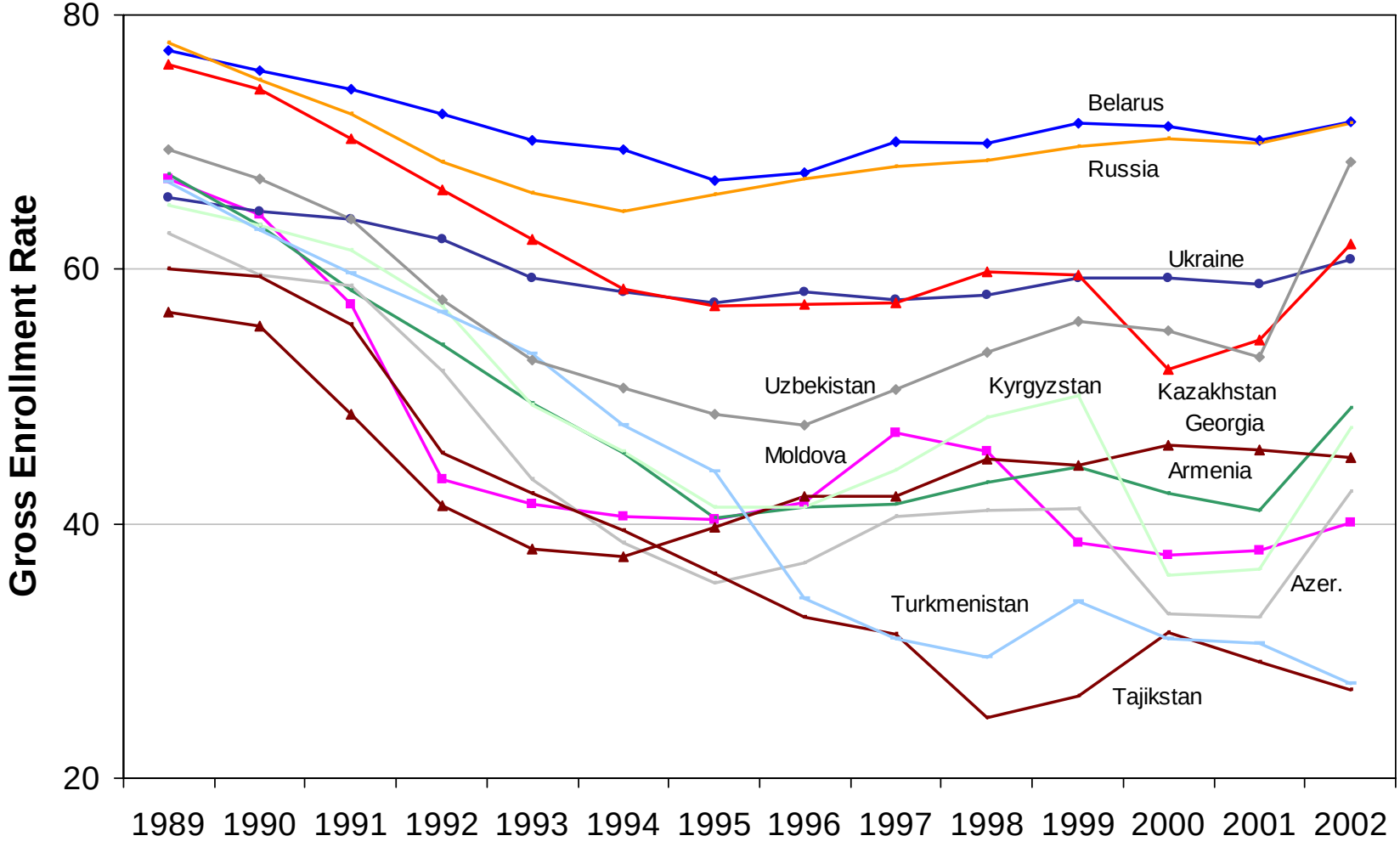
Total Secondary Enrollment: Southern Tier CEE



For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 28

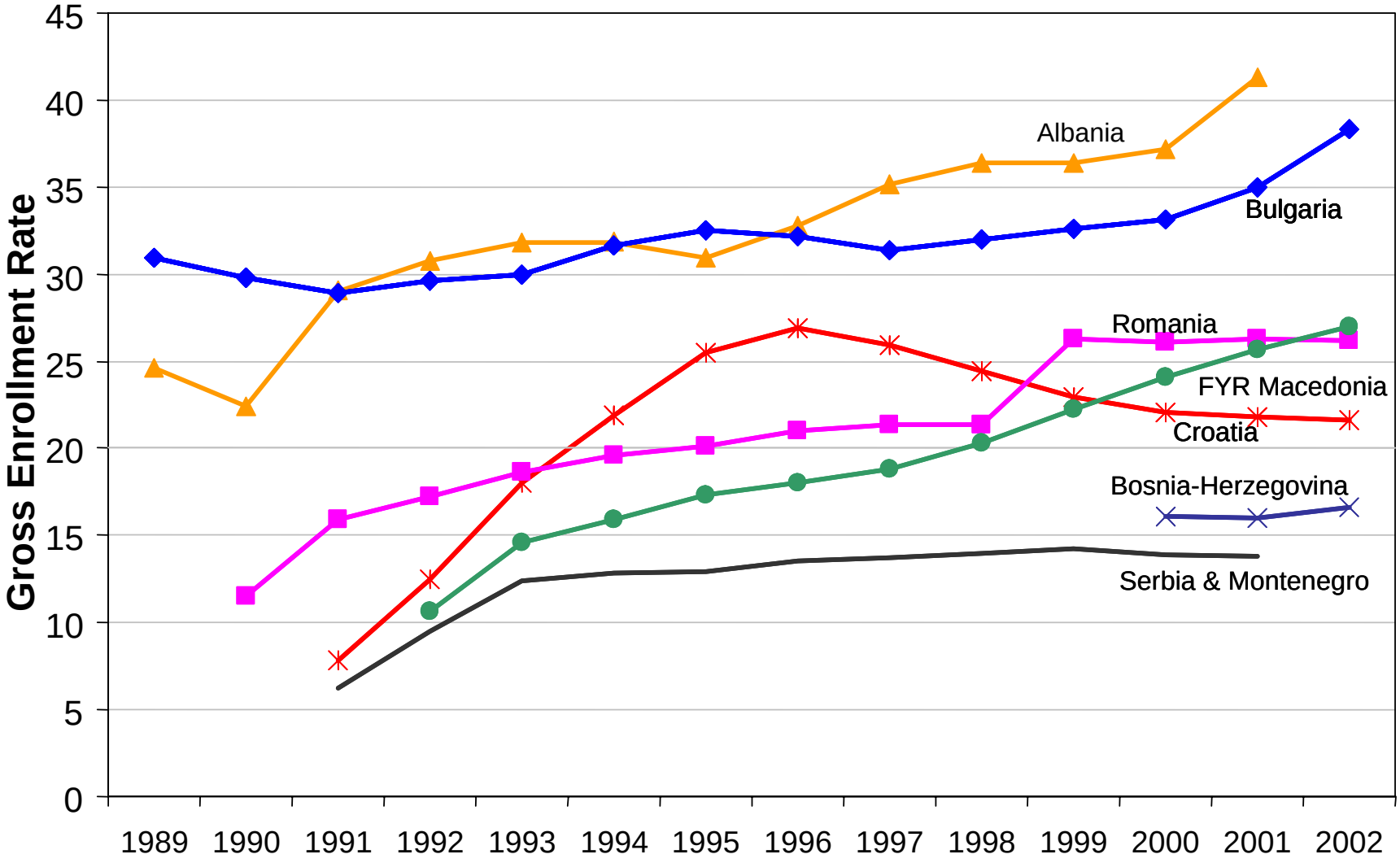
Total Secondary Enrollment: Eurasia



For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 29

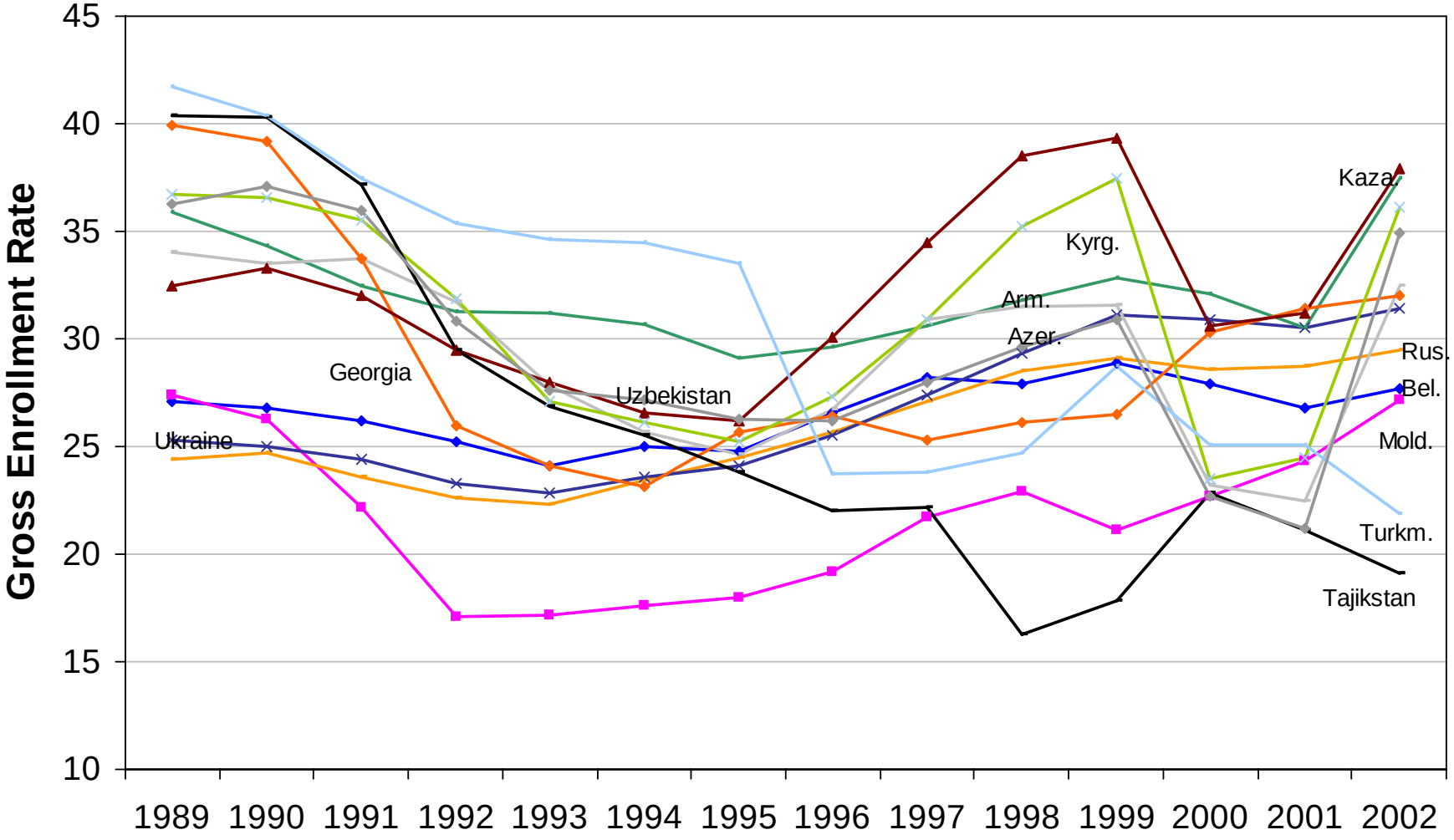
General Secondary Enrollment: Southern Tier CEE



For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 14-17 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 30

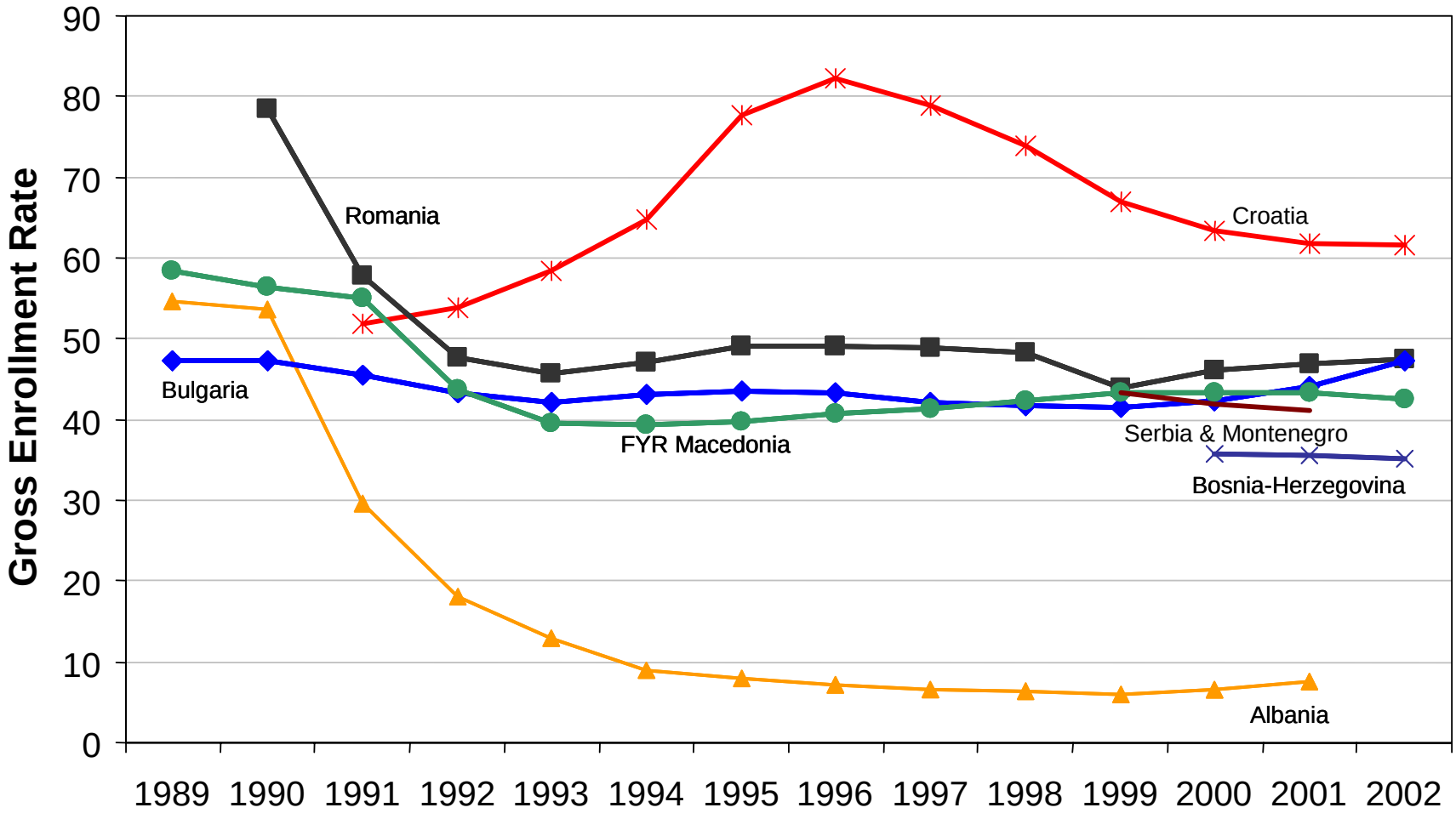
General Secondary Enrollment: Eurasia



For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 31

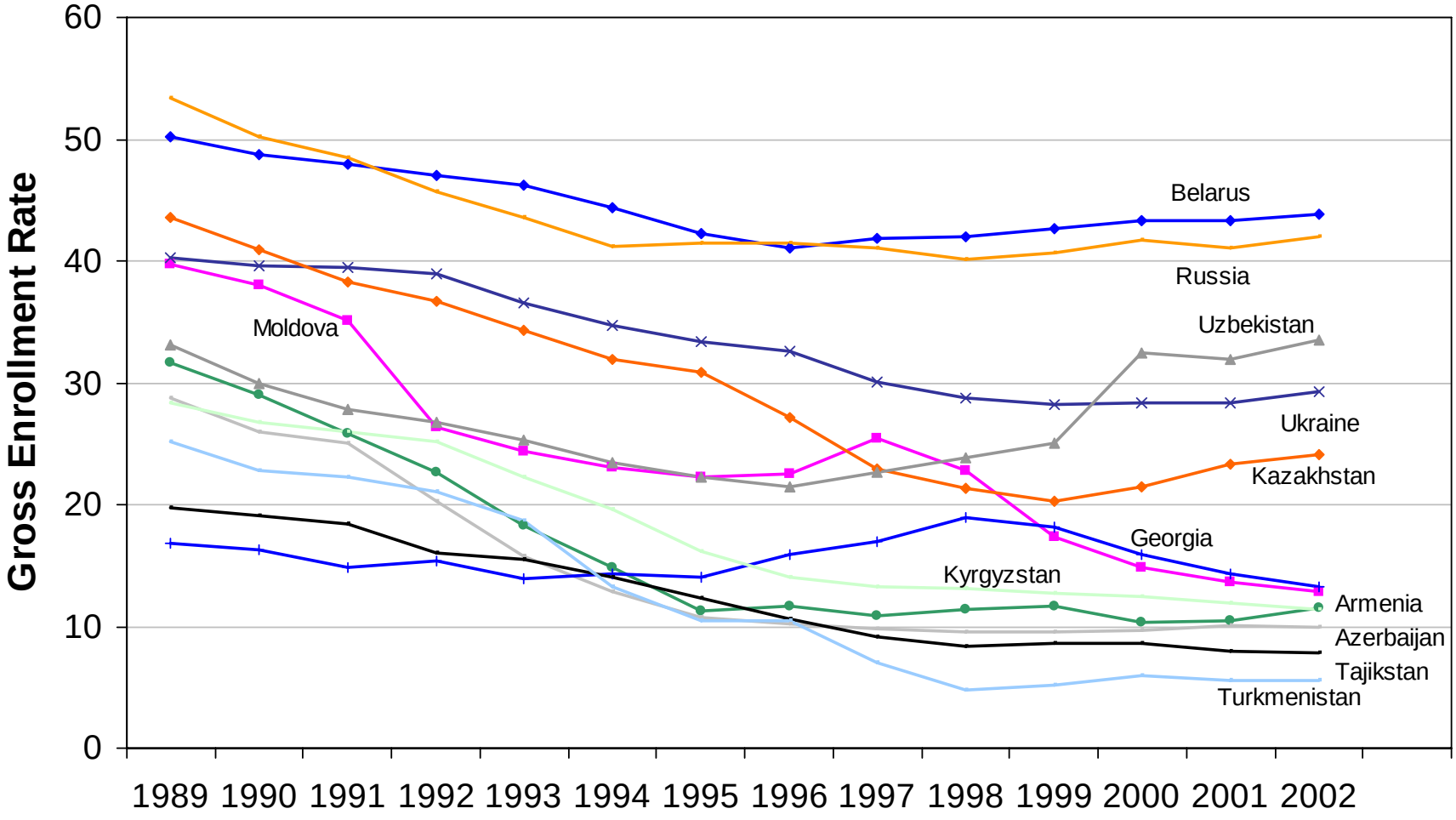
Vocational/Technical Enrollment: Southern Tier CEE



For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Figure 32

Vocational/Technical Enrollment: Eurasia



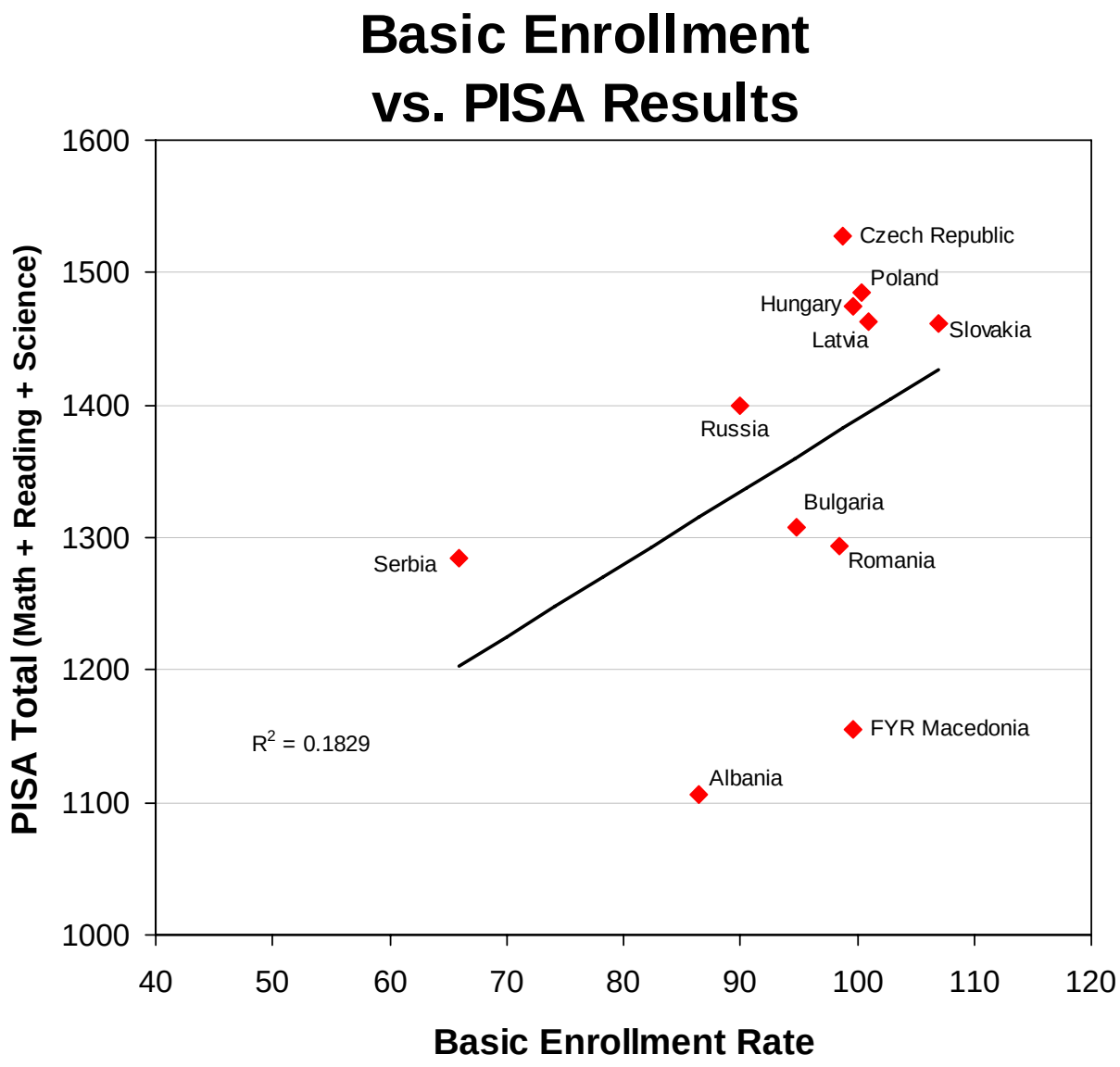
For 1989-1995: % 14-17 year old population enrolled; For 1996-2002: % 15-18 year old population enrolled. UNICEF, *Social Monitor* (2004).

Table 15. Secondary Enrollments

	1989 General	Vocational	Ratio	2002 General	Vocational	Ratio	Ratio Change
Czech Republic	14.1	65.1	4.6	18.9	71.7	3.8	-0.8
Hungary	17.3	55.3	3.2	36.5	71.1	1.9	-1.2
Poland	20.3	69.8	3.4	46	65.7	1.4	-2.0
Slovakia	14.3	64.7	4.5	27.8	56	2.0	-2.5
Slovneia	19.5	61	3.1	37.5	63	1.7	-1.4
Estonia	37.8	20.6	0.5	46.8	32.9	0.7	0.2
Lativa	22.1	48.1	2.2	41.6	30.2	0.7	-1.5
Lithuania	35.5	37.8	1.1	48.9	17.7	0.4	-0.7
Bulgari	30.9	47.3	1.5	38.3	47.3	1.2	-0.3
Romania	11.5	78.4	6.8	26.2	47.4	1.8	-5.0
Albania	24.6	54.6	2.2	41.3	7.6	0.2	-2.0
Bosnia				16.6	35.1	2.1	
Croatia	7.8	51.9	6.7	21.6	61.5	2.8	-3.8
Macedonia	10.6	58.4	5.5	27	42.5	1.6	-3.9
Serbia	6.2			13.8	41.2	3.0	
Belarus	27.1	50.2	1.9	27.7	43.8	1.6	-0.3
Moldova	27.4	39.7	1.4	27.2	12.9	0.5	-1.0
Russia	24.4	53.4	2.2	29.5	42	1.4	-0.8
Ukraine	25.3	40.3	1.6	31.4	29.3	0.9	-0.7
Armenia	35.9	31.6	0.9	37.5	11.5	0.3	-0.6
Azerbaijan	34	28.8	0.8	32.5	10	0.3	-0.5
Georgia	39.9	16.8	0.4	32	13.2	0.4	0.0
Kazakhstan	32.5	43.6	1.3	37.9	24.1	0.6	-0.7
Kyrgyzstan	36.7	28.3	0.8	36.1	11.4	0.3	-0.5
Tajikistan	40.4	19.7	0.5	19.1	7.8	0.4	-0.1
Turkmenistan	41.7	25.1	0.6	21.9	5.5	0.3	-0.4
Uzbekistan	36.3	33.1	0.9	34.9	33.5	1.0	0.0
Northern Tier CEE	22.6	52.8	2.8	38.0	51.0	1.6	-1.3
Southern Tier CEE	15.3	58.1	4.5	26.4	40.4	1.8	-3.0
Eurasia	33.5	34.2	1.1	30.6	20.4	0.7	-0.4

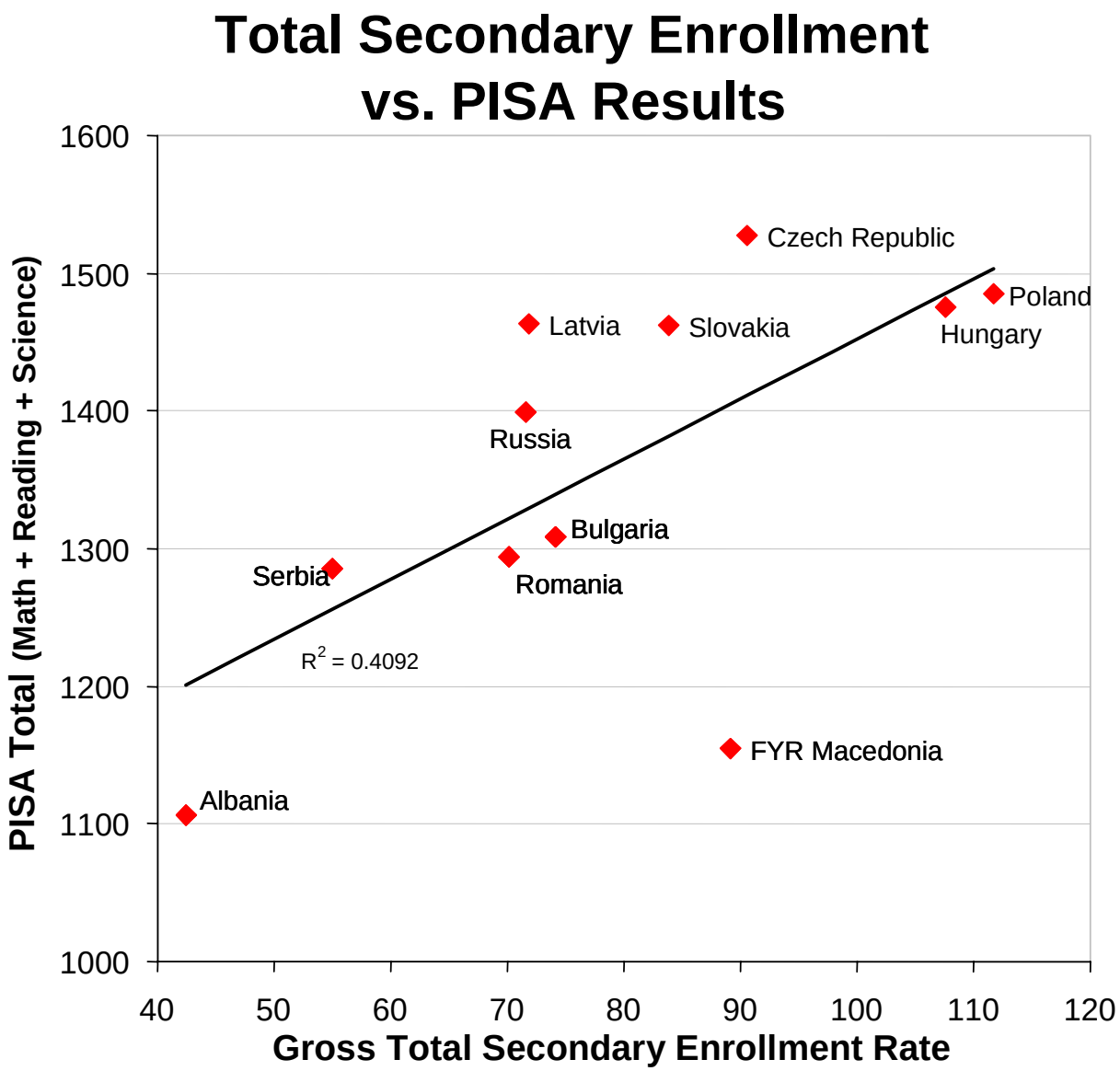
UNICEF, Social Monitor (2004).

Figure 33



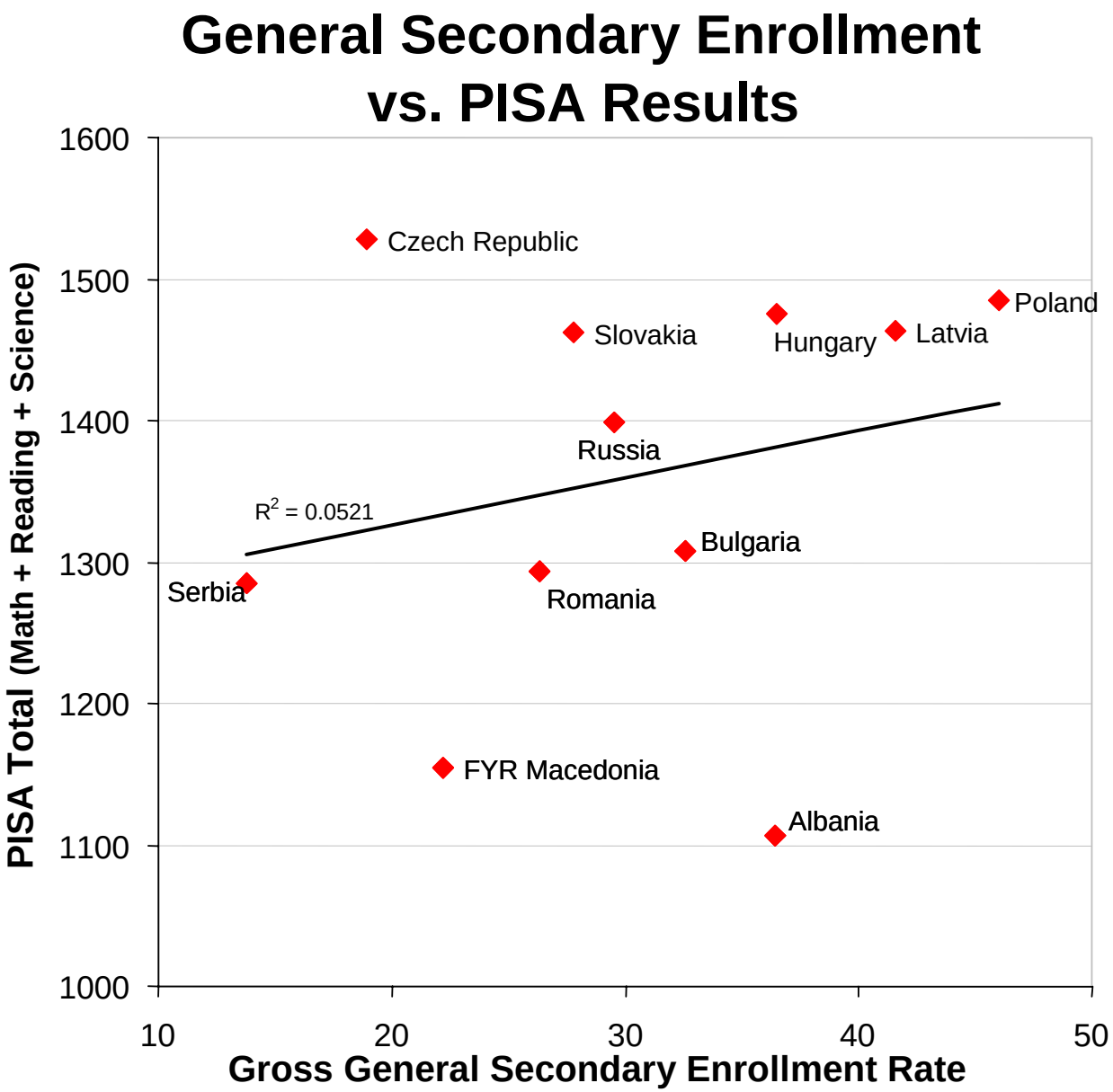
Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Northern Tier CEE annd Russia use 2002 enrollment figures, Serbia uses 2001; Southern Tier CEE countries (except Serbia) use 2001 enrollment figures.
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 34



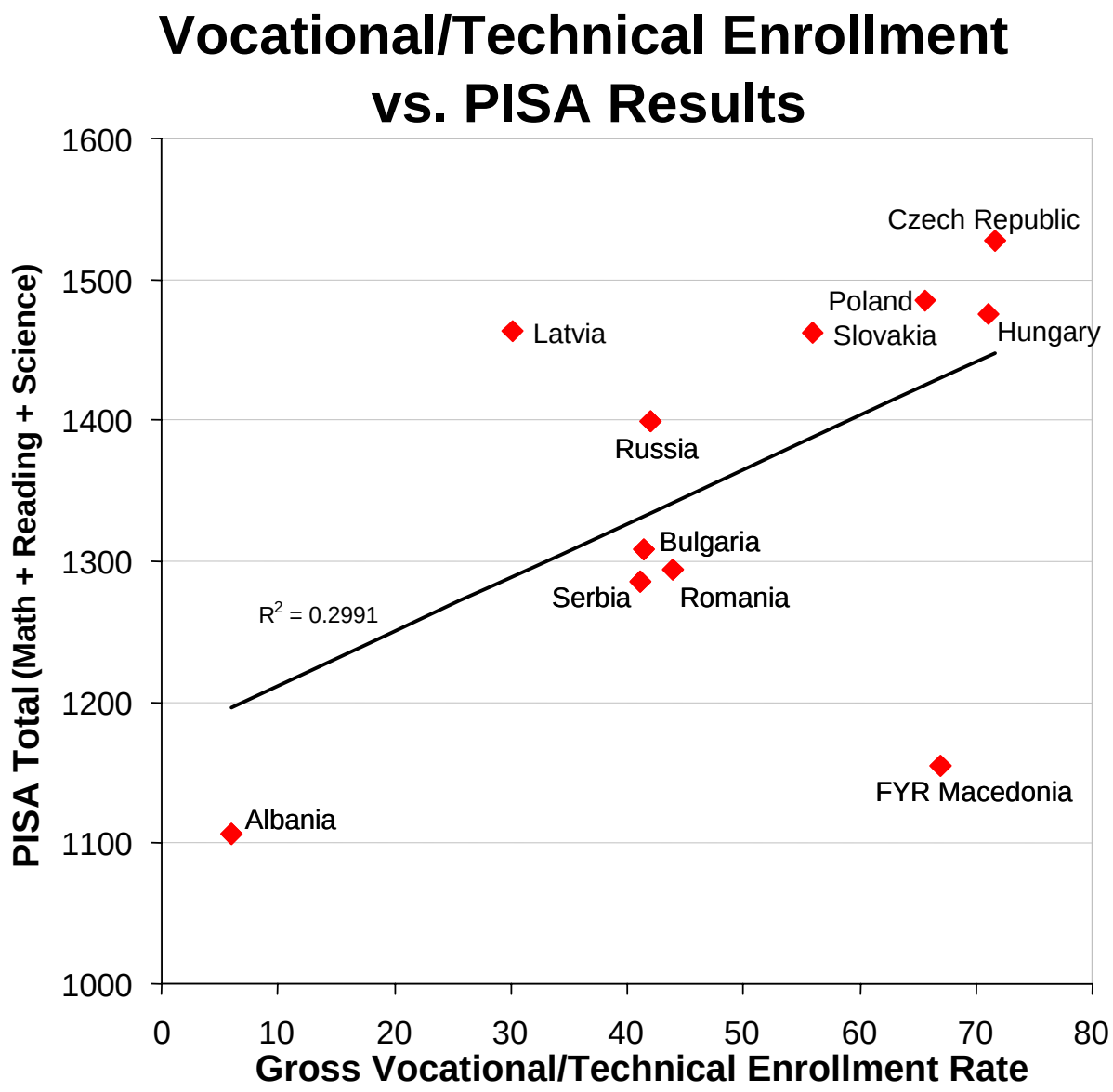
Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Northern Tier CEE and Russia use 2002 enrollment figures; Southern Tier CEE countries use 2001 enrollment figures.
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 35



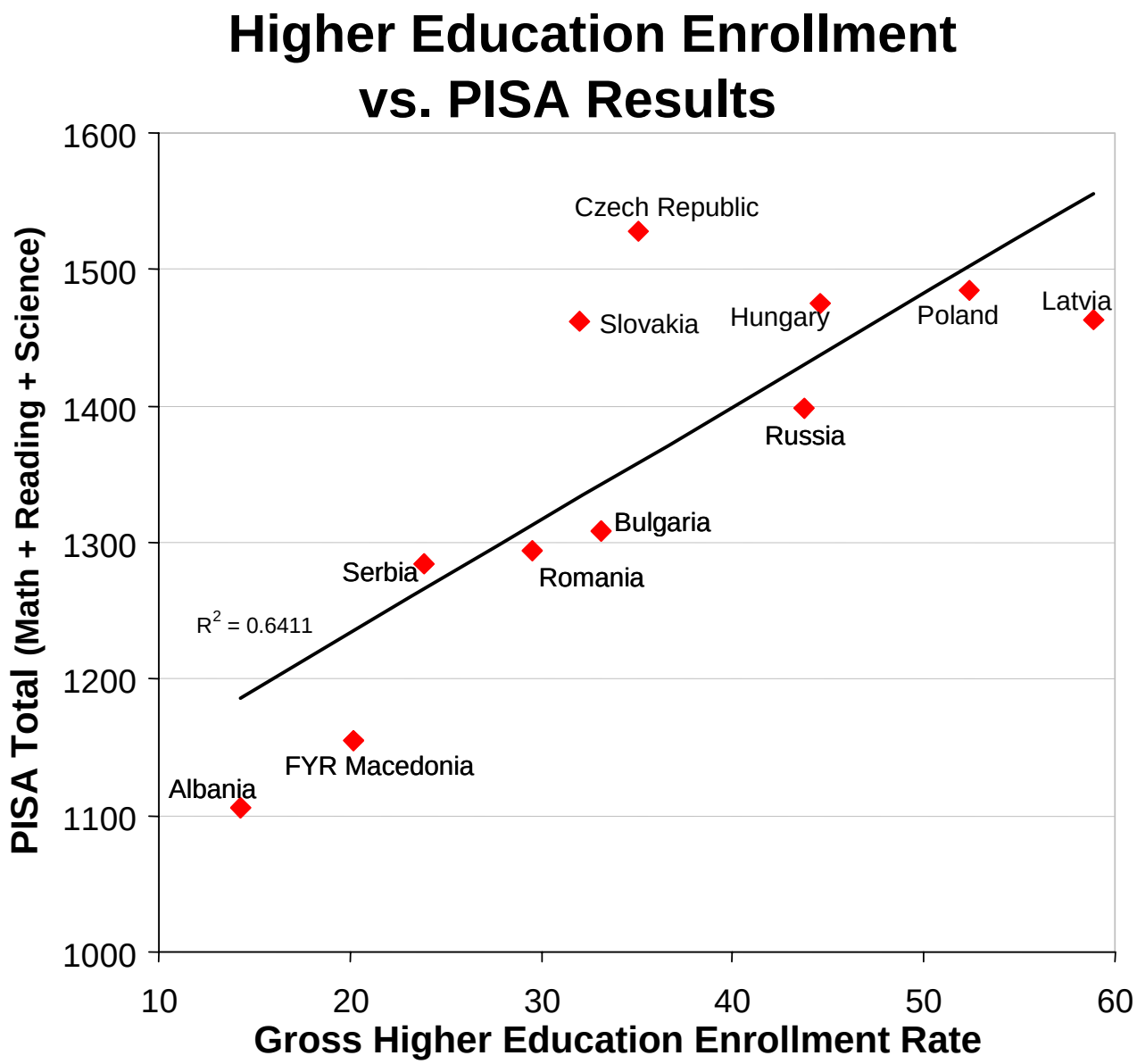
Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Northern Tier CEE and Russia use 2002 enrollment figures; Southern Tier CEE countries use 2001 enrollment figures.
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 36



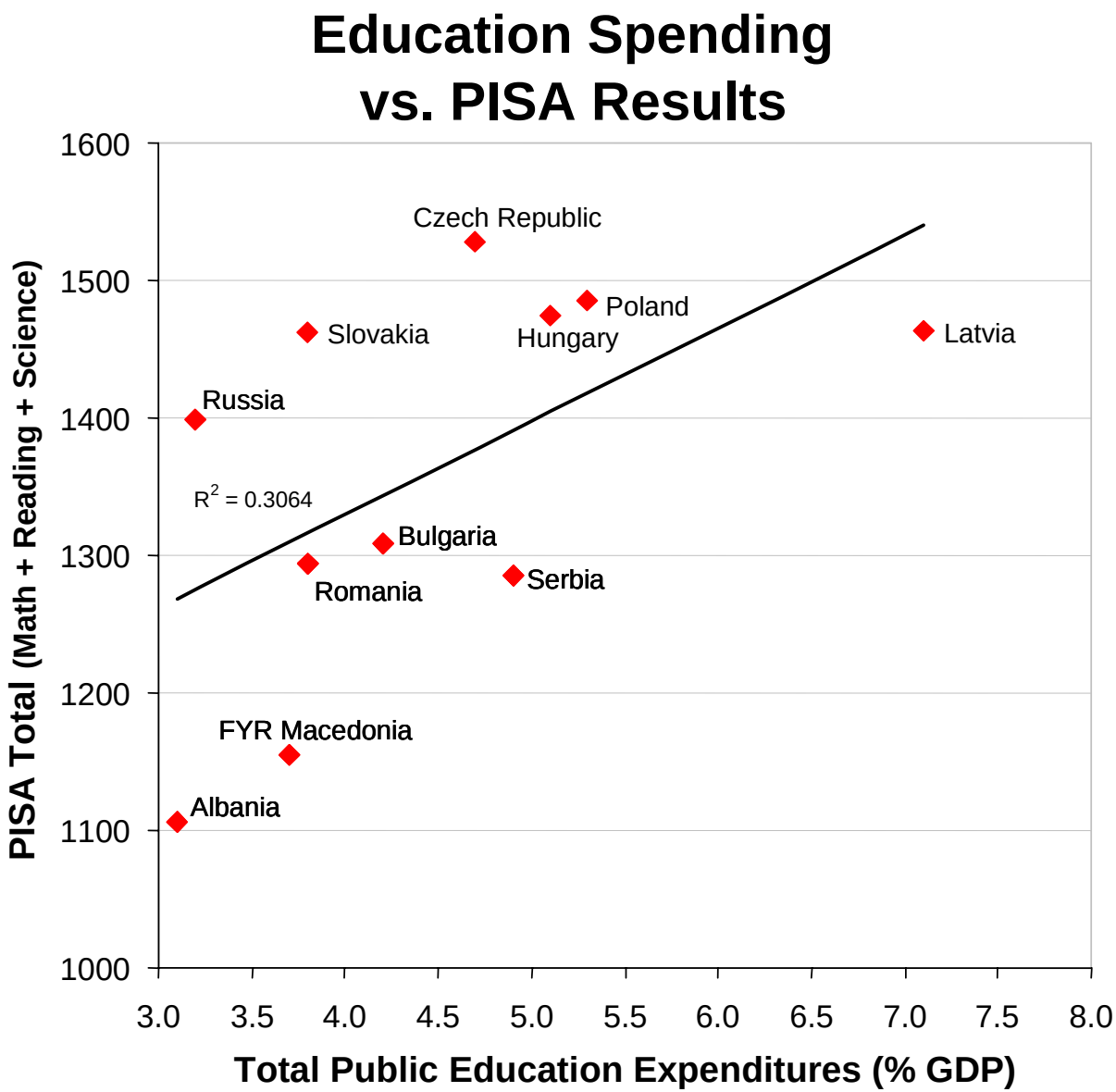
Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Northern Tier CEE and Russia use 2002 enrollment figures, Southern Tier CEE countries use 2001 enrollment figures.
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 37



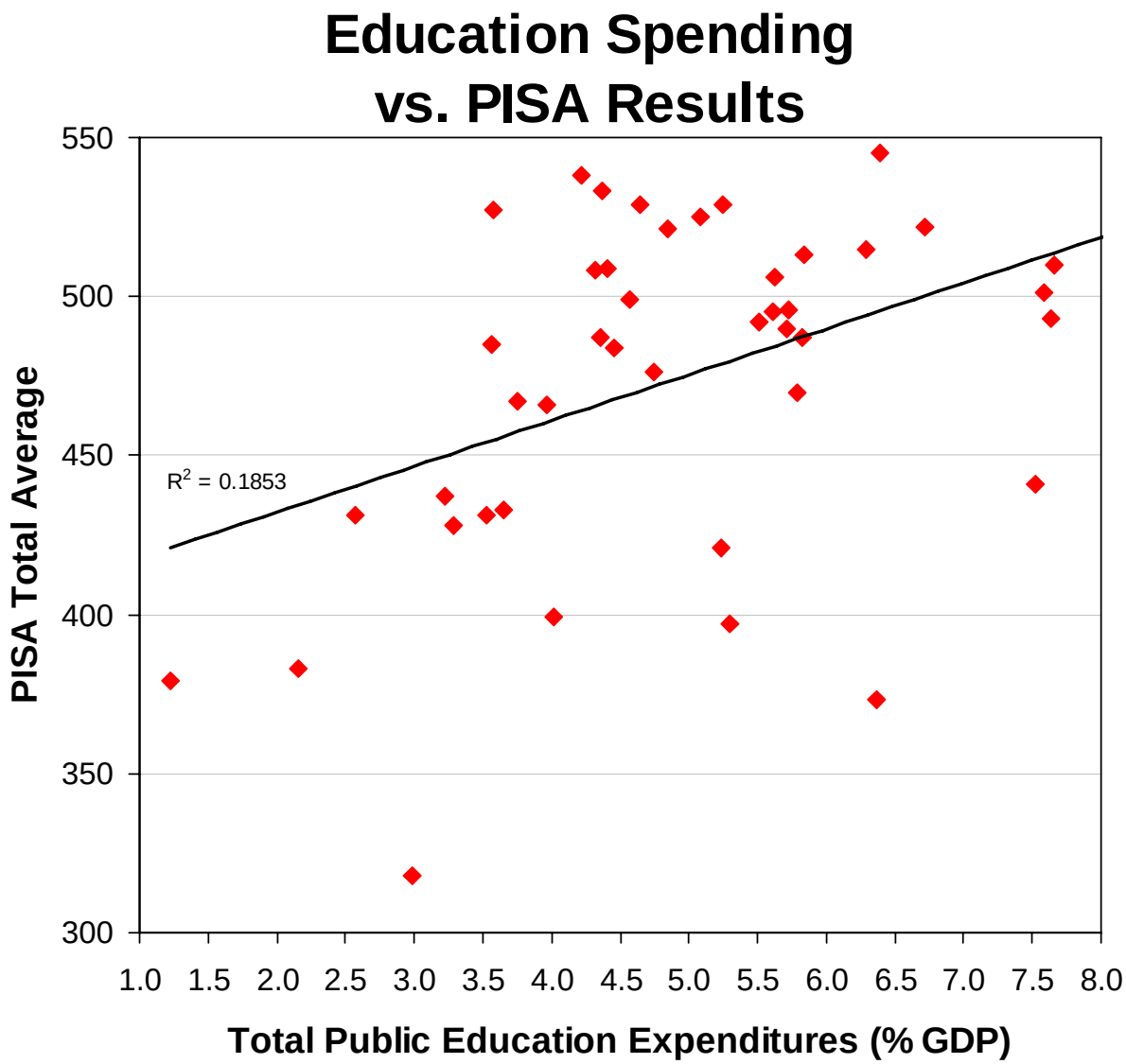
Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Northern Tier CEE and Russia use 2002 enrollment figures; Southern Tier CEE countries use 2001 enrollment figures.
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 38



Northern Tier CEE countries, Serbia, and Russia use PISA 2003 results; Southern Tier CEE countries (except Serbia) use PISA 2000 (PLUS) results. Czech Republic, Hungary, Latvia, and Poland use 2002 expenditure figures; Serbia and Russia use 2000; Albania, Bulgaria, and FYR Macedonia use 1999..
UNICEF, *Social Monitor 2004* (2004). OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004).

Figure 39



Bulgaria, Peru, Romania, and the United Kingdom use PISA 2000 results; all other countries use PISA 2000. OECD, *Learning for Tomorrow's World: First Results from PISA 2003* (2004). Enrollment figures used from closest year available to PISA assessment. Data taken from UNESCO Institute for Statistics, 2005.

Table 16: R&D Personnel per Million Inhabitants

	1994-96	1999-01	% Change
Croatia	2,674	1,534	-43
Georgia	3,857	2,514	-35
Bulgaria	2,460	1,639	-33
Ukraine	3,886	2,712	-30
Romania	1,961	1,458	-26
Belarus	2,647	2,153	-19
Kyrgyzstan	772	630	-18
Slovenia	3,678	3,135	-15
Latvia	1,579	1,376	-13
Armenia	1,731	1,536	-11
Moldova	1,763	1,597	-9
Estonia	2,488	2,334	-6
Russia	4,208	4,045	-4
Slovakia	2,586	2,633	2
Lithuania	2,719	2,795	3
Poland	1,299	1,473	13
Czech Republic	1,854	2,178	17
Hungary	1,545	1,950	26
Europe and Eurasia	3,230	2,346	-27
NT CEE	1,670	1,842	10
ST CEE	2,171	965	-56
Eurasia	3,905	2,746	-30
Muslim Majority			
Balkans			
Caucasus	3,042	1,096	-64
E&E less Balkans&Caucasus	3243	2515	-22
Congo	100	70	-30
Mongolia	708	647	-9
Panama	317	308	-3
Zambia	56	55	-2
Germany	4,155	4,457	7
Mexico	366	408	11
China	459	584	27
Uganda	34	38	12
El Salvador	15	47	213
EU-15 (4 countries)	2,732	3,488	32
Latin America & Caribbean (10 countries)	1,626	749	-54
East Asia & Oceania (5 countries)	870	1,506	73

UNESCO Institute for Statistics (1997 and 2004).

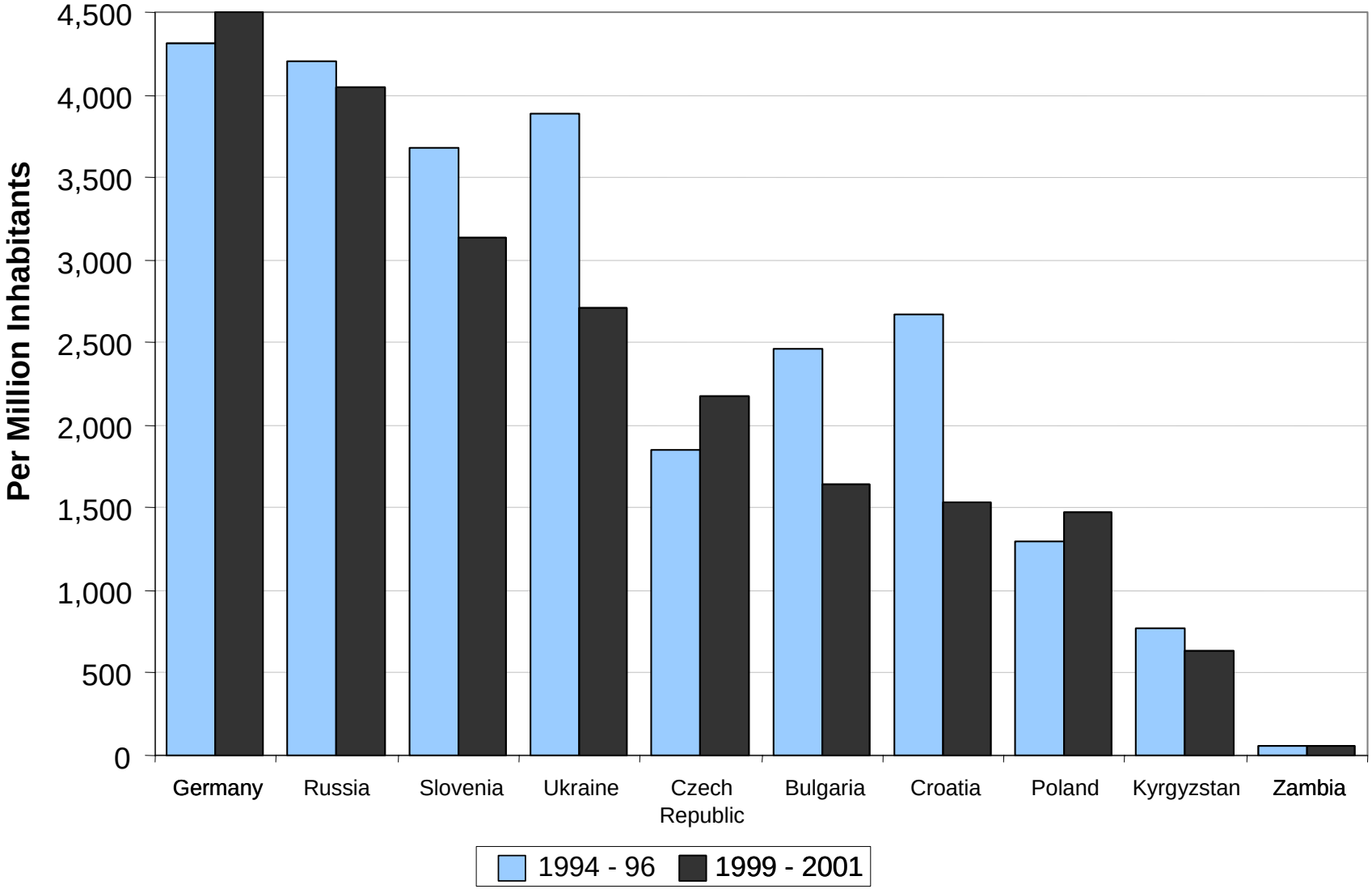
1/ 1996 for Lithuania, Mexico, Tunisia, Uganda, Congo, Zambia, Mongolia, Germany and 1994 for Romania, Kyrgyzstan and Madagascar.

2/ 1997 for Kyrgyzstan; 1999 for Croatia, Latvia, Georgia, Zambia, Germany and Mexico; 2000 for Bulgaria, Estonia, Moldova, Ukraine, Armenia, Congo, Mongolia and Uganda.

Figure 40

R&D Personnel in E&E

1994-96 vs. 1999-01



UNESCO *Institute for Statistics* (1997 and 2004).

Table 17. Education Gaps

	Education Spending 02 or mrd	Primary Enrollment 02 or mrd	Pre-primary Enrollment 02 or mrd	Total Secondary Enrollment 02 or mrd	Tertiary Enrollment 02 or mrd
Czech Republic	4.7	98.7	88.1	90.6	35.1
Estonia	6.8	104.4	80.5	79.7	53.2
Lithuania	6.3	103	54.5	66.7	56.5
Slovakia	3.8	107	70.7	83.8	32
Poland	5.3	100.3	51.1	111.8	52.4
Hungary	5.1	99.6	87.8	107.6	44.6
Belarus	6.8	93.3	69.2	71.6	34.3
Ukraine	5.6	94.7	48.7	60.8	38.7
Latvia	7.1	101	77.7	71.8	58.9
Russia	3.2	90	68.2	71.5	43.7
Croatia	NA	95.7	38.4	83.1	31.5
Slovenia	5.1	101.1	64.2	100.5	69.3
Moldova	5.8	94.7	52.4	*40.1	* 24.1
Kazakhstan	NA	100	*13.5	62	38
Serbia & Mont	4.9	*65.9	44.6	76	* 23.9
Bulgaria	4.2	98.7	74.2	85.5	33.9
Kyrgyzstan	4.5	94.8	*9.5	* 47.5	35
Georgia	*2.2	97	30.8	*45.2	38.4
Uzbekistan	NA	97.5	*19.9	68.4	*7.9
Romania	*2.9	100.9	71	73.6	32.5
Macedonia	3.7	97.1	27.1	62.8	*22.5
Azerbaijan	3.2	90.4	*19.3	*42.5	*13.5
Armenia	*1.9	88.4	*25.7	*49.1	*21.8
Albania	*2.6	104	34.3	*48.9	*14.3
Bosnia & Herz	NA	*79.3	*8.9	73?	*19.2
Tajikistan	*2.6	94.4	*6.1	*26.9	*13
Turkmenistan	5.8	*80.8	*20.2	*27.4	*2.6
	* < 3%	* <85%	* < 30%	* < 50%	* < 25%

Data not available: NA; Vulnerable: *)

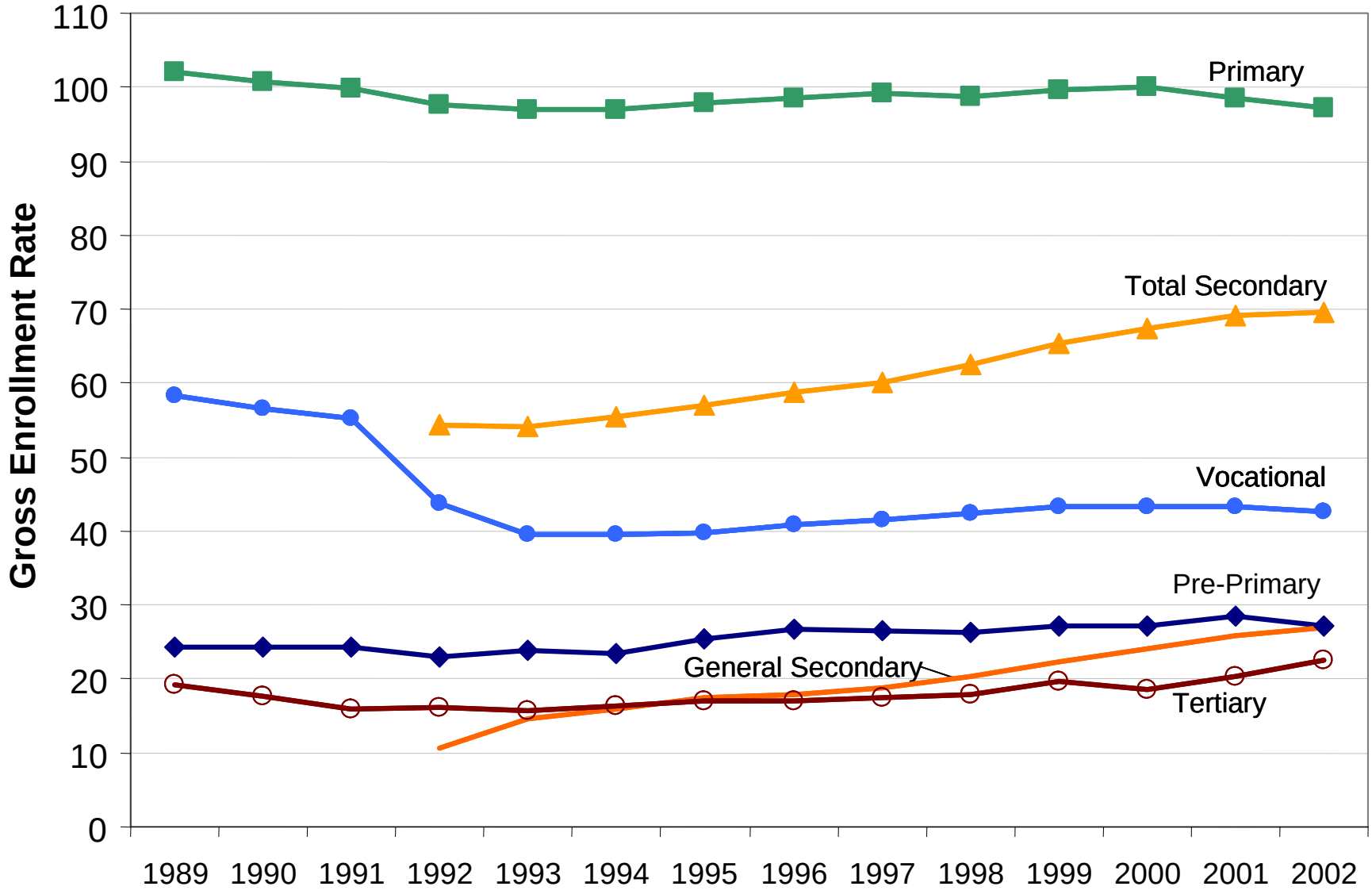
Table 17. Continued

	PISA	PISA disparities	PISA hindered	TIMSS	IALS	PIRLS	Brain Drain	*/Available	%
Czech Republic	509	small	little	530	58	537	17	0/12	0
Estonia	NA	NA	NA	542	NA	NA	-6	0/7	0
Lithuania	NA	NA	NA	511	NA	543	3	0/8	0
Slovakia	487	small	little	*513&B	NA	518	2	1/11	9
Poland	485	small	little	NA	*26	NA	13	1/10	10
Hungary	492	*	little	536	*35	543	26	2/12	17
Belarus	NA	NA	NA	NA	NA	NA	*-19	1/6	17
Ukraine	NA	NA	NA	NA	NA	NA	*-30	1/6	17
Latvia	488	small	*	509	NA	545	*-13	2/11	18
Russia	466	small	**	*511&B	NA	528	-4	2/11	18
Croatia	NA	NA	NA	NA	NA	NA	*-43	1/5	20
Slovenia	NA	NA	NA	507	*28	502	*-15	2/9	22
Moldova	NA	NA	NA	466	NA	492	-9	2/8	25
Kazakhstan	NA	NA	NA	NA	NA	NA	NA	1/4	25
Serbia & Mont	* 428	small	little	473	NA	NA	NA	3/9	33
Bulgaria	*436	*	little	*478&B	NA	550	*-33	4/11	36
Kyrgyzstan	NA	NA	NA	NA	NA	NA	*-18	3/6	50
Georgia	NA	NA	NA	NA	NA	NA	*-35	3/6	50
Uzbekistan	NA	NA	NA	NA	NA	NA	NA	2/4	50
Romania	*431	*	*	473	NA	NA	*-26	6/10	60
Macedonia	*385	**	**	**442&B	NA	*442	NA	6/10	60
Azerbaijan	NA	NA	NA	NA	NA	NA	NA	3/5	60
Armenia	NA	NA	NA	473	NA	NA	*-11	5/7	71
Albania	* 369	***	**	NA	NA	NA	NA	6/8	75
Bosnia & Herz	NA	NA	NA	NA	NA	NA	NA	3/4	75
Tajikistan	NA	NA	NA	NA	NA	NA	NA	4/5	80
Turkmenistan	NA	NA	NA	NA	NA	NA	NA	4/5	80
						* < 450			
	* < 450				* < 50% literate		* > -10%		

B: Backsliding
PISA disparities: by subject; gender; region
(subject: * => 7.5%; gender: * > 5%; region: * > 10%)
PISA hindered: by heating, etc.; instructional materials
(heating: * > 25%; instructional mat: * > 35%)
TIMSS: level and/or trend
(level: * < 450; trend: backsliding since 1995)
Brain drain: change in R&D persons from 1994 to 2001
(* > 10% decrease)

Figure 41

Enrollments in FYR Macedonia



UNICEF, *Social Monitor 2004* (2004).

Figure 42

PISA Results for FYR Macedonia

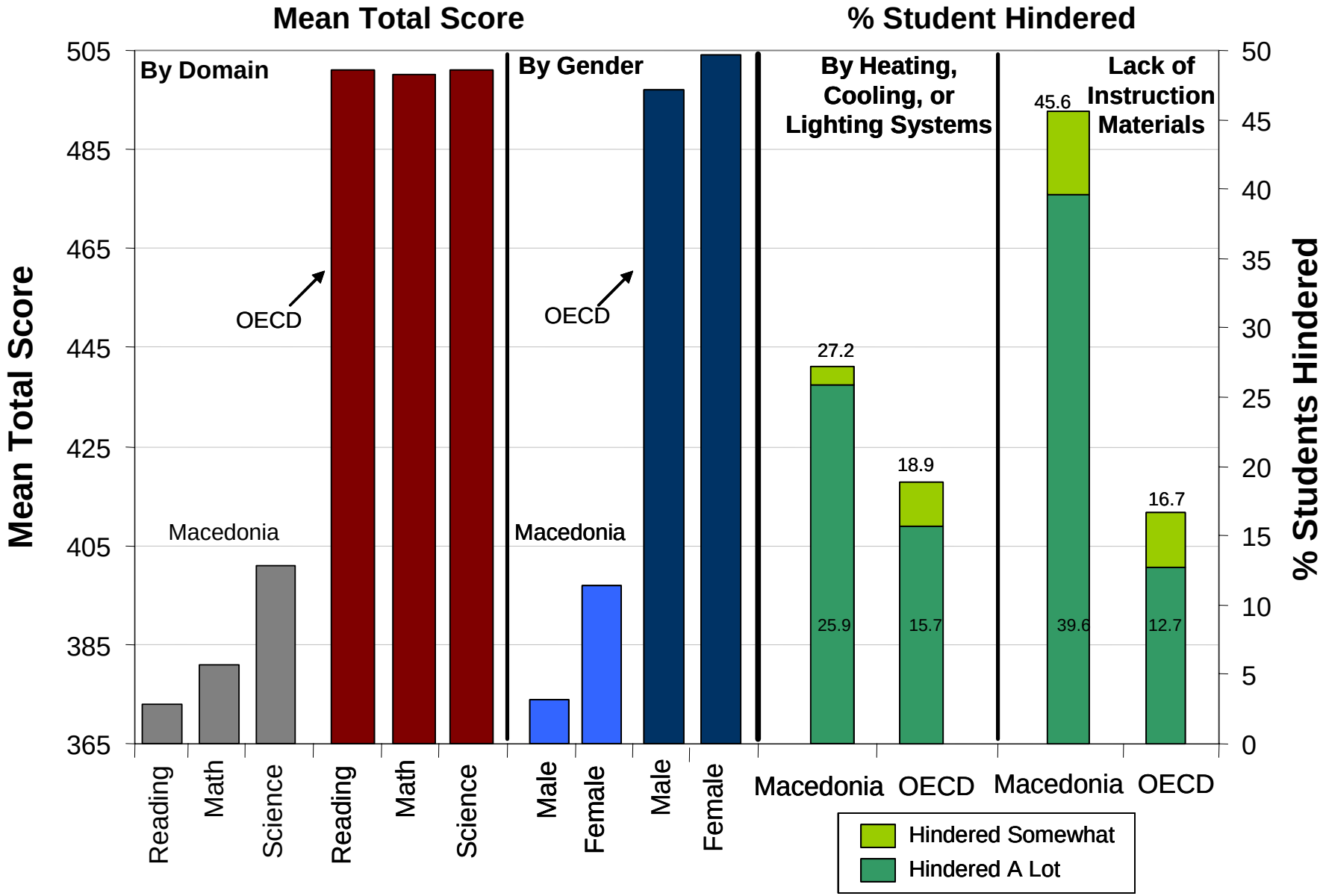
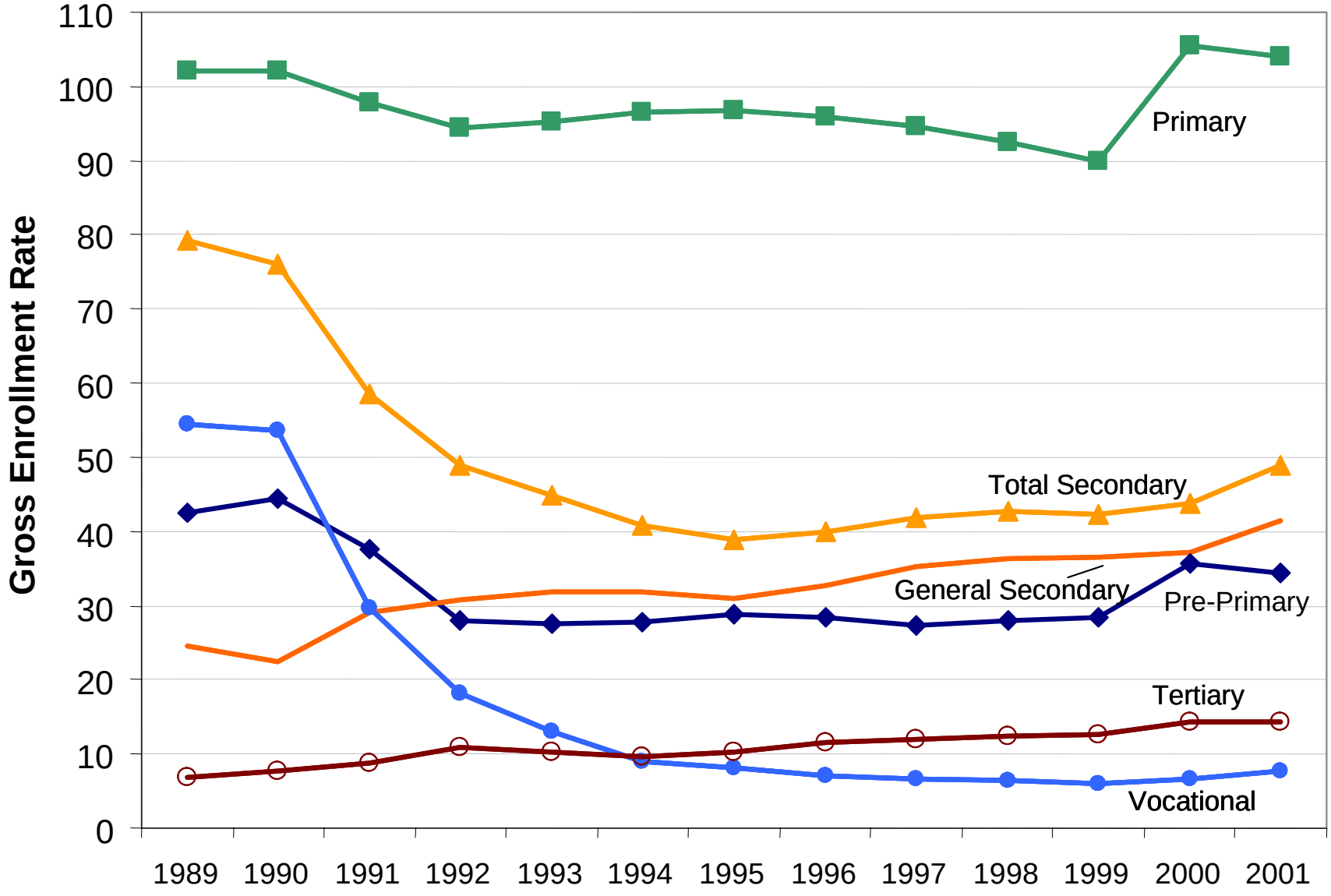


Figure 43

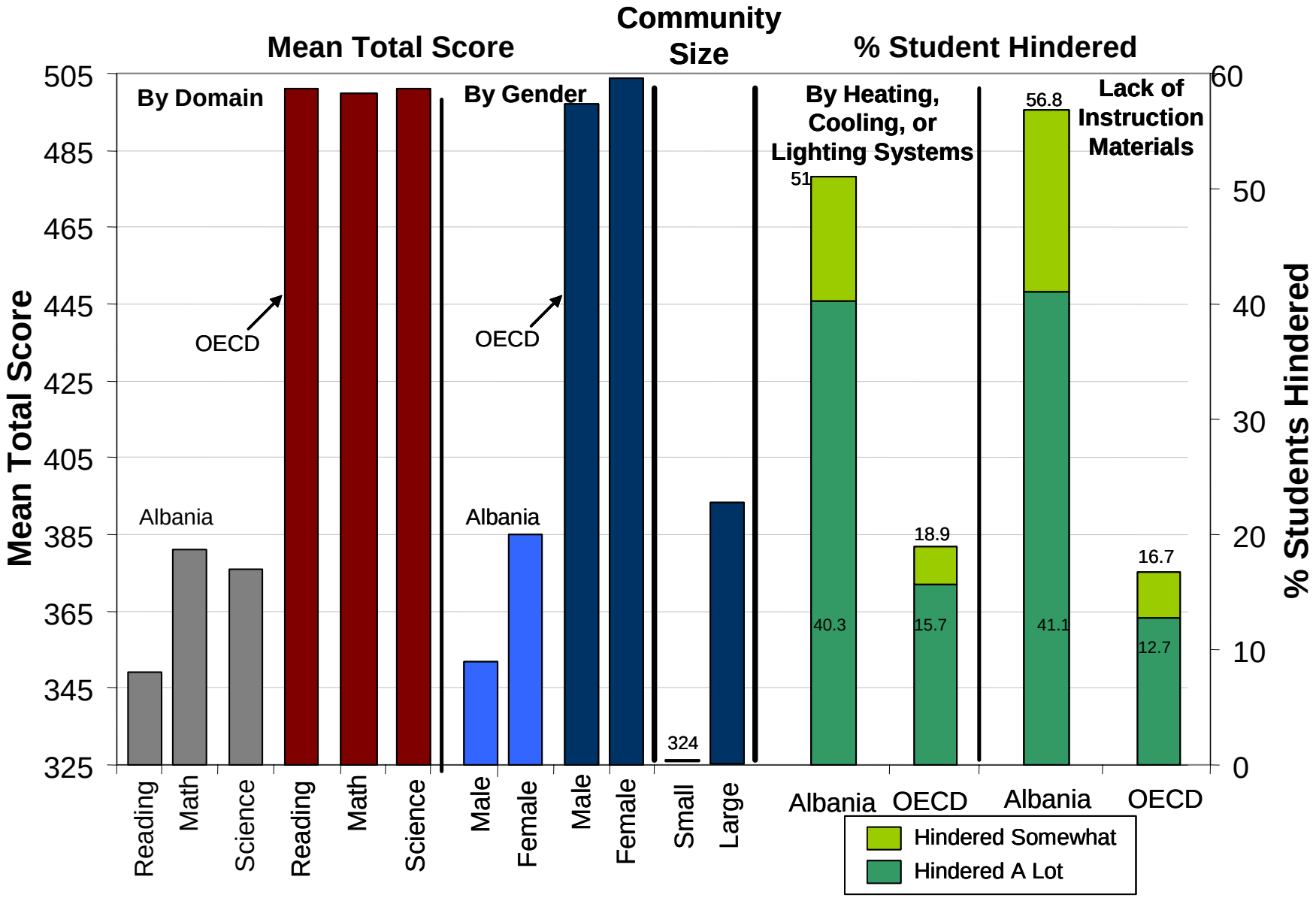
Enrollments in Albania



UNICEF, *Social Monitor 2004* (2004).

Figure 44

PISA Results for Albania



References

Berryman, Sue, Rasnake, Roger, Allison, Christine. (2002) *Education Systems of Europe and Eurasia: Strategic Investment Options for USAID*. Aguirre International and the International Science and Technology Institute.

Brown, Giorgina, Micklewright, John, Schnepf, Sylke, Waldmann, Robert. (2005) *Cross National Surveys of Learning Achievement: How Robust are the Findings?* ISTAT, Rome.

Micklewright, John. (2000) *Education, Inequality, and Transition.* UNICEF Innocenti Research Centre, Florence.

Mullis, I.V.S., M.O. Martin, E.J. Gonzalez, Kennedy, Ann (2004), PIRLS *2001 International Report: IEA's Study of Reading Literacy Achievement in Primary School in 35 Countries*, International Study Center, Lynch School of Education, Boston, College: Chestnut Hill, MA.

Mullis, I.V.S., M.O. Martin, E.J. Gonzalez, S.J. Chrostowski (2004), *TIMSS 2003 International Science Report: Findings from IEA's Trends in International Mathematics and Science Study at the Fourth and Eight Grades*, International Study Center, Lynch School of Education, Boston, College: Chestnut Hill, MA.

OECD (2004), *Learning for Tomorrow's World: First Results from PISA 2003*, Organization for Economic Development and Cooperation: Paris.

OECD and Statistics Canada, *Literacy in the Information Age: Final Report of the International Adult Literacy Survey*. Ottawa, Ontario: Statistics Canada, 2000.

OECD and UNESCO (2003), *Literacy Skills for the World of Tomorrow: Further Results from PISA 2000*, Organization for Economic Development and UNESCO Institute for Statistics.

UNICEF, *Innocenti Social Monitor 2004*, Florence: UNICEF Innocente Research Center, 2004. Statistical Annex.

USAID/EE/DGST. *Social Transition Strategy*. Bureau for Europe and Eurasia, 2005.

USAID/EE/DGST. *Social Issues Critical for Sustainability of Reform: Education Sector Discussion Paper* (August 2003).

US Department of Education. *Comparing NAEP, TIMSS, and PISA in Mathematics and Science* (2004).