Summary of Dongchan Lee's new discoveries after the release of the TIMSS 2015 and PISA 2015 results on math, science, and readings & the historic impacts for the global math education and economy of all the nations

Prepared by Dongchan Lee

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(Draft 1: Conservative estimates)

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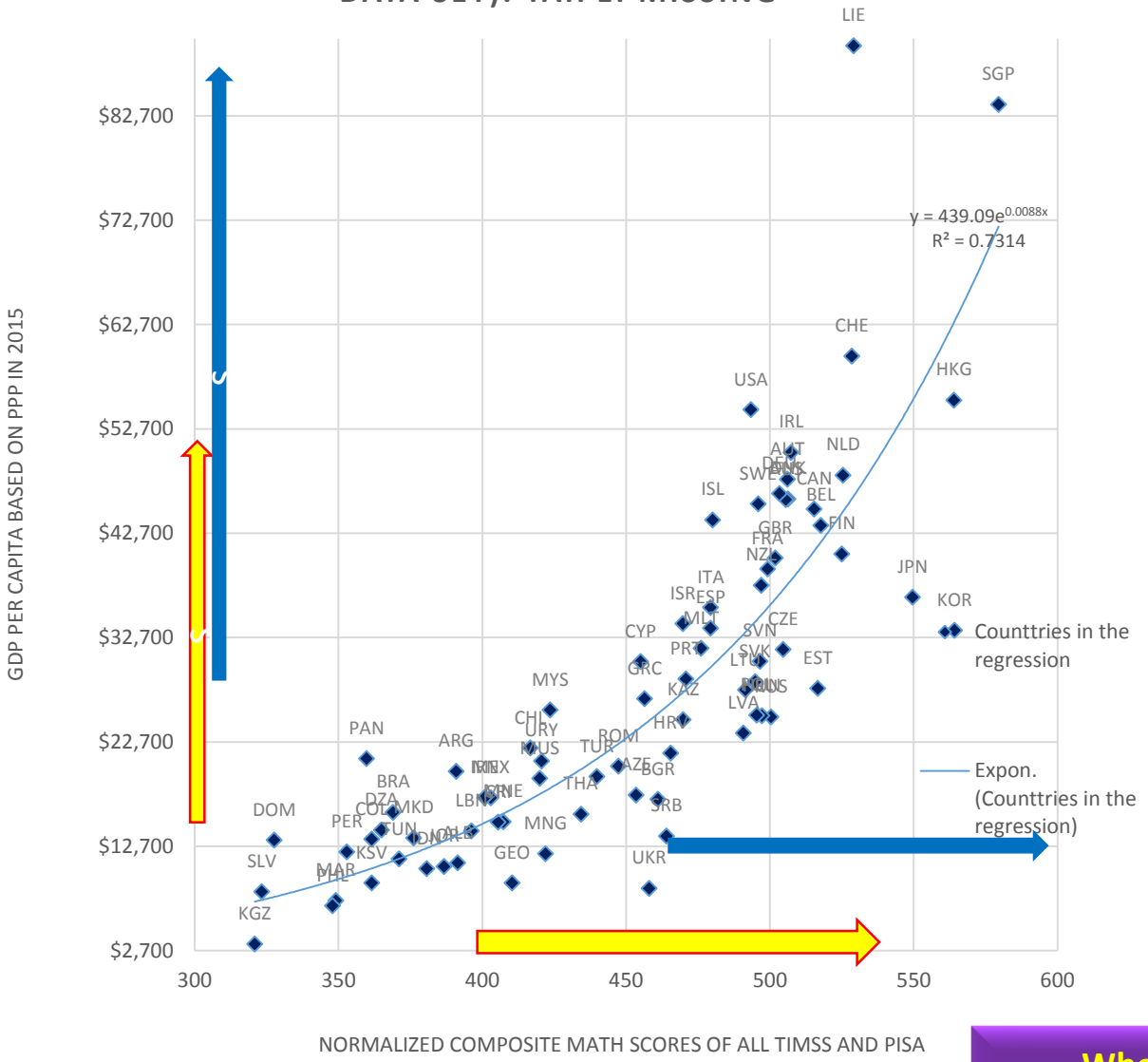
NORMALIZED COMPOSITE MATH SCORES OF ALL TIMSS AND PISA MATH VS. GDP PER CAPITA BASED ON PPP IN 2015 AFTER 12 OUTLIERS (8 TOP OIL-RICHEST COUNTRIES & VIETNAM) & 4 OTHERS (FROM THE TOTAL 84 COUNTRY DATA SET). TAIPEI MISSING



An amazing power of reducing the math poverty in the developed nations (the OECD level nations) by 20-30%.

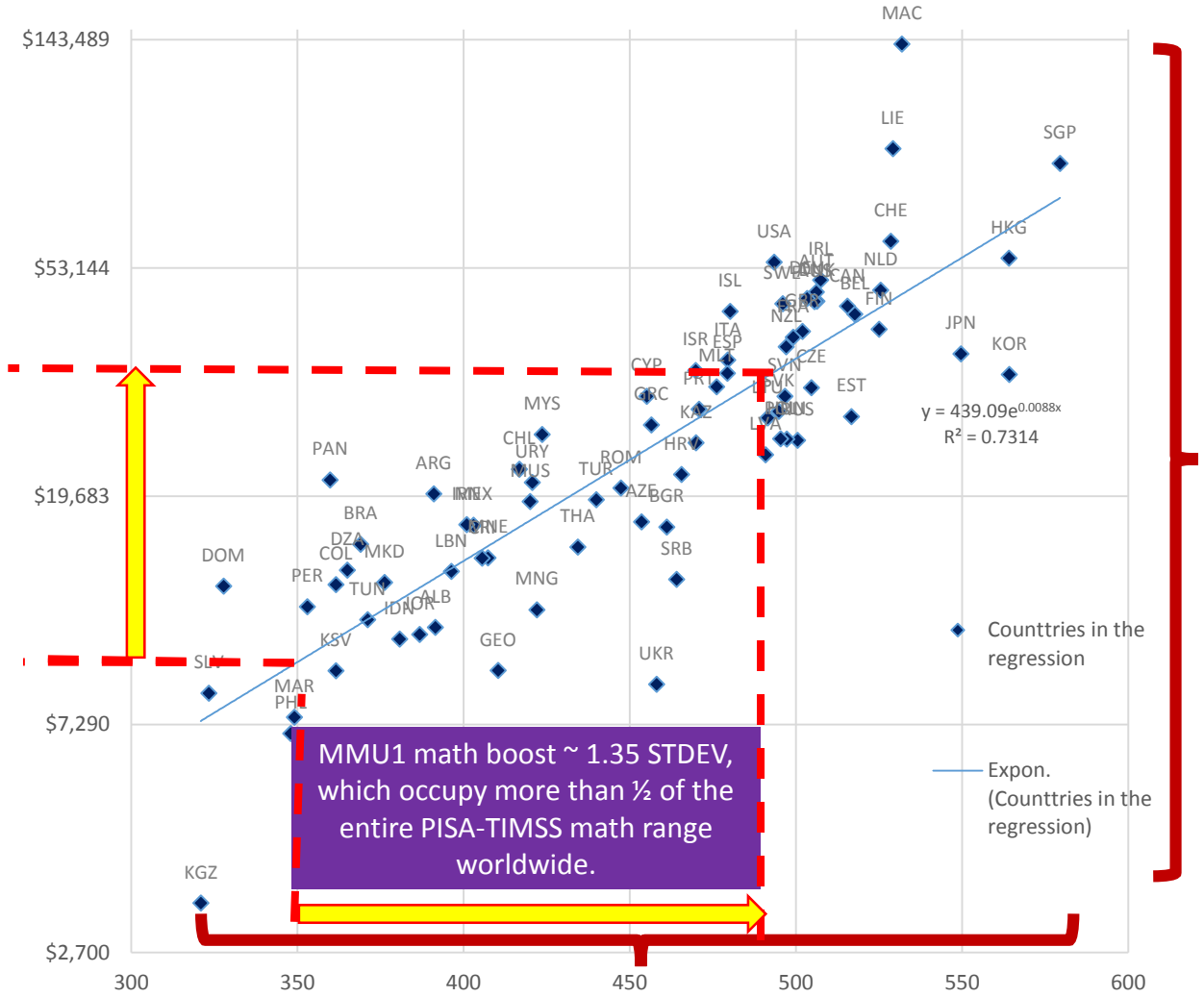
You empower the math poorest out of their stangnations. The result is that you all get richer than all you richer friends that you envy.

Except that you make this happen in a few or several decades instead of 100-200 years.

When the log is converted to the normal linear space growths.

NORMALIZED COMPOSITE MATH SCORES OF ALL TIMSS AND PISA MATH VS. LOG OF GDP PER CAPITA BASED ON PPP IN 2015 AFTER 12 OUTLIERS (8 TOP OIL-RICHEST COUNTRIES & VIETNAM) & 4 OTHERS (FROM THE TOTAL 84 COUNTRY DATA SET). TAIPEI MISSING

The red arrow is the math chasm between the top math countries and poorest math countries in the entire PISA and TIMSS tests



NORMALIZED COMPOSITE MATH SCORES OF ALL TIMSS AND PISA

To reduce the math poverty (about PISA math 420 cut off point) by 20-30% in the developed nations ~ is roughly the arrow growth you see here.

Summary of Dongchan Lee's new discoveries after the release of the TIMSS 2015 and PISA 2015 results on math, science, and readings

1) Math skills → Income per capita: Math 1 STDEV of math growth ~ 2.3-2.4 times GDP per capita growths in PPP

2) All developed Englihs speaking countries and most of the Latin American countries have the stronger reading scores than math scores by large margins.

3) The difference of the math scores – reading scores can explain the income growths better than the mean school years if we exclude 3-6 outliers (5-10% of the participating number of nations).

4) All developed English speaking countries and most of the Latin American countries have the stronger reading scores than math scores by large margins.

5) As years go by, the impact of the relative strength of math over reading skills tend to impact the GDP per capita more strongly, about 50-75% of the overall impact levels of the math average scores to the income per capita.

Summary of Dongchan Lee's new discoveries after the release of the TIMSS 2015 and PISA 2015 results on math

1) The results of the PISA 2015, TIMSS 2015, and the overall patterns of the math score growths past 15-20 years show that most developed nations are stagnating.

2) The overall lost years of math growth in the USA, South Korea, etc. for instance, show that the estimated GDP loss to these nations are at least 2-5 years of the annual GDP over the next half a century. (in upcoming paper).

3) In spite of the fast rise of the technology-based education, including that for mathematics in most of the developed countries, obviously the technology can't solve the math EDU stagnations. There must be alternatives.

NOTE: if the governments stay as they have been, the history of the past 15-20 years clearly show that there are little chances for them to raise their national math average. The technology has limits. Only MMU1 can show the first signs of evidences so that all can move forward after the initial more evidences in the developed nations rise.

MMU1 (Mini Mini USL1) proposals to Americas 2017

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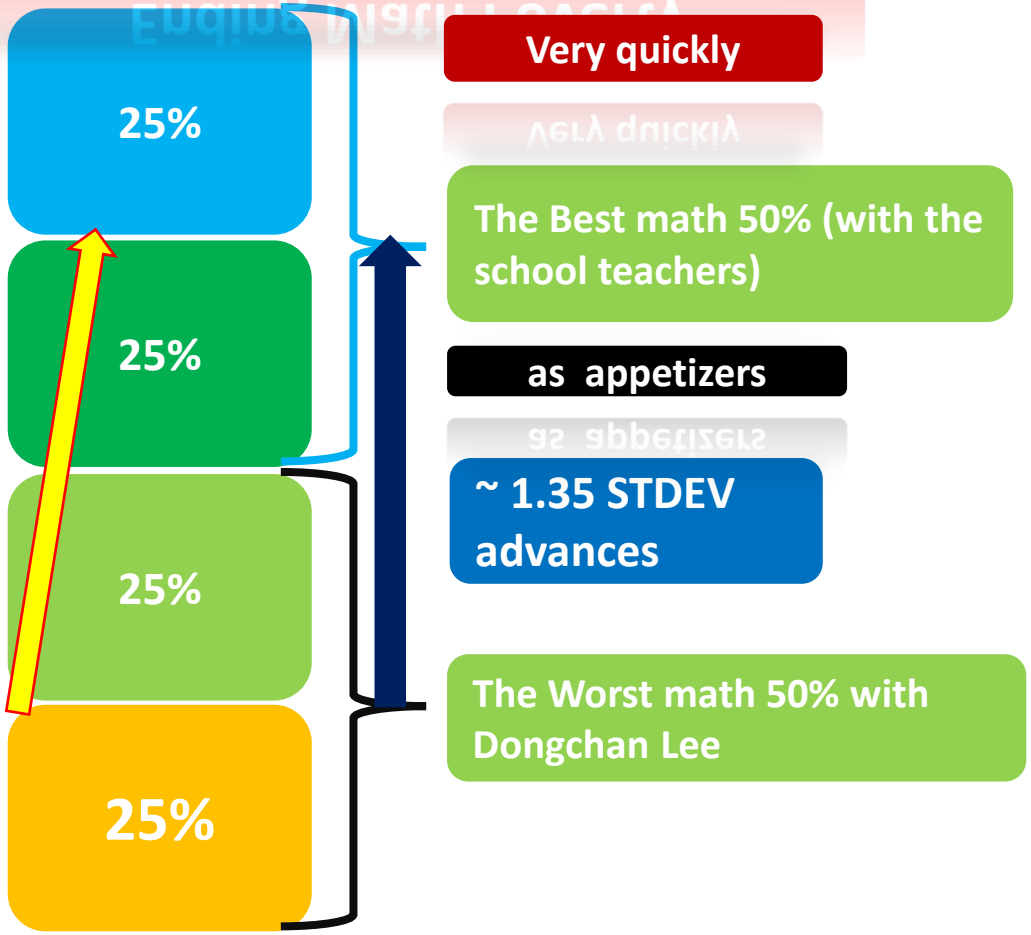
With Dongchan Lee

Ending Math Poverty

To raise nationally this takes 50-150 years normally.



PISA & TIMSS math (the 2 Olympics or World Cup of math and science education assessments in the world) growth stagnations or even collapses 2000-2015: the average math and percentile distributions of PISA (15 years) & TIMSS (20 years) & why MMU1 by Dongchan Lee can change these all quickly

7 English-speaking developed countries, Latin American countries, and 3 of Asian Tigers

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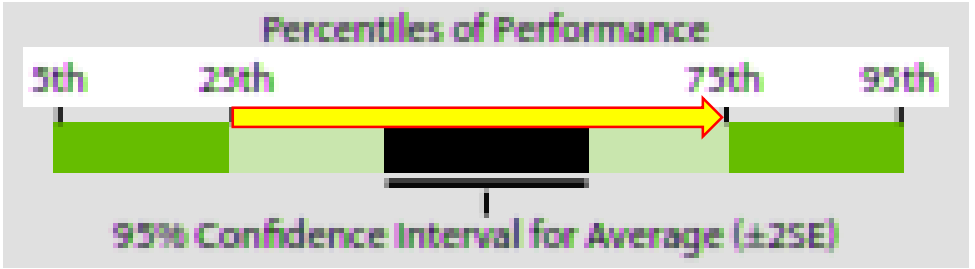
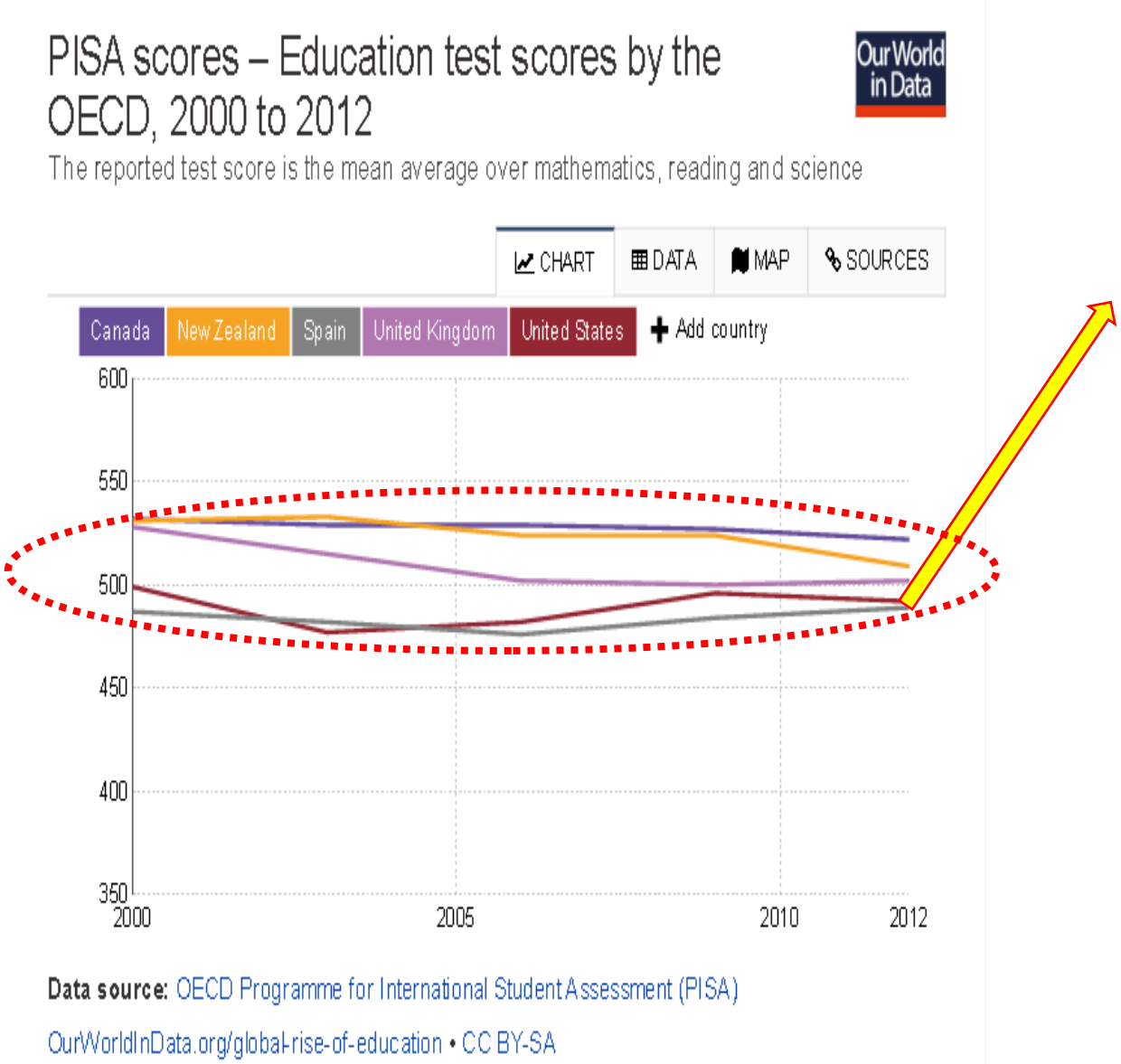
Country average significantly higher than the centerpoint of the TIMSS 4th grade scale

Country average significantly lower than the centerpoint of the TIMSS 4th grade scale

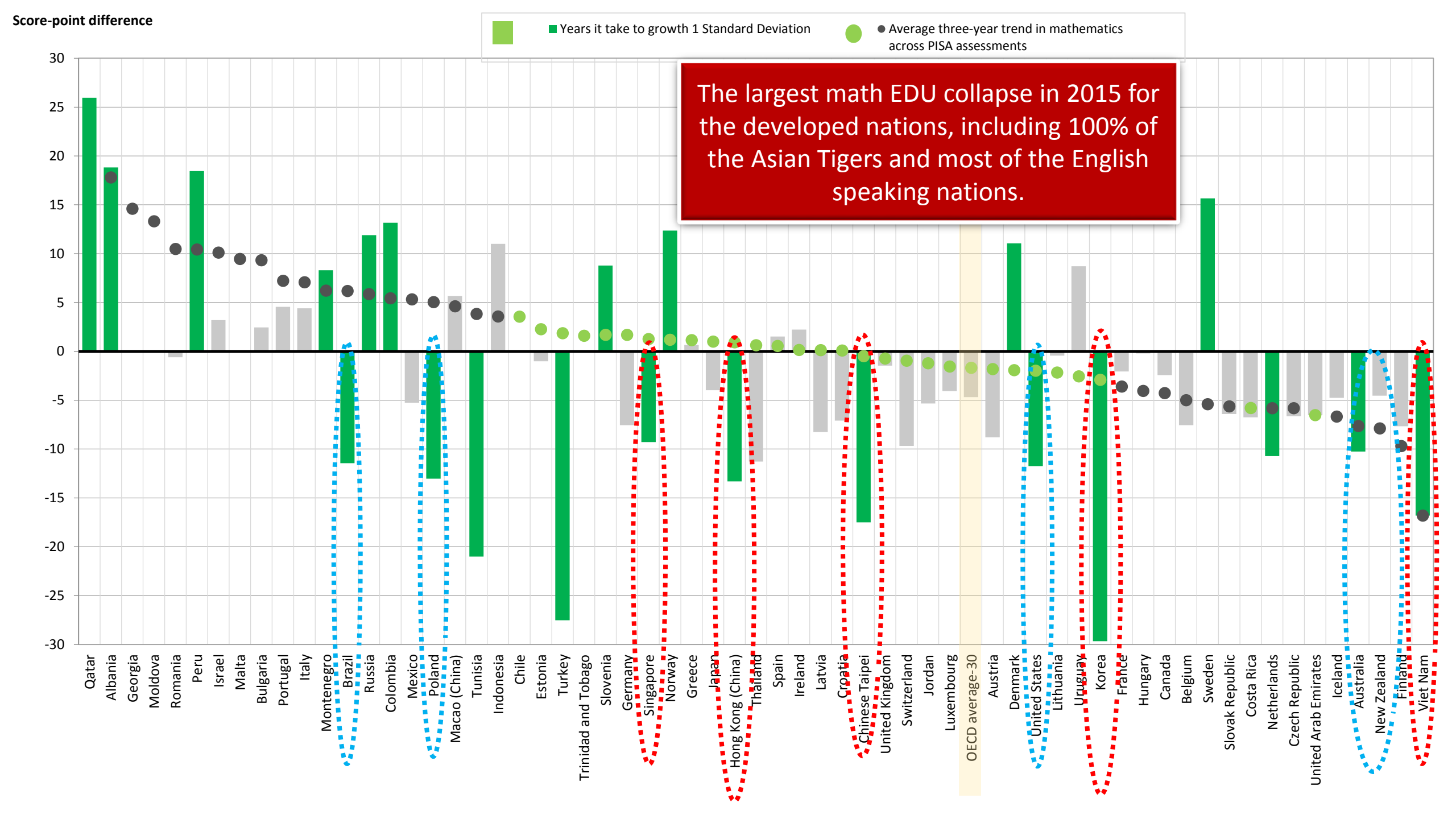


MMU1 is all about following the yellow arrow.
MMU1 pilots are to boost the math poverty to end the math poverty: from the low 25 percentile to about 25 percentile to get the first flavor of what this is going to be like to the national governments that can fully commit and support the MMU1 initiatives.

As such, this will focus first on the math poorest 10-20-30 % of the student population in each participating cities, states, or counries.

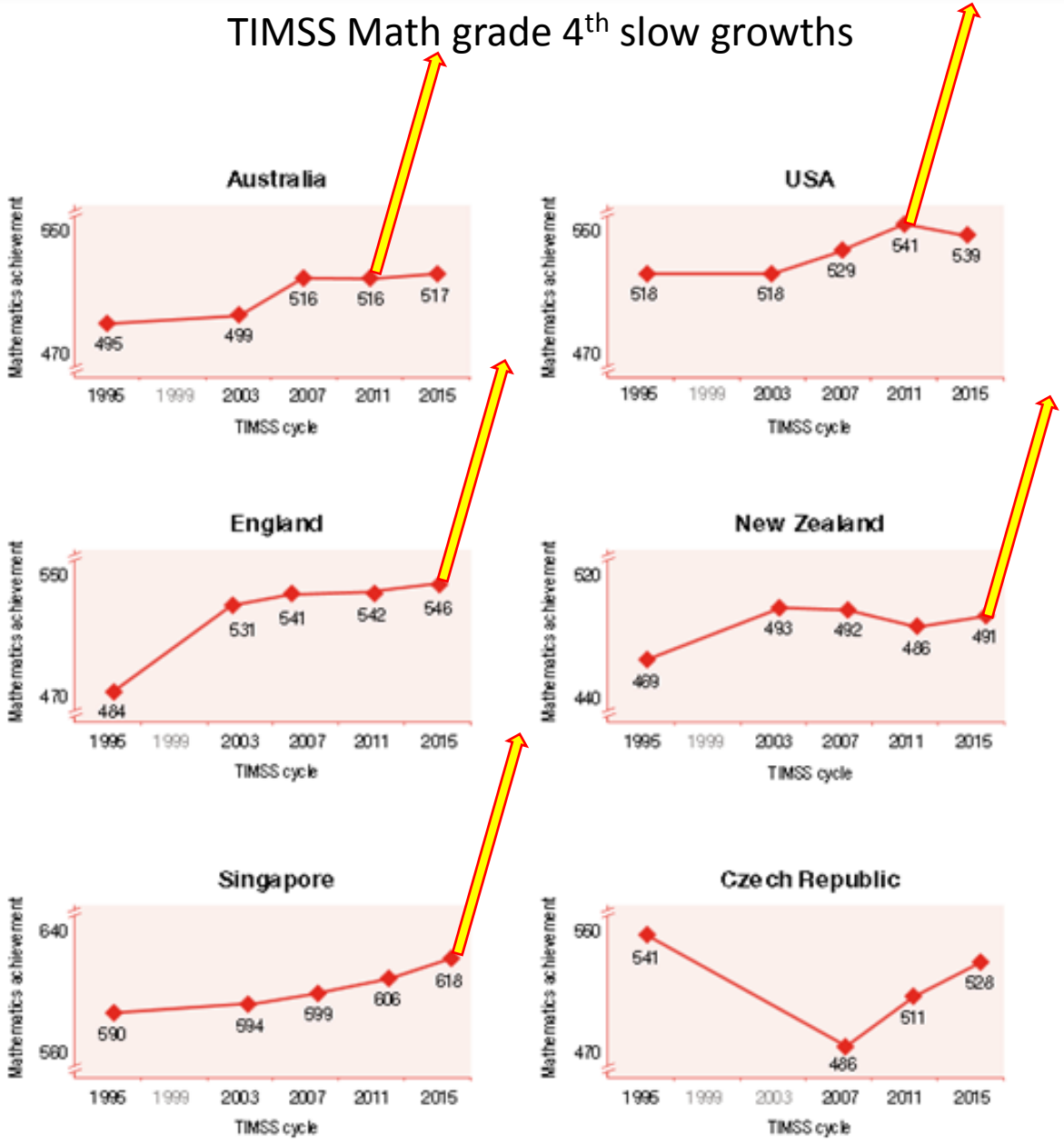


See the quasi-flat growths of these nations for 12 years in PISA overall. The yellow arrow is roughly the efficiency slope boost in MMU1 level operations.

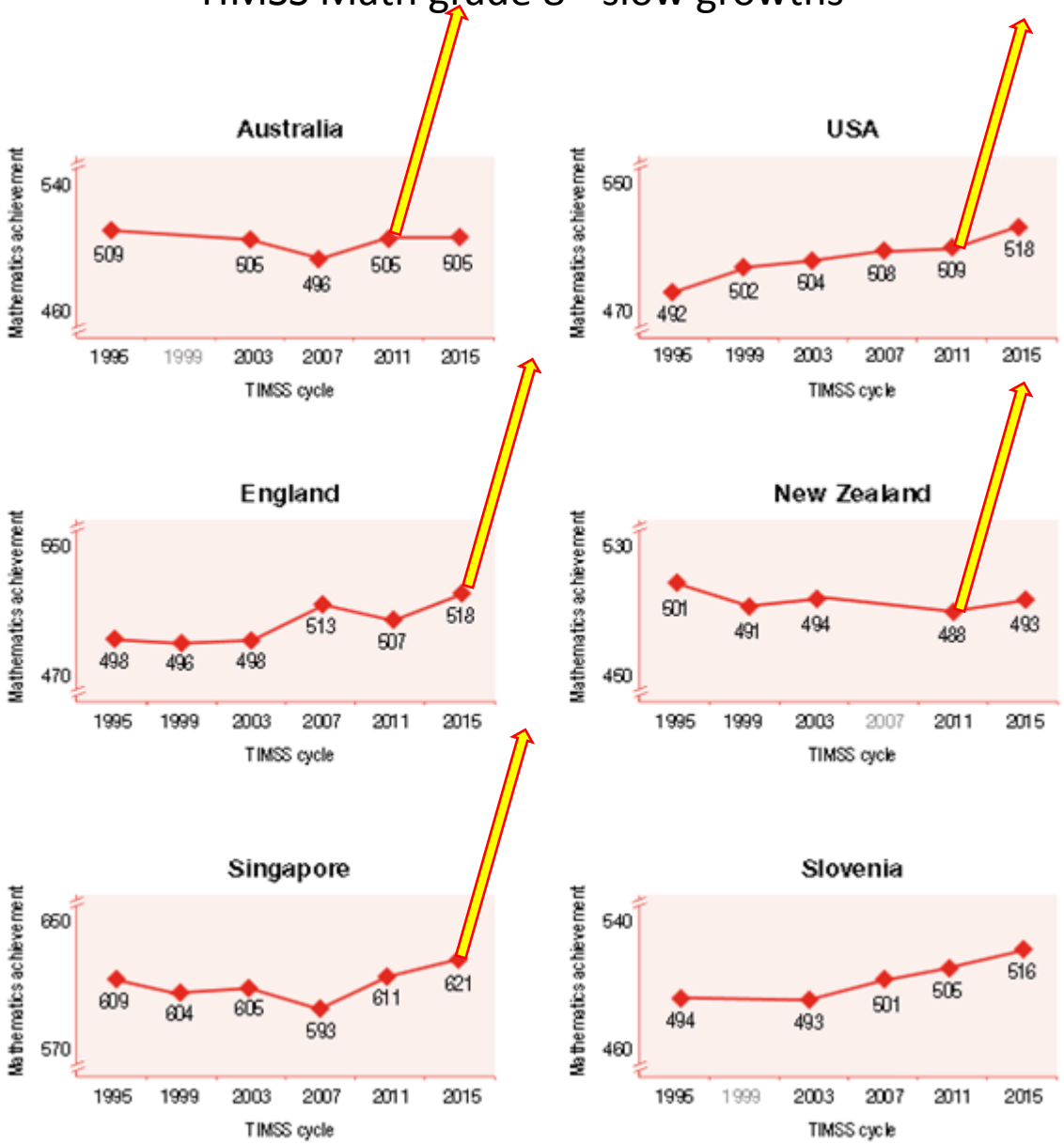

Score-point difference
Years it take to growth 1 Standard Deviation
Average three-year trend in mathematics across PISA assessments
The largest math EDU collapse in 2015 for the developed nations, including 100% of the Asian Tigers and most of the English speaking nations.
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
Qatar
Albania
Georgia
Moldova
Romania
Peru
Israel
Malta
Bulgaria
Portugal
Italy
Montenegro
Brazil
Russia
Colombia
Mexico
Poland
Macao (China)
Tunisia
Indonesia
Chile
Estonia
Turkey
Trinidad and Tobago
Slovenia
Germany
Singapore
Norway
Greece
Japan
Hong Kong (China)
Thailand
Spain
Ireland
Latvia
Croatia
Chinese Taipei
United Kingdom
Switzerland
Jordan
Luxembourg
OECD average-30
Austria
Denmark
United States
Lithuania
Uruguay
Korea
France
Hungary
Canada
Belgium
Sweden
Slovak Republic
Costa Rica
Netherlands
Czech Republic
United Arab Emirates
Iceland
Australia
New Zealand
Finland
Viet Nam

Quasi-horizontal TIMSS math growths past 20 years and what MMU1 is equivalent to do if implemented (Yellow Arrows)

TIMSS Math grade 4th slow growths

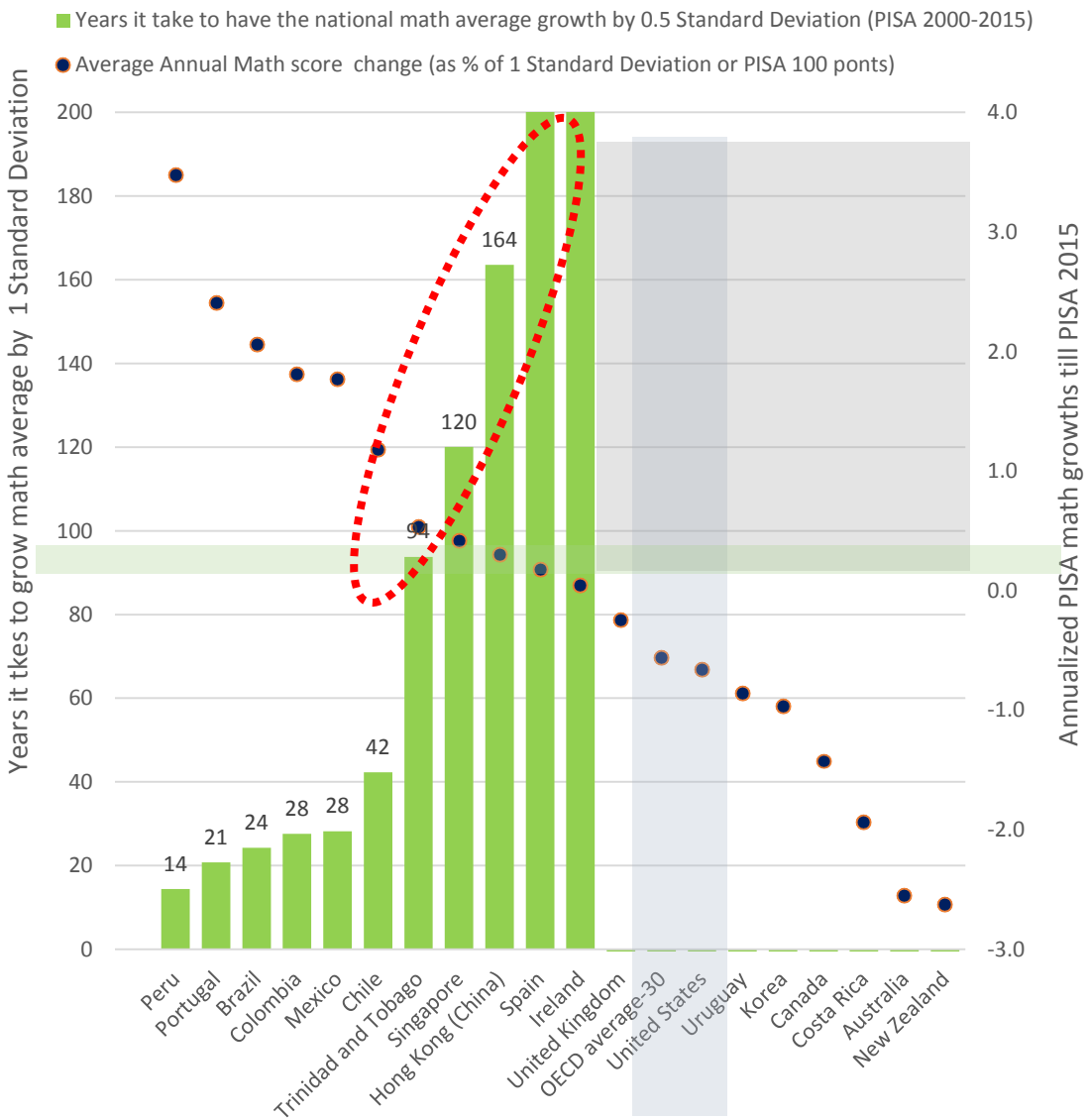


TIMSS Math grade 8th slow growths



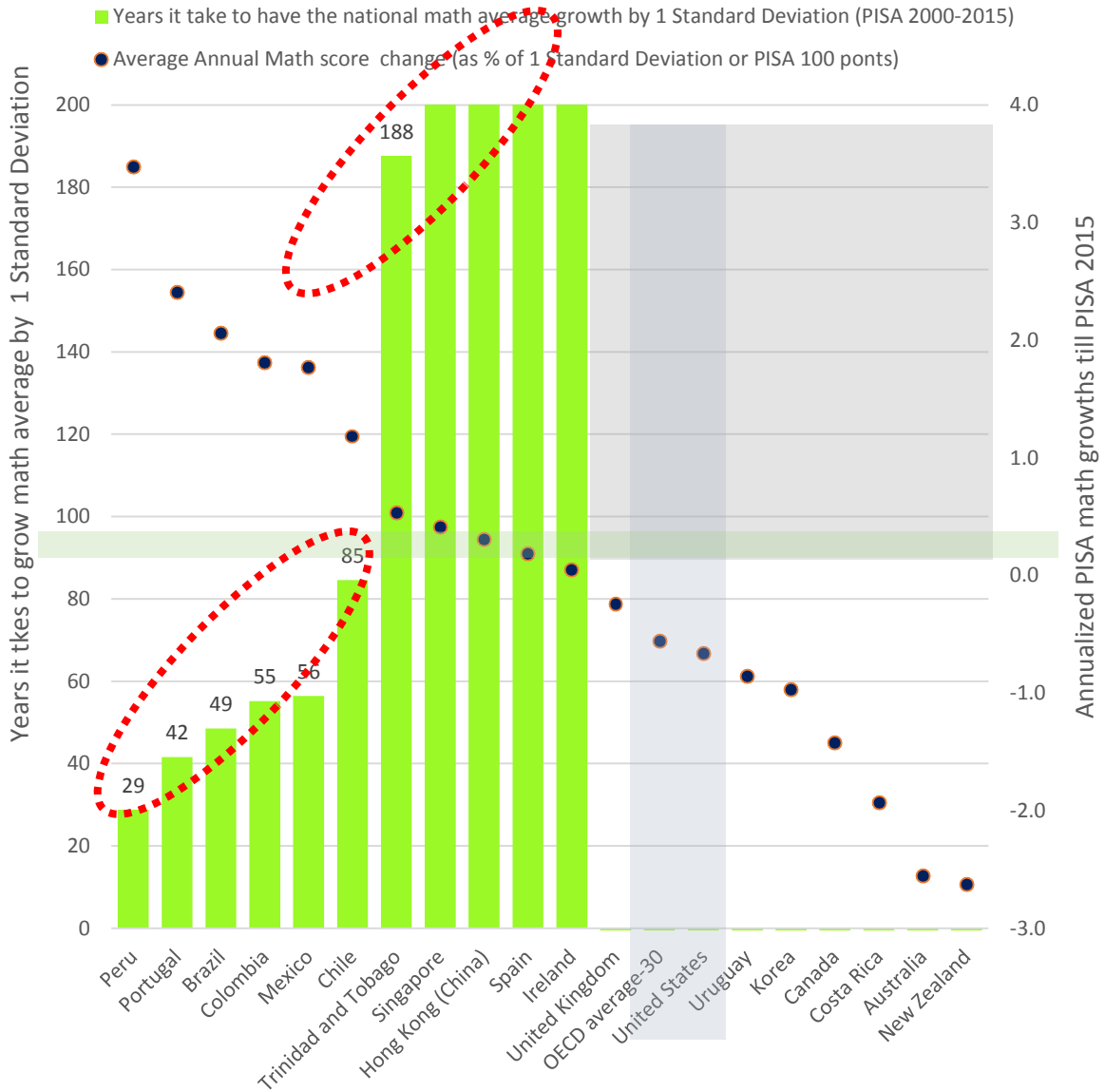
These show how many generations are needed to even boost the national math by 40-80% of what MMU1 can do.

Years it take to have the national math average growth by 0.5 Standard Deviation (PISA 2000-2015) **in English, Spanish, Portuguese, or Korean speaking countries**



PISA countries for math (for the average math growth trends 2000-2015)

Years it take to have the national math average growth by 1 Standard Deviation (PISA 2000-2015) in English, Spanish, Portuguese, or Korean speaking countries



PISA countries for math (for the average math growth trends 2000-2015)

The stagnations of the math growths of TIMSS grades 4 and 8 in all English speaking developed countries and some others in the next page. They are all vertical. The YELLOW ARROW is what MMU1 focuses on: to empower the math poorer 25 percentile to the 75 percentile very rapidly for the fully supporting, committed nations.

Country average significantly higher than the centerpoint of the TIMSS 4th grade scale

Country average significantly lower than the centerpoint of the TIMSS 4th grade scale

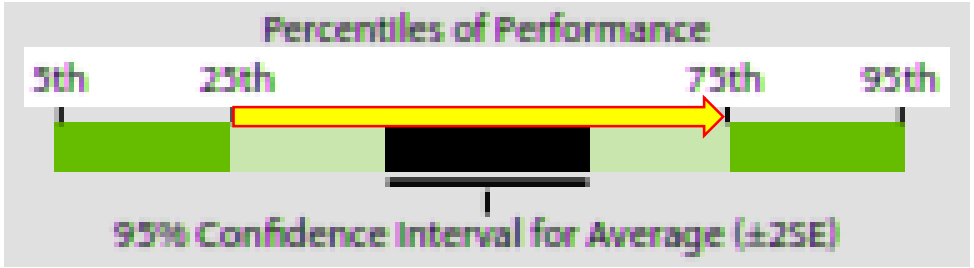


Exhibit 1.7: Differences in Mathematics Achievement Across Assessment Years

Instructions: Read across the row to determine if the performance in the row year is significantly higher (O) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2011	2007	2003	1995	Mathematics Achievement Distribution
Australia						
2015	517 (3.1)	1	1	19 O	23 O	
2011	516 (3.0)		0	17 O	21 O	
2007	516 (3.5)			17 O	22 O	
† 2003	499 (3.9)				4	
‡ 1995	495 (3.5)					
England						
2015	546 (2.8)	4	5	15 O	62 O	
2011	542 (3.5)		1	11 O	58 O	
2007	541 (3.0)			10 O	57 O	
† 2003	531 (3.7)				47 O	
3 † 1995	484 (3.3)					
Ireland						
2015	547 (2.1)	20 O			24 O	
2011	527 (2.6)				5	
2 1995	523 (3.5)					
Italy						
2 2015	507 (2.6)	-1	0	4		
2011	508 (2.6)		1	5		
2007	507 (3.1)			4		
2003	503 (3.7)					
New Zealand						
2015	491 (2.3)	4	-2	-3	21 O	
2011	480 (2.6)		-9	-7 ▼	17 O	
2007	492 (2.4)			-1	23 O	
2003	493 (2.2)				24 O	
1995	469 (4.4)					
Northern Ireland						
‡ 2015	570 (2.9)	8				
† 2011	562 (2.8)					
Spain						
2 2015	505 (2.5)	23 O				
2011	482 (2.8)					
United Arab Emirates						
2015	452 (2.4)	17 O				
2011	434 (2.0)					
United States						
2 † 2015	539 (2.3)	-1	10 O	21 O	21 O	
2 2011	541 (1.9)		12 O	22 O	23 O	
2 † 2007	529 (2.5)			11 O	11 O	
† 2003	518 (2.4)				0	
1995	518 (2.9)					
Korea, Rep. of						
2015	608 (2.2)	3			27 O	
2011	605 (1.9)				24 O	
2 1995	581 (1.8)					
Chile						
2015	459 (2.4)	-3				
2011	462 (2.3)					

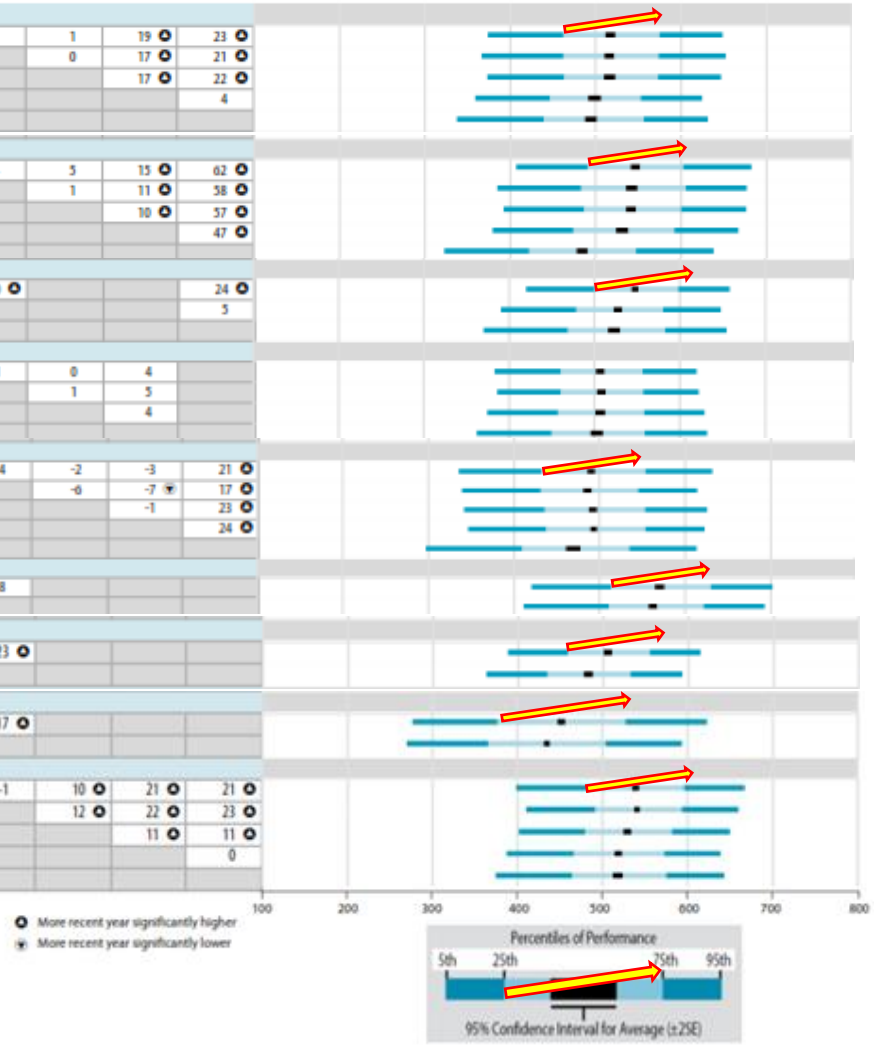
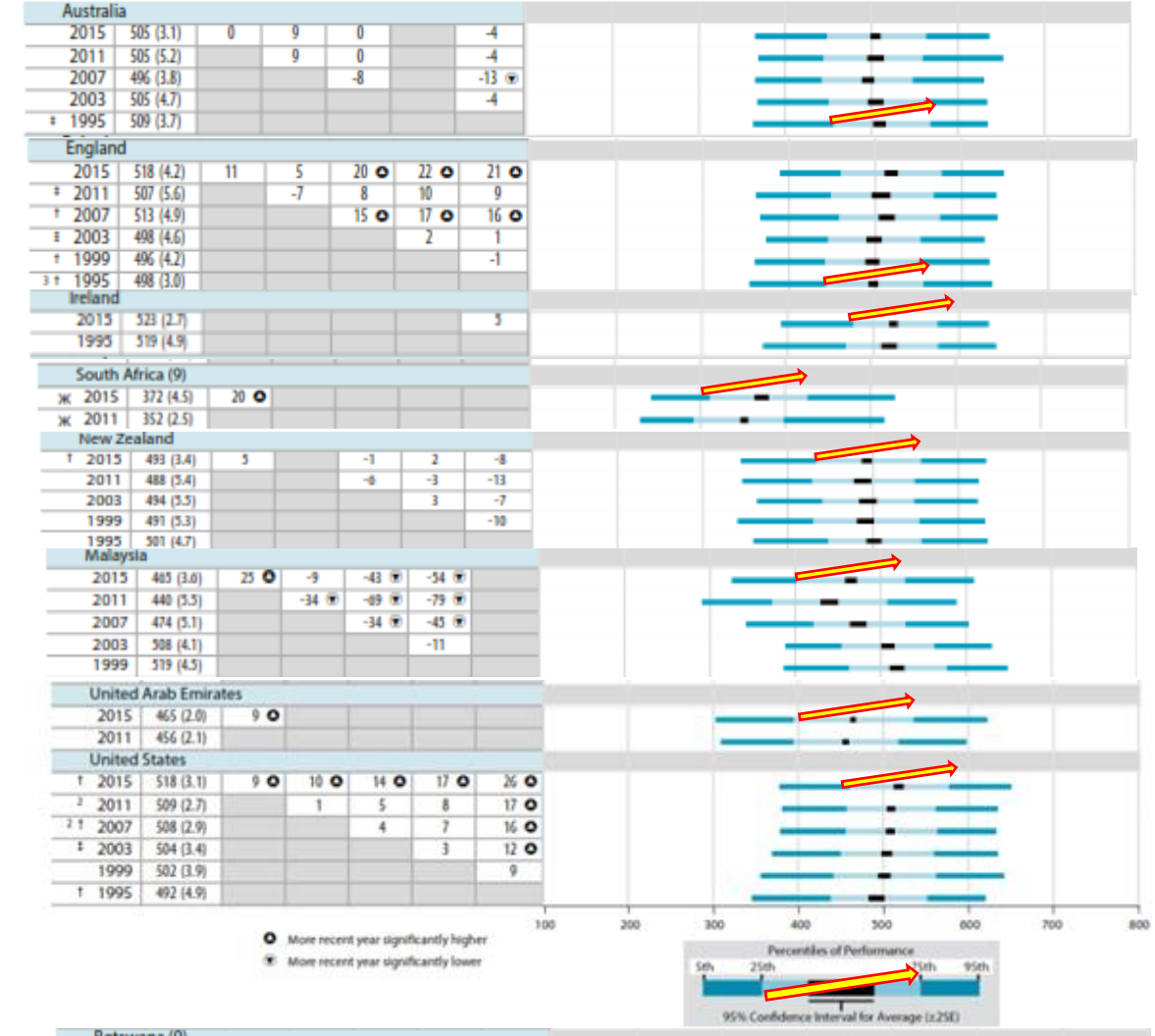


Exhibit 1.8: Differences in Mathematics Achievement Across Assessment Years

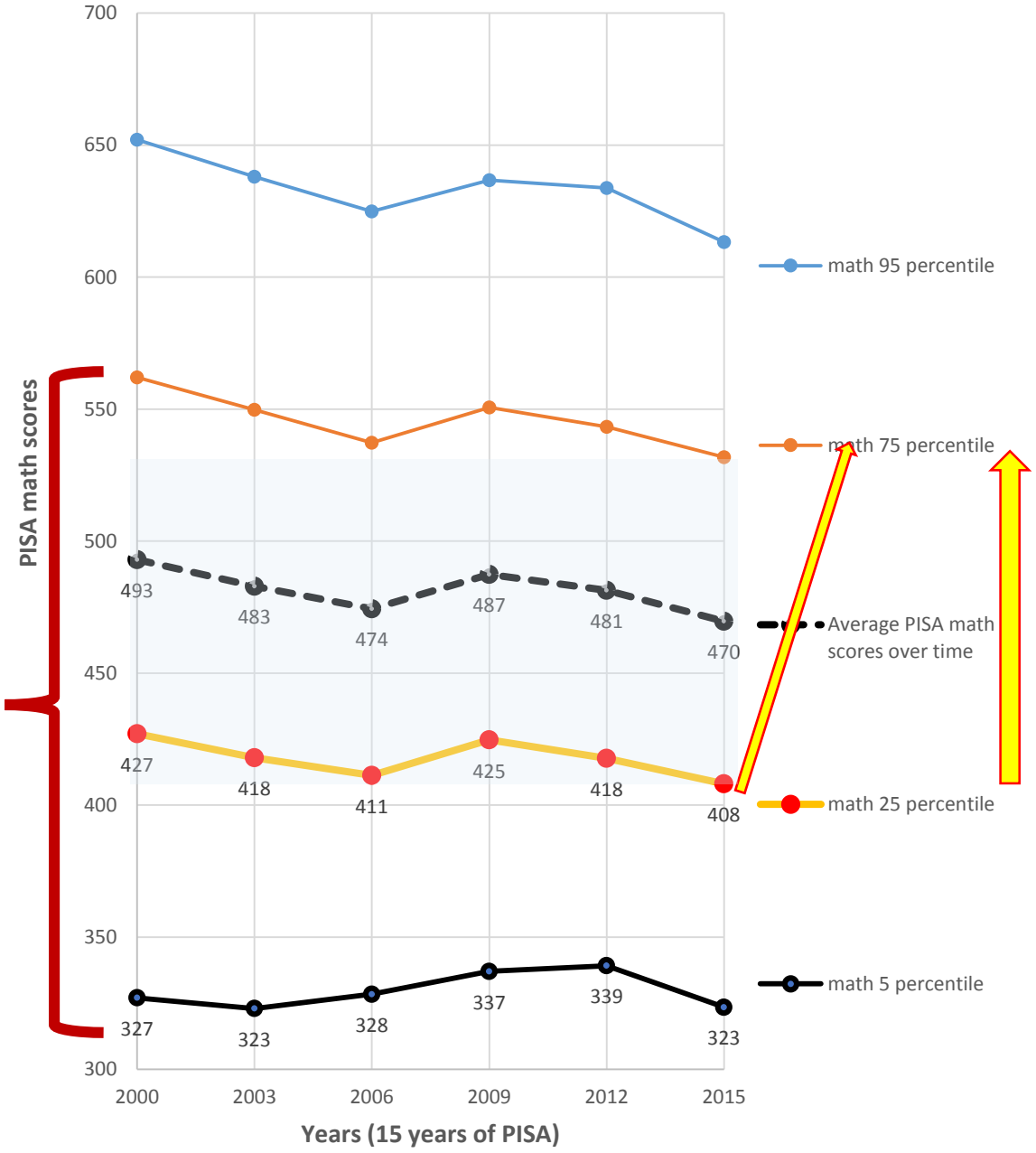
Instructions: Read across the row to determine if the performance in the row year is significantly higher (O) or significantly lower (▼) than the performance in the column year.

Country	Average Scale Score	Differences Between Years 2011	2007	2003	1999	1995	Mathematics Achievement Distribution
Australia							
2015	505 (3.1)	0	9	0		-4	
2011	505 (5.2)		9	0		-4	
2007	496 (3.8)			-8		-13 ▼	
2003	505 (4.7)					-4	
‡ 1995	509 (3.7)						
England							
2015	518 (4.2)	11	5	20 O	22 O	21 O	
‡ 2011	507 (5.6)		-7	8	10	9	
† 2007	513 (4.9)			15 O	17 O	16 O	
‡ 2003	498 (4.6)				2	1	
† 1999	496 (4.2)					-1	
3 † 1995	498 (3.0)						
Ireland							
2015	523 (2.7)					5	
1995	519 (4.9)						
South Africa (9)							
✳ 2015	372 (4.5)	20 O					
✳ 2011	352 (2.5)						
New Zealand							
† 2015	493 (3.4)	3		-1	2	-8	
2011	488 (5.4)			-6	-3	-13	
2003	494 (5.5)				3	-7	
1999	491 (5.3)					-10	
1995	501 (4.7)						
Malaysia							
2015	465 (3.0)	25 O	-9	-43 ▼	-54 ▼		
2011	440 (5.5)		-34 ▼	-69 ▼	-79 ▼		
2007	474 (5.1)			-34 ▼	-45 ▼		
2003	508 (4.1)				-11		
1999	519 (4.5)						
United Arab Emirates							
2015	465 (2.0)	9 O					
2011	456 (2.1)						
United States							
† 2015	518 (3.1)	9 O	10 O	14 O	17 O	26 O	
2 2011	509 (2.7)		1	5	8	17 O	
2 † 2007	508 (2.9)			4	7	16 O	
‡ 2003	504 (3.4)				3	12 O	
1999	502 (3.9)					9	
† 1995	492 (4.9)						
Botswana (9)							
ψ 2015	391 (2.0)	-6					
ψ 2011	397 (2.5)						
Chile							
ψ 2015	427 (3.2)	11 O		41 O	35 O		
2011	416 (2.7)			29 O	24 O		
2003	387 (3.3)				-6		
1999	392 (4.4)						

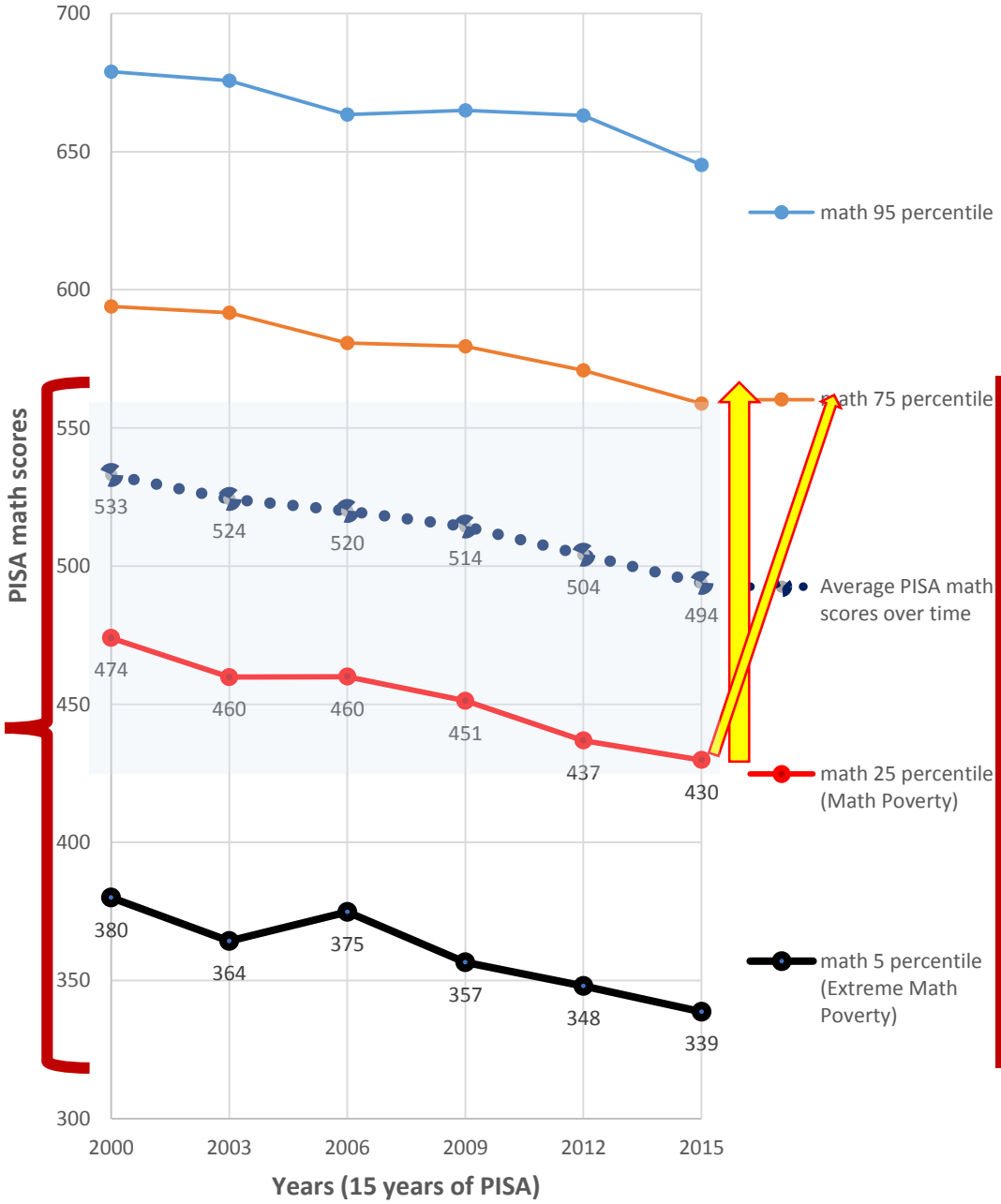


The stagnations of the math growths of PISA math in all English speaking developed countries and some others in the next page. They are all horizontal. The YELLOW ARROW is what MMU1 focuses on vertically: to empower the math poorer 25 percentile to the 75 percentile very rapidly for the fully supporting, committed nations.

United States: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)

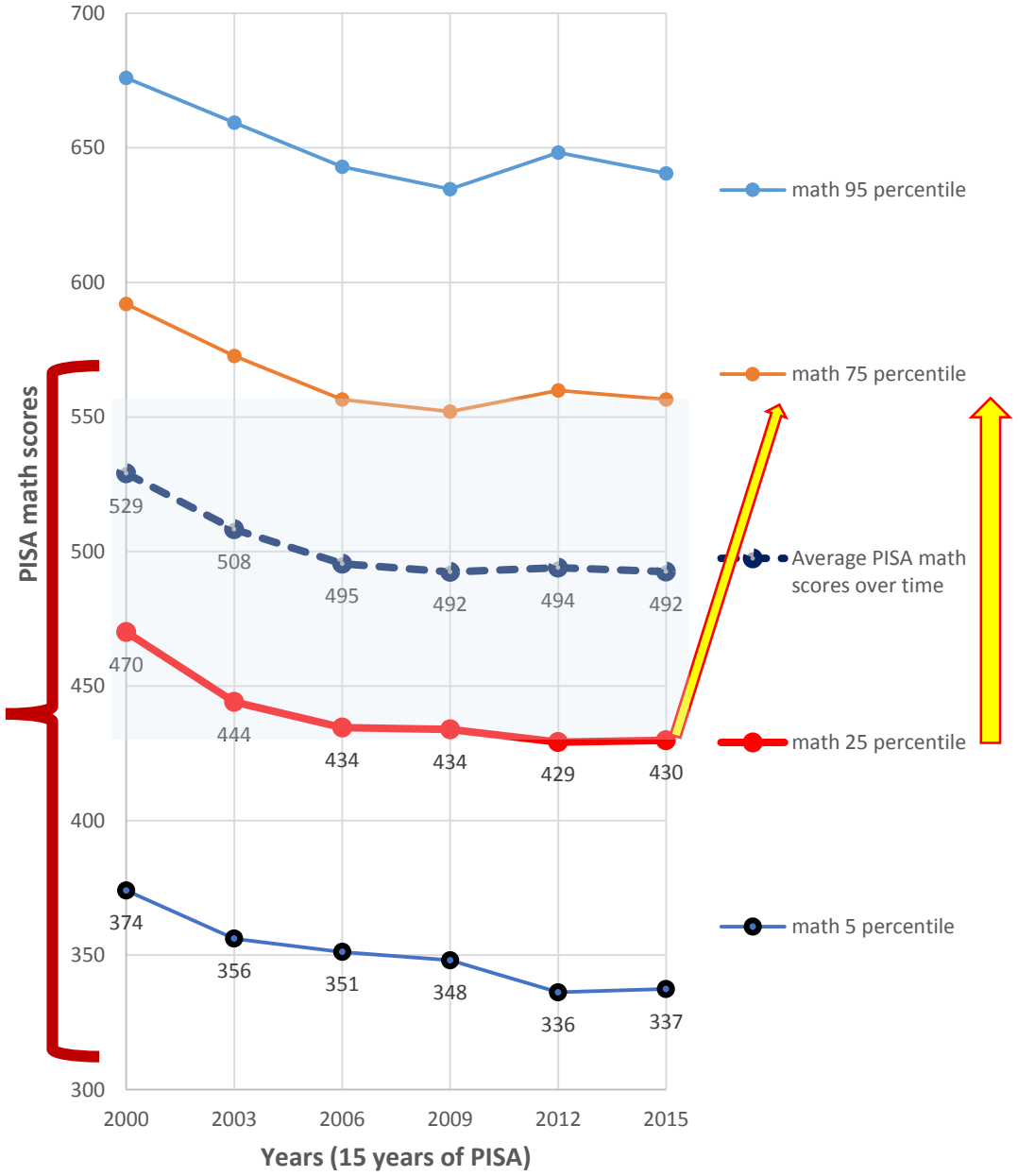


AUSTRALIA: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)

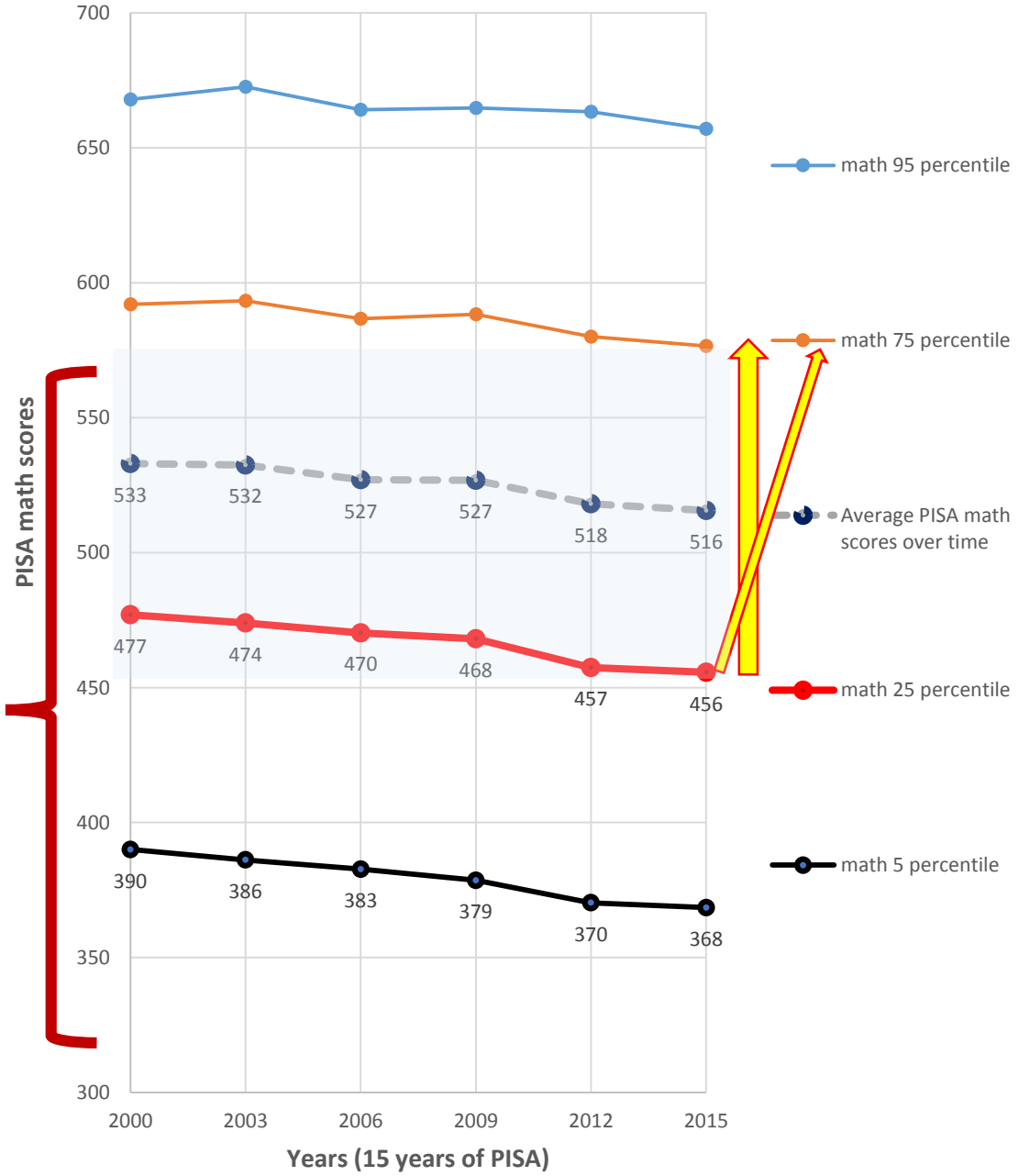


The red arrow is the math chasm between the top math countries and poorest math countries in the entire PISA and TIMSS tests

United Kingdom: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



CANADA: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



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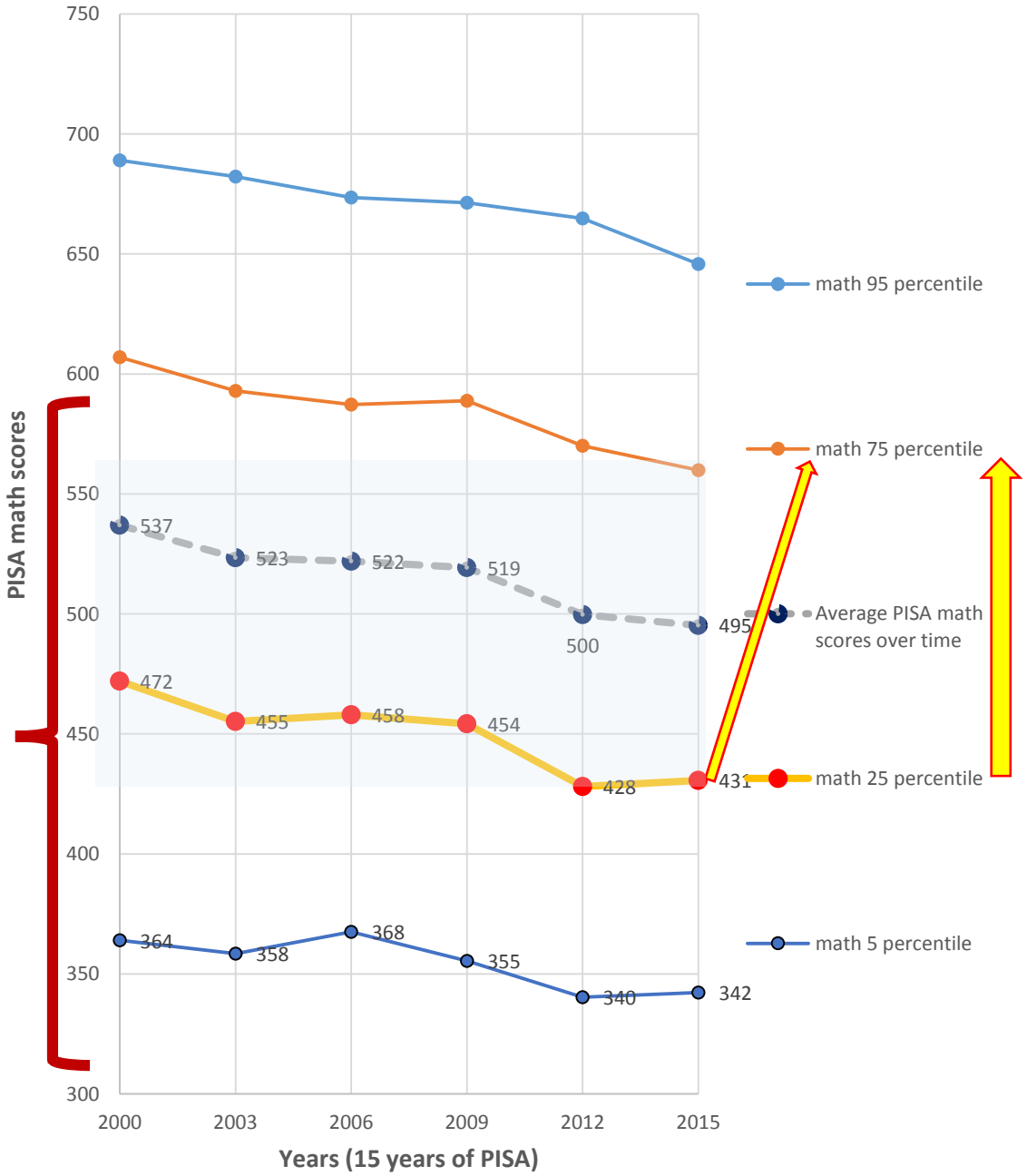
NEW ZEALAND: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



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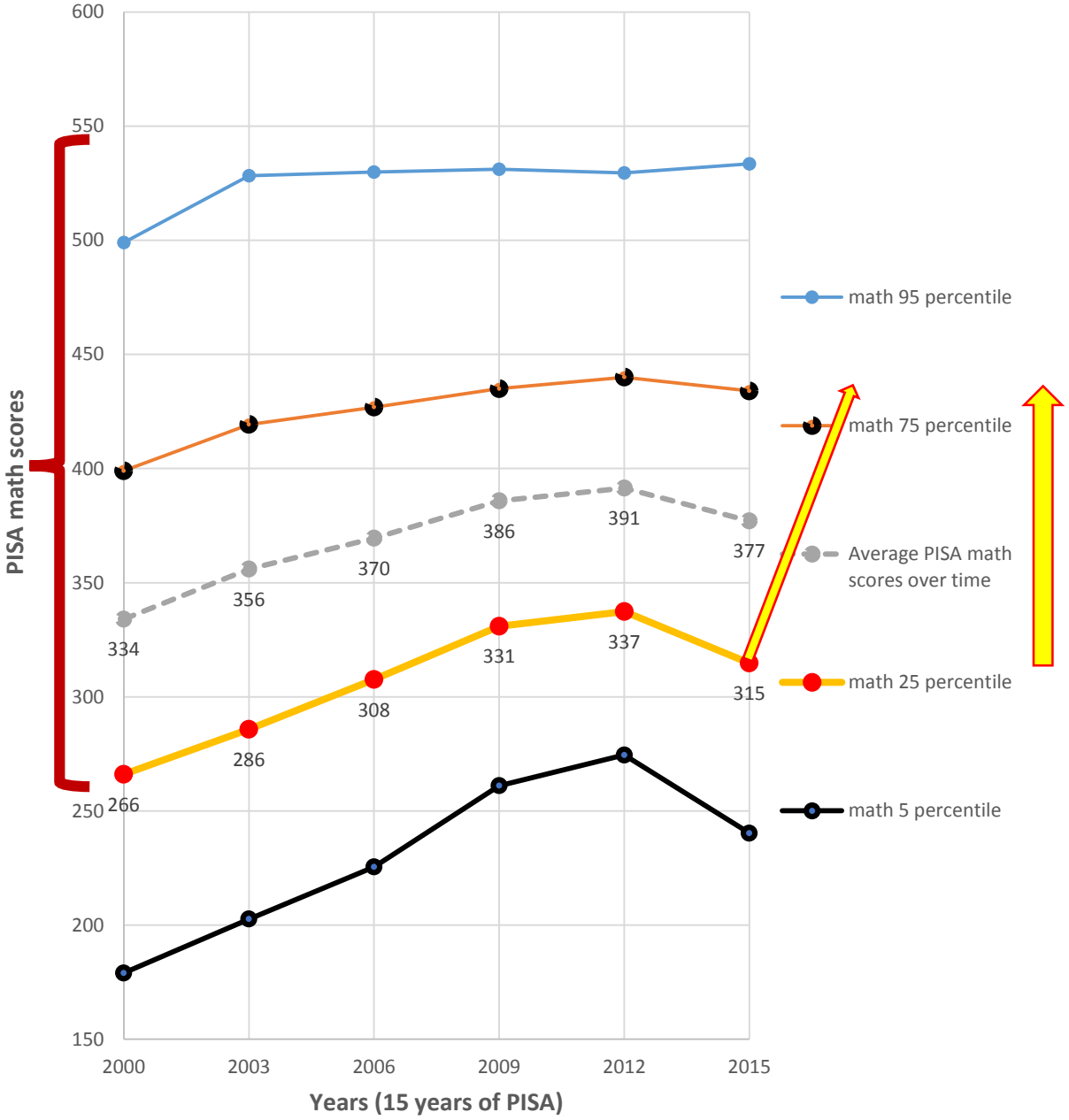
PISA math growths 2000-2015:
Latin American countries

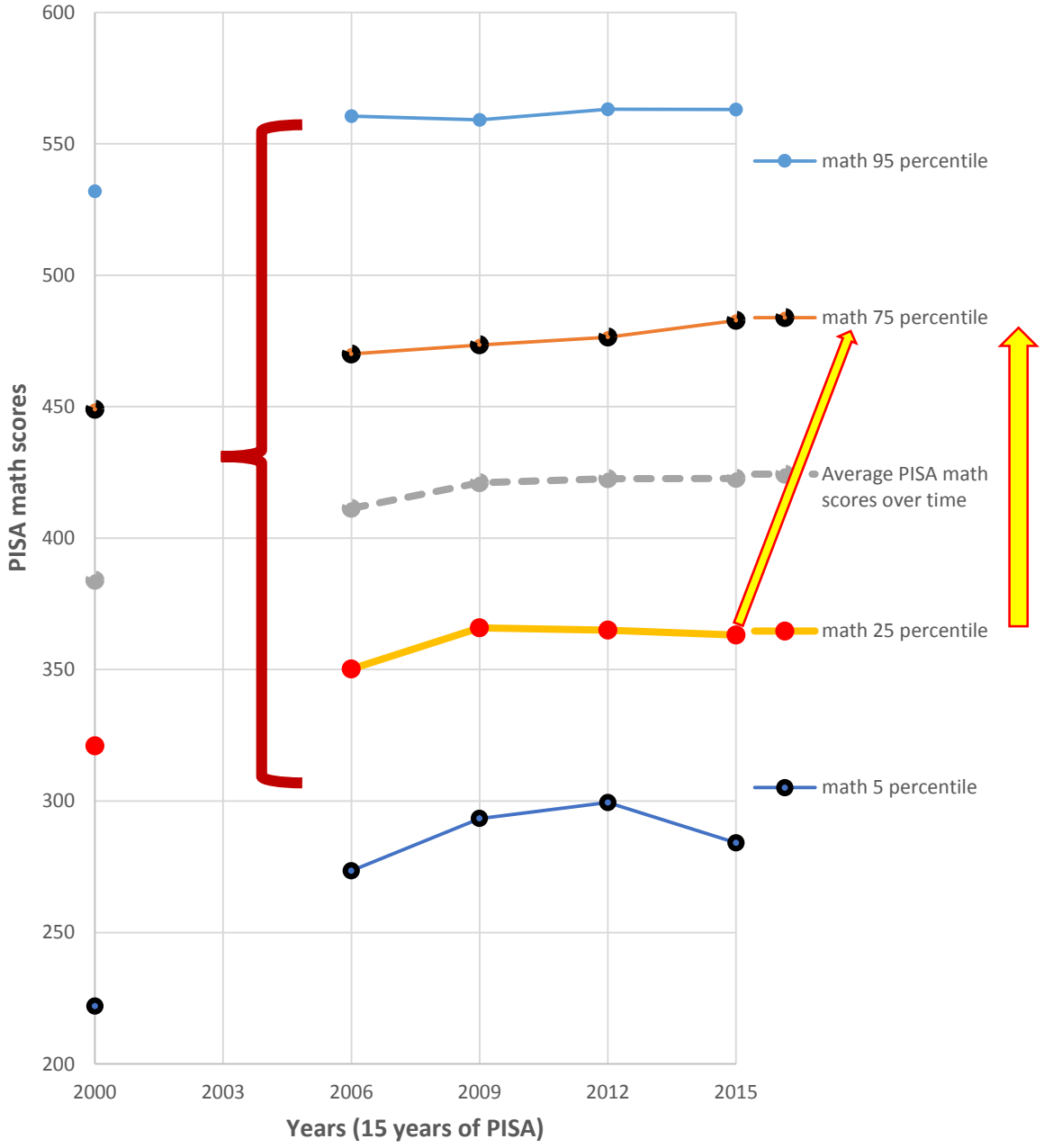
Brazil: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



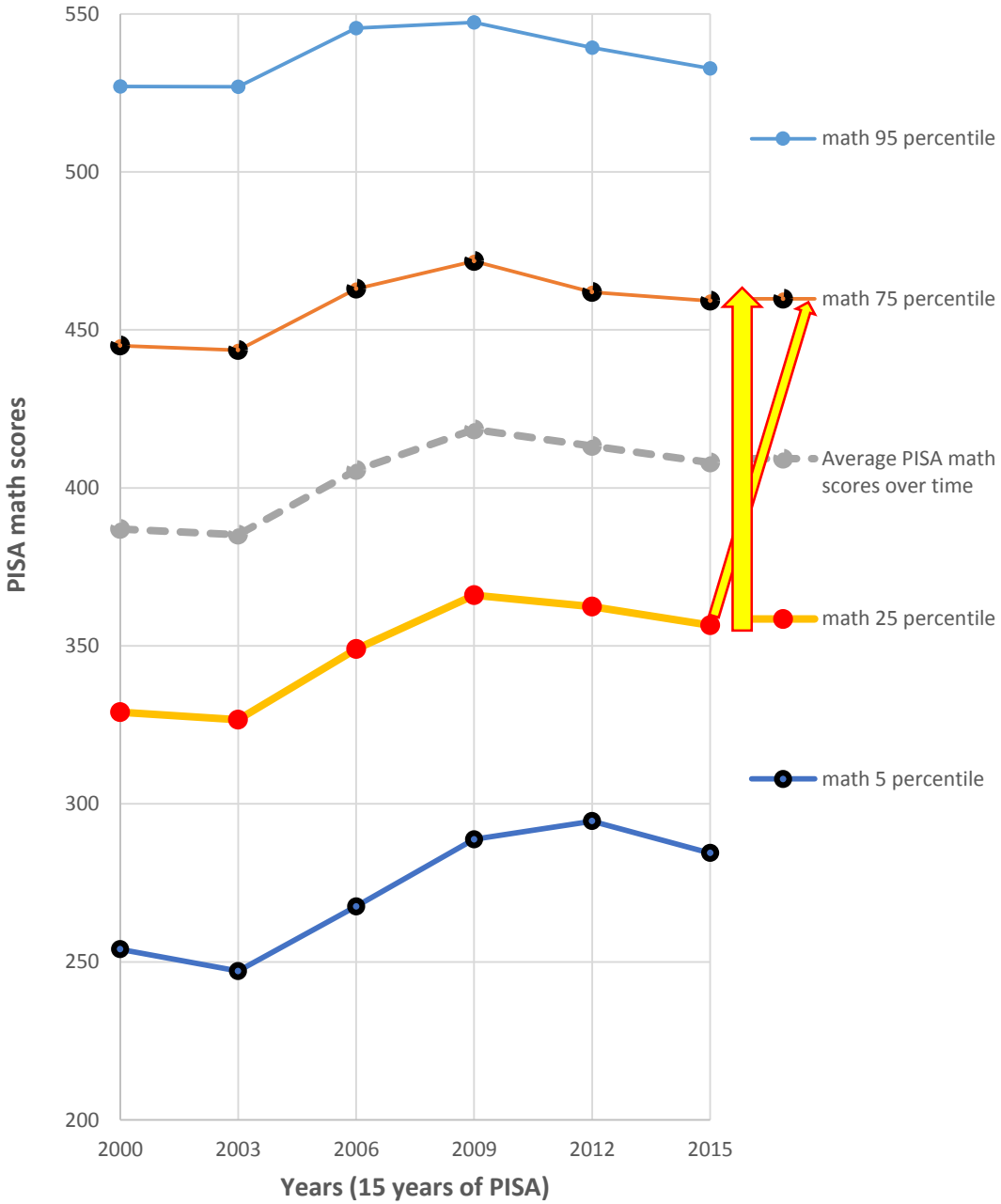
The red arrow is the math chasm between the top math countries and poorest math countries in the entire PISA and TIMSS tests

How much can the dominance of math average over that of reading average can impact the GDP per capita as time goes on?

CHILE: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



MEXICO: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



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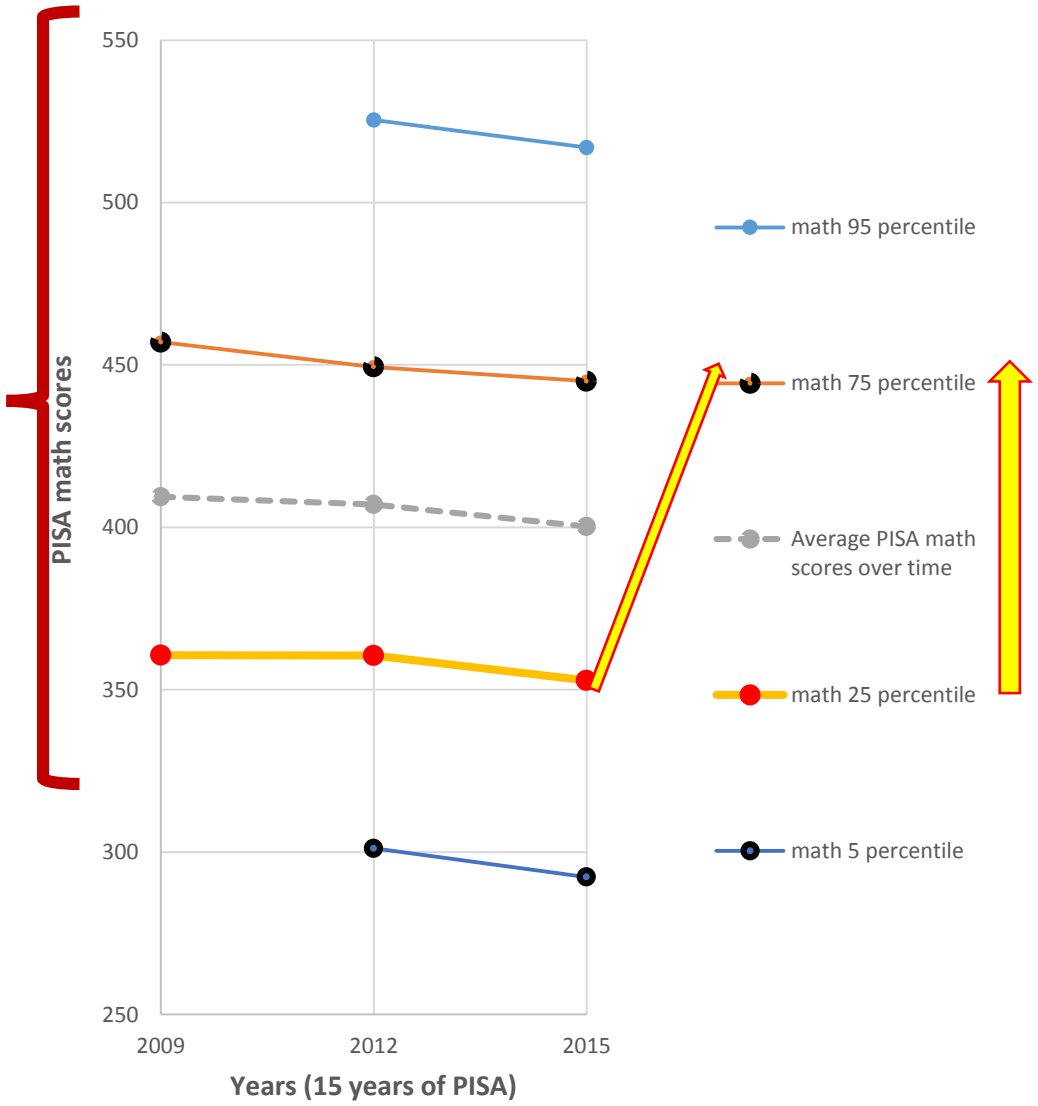
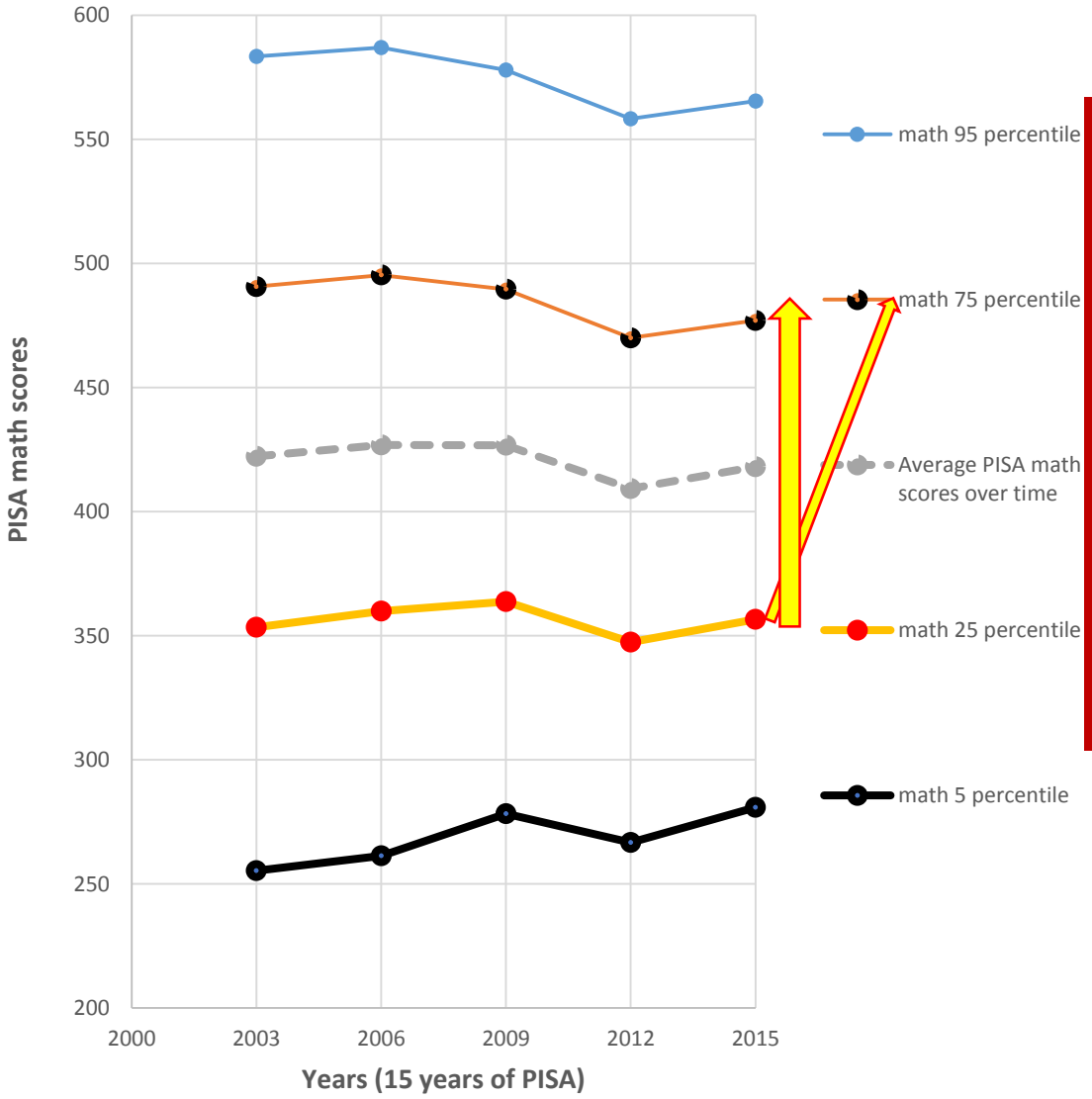
COSTA RICA: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



URUGUAY: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



The red arrow is the math chasm between the top math countries and poorest math countries in the entire PISA and TIMSS tests

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile (E
Australia	2000	679.00	594.00	533.00	474.00	380.00
Australia	2003	675.68	591.65	524.27	459.79	364.32
Australia	2006	663.46	580.72	519.91	459.99	374.85
Australia	2009	664.93	579.51	514.34	451.25	356.59
Australia	2012	663.13	570.88	504.15	436.84	348.02
Australia	2015	645.17	558.77	493.90	429.81	338.69

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Canada	2000	668.00	592.00	533.00	477.00	390.00
Canada	2003	672.66	593.29	532.49	473.94	386.18
Canada	2006	664.19	586.70	527.01	470.28	382.72
Canada	2009	664.80	588.29	526.81	468.06	378.57
Canada	2012	663.40	580.07	518.07	457.38	370.28
Canada	2015	657.07	576.55	515.65	455.66	368.50

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Ireland	2000	630.00	561.00	503.00	449.00	357.00
Ireland	2003	640.97	561.88	502.84	444.99	360.43
Ireland	2006	634.14	558.94	501.47	444.97	365.97
Ireland	2009	617.36	547.57	487.14	432.16	337.82
Ireland	2012	639.56	559.21	501.50	445.31	359.30
Ireland	2015	632.50	558.72	503.72	450.14	370.63

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
New Zealand	2000	689.00	607.00	537.00	472.00	364.00
New Zealand	2003	682.30	593.01	523.49	455.23	358.50
New Zealand	2006	673.51	587.25	521.99	458.02	367.51
New Zealand	2009	671.37	588.84	519.30	454.18	355.39
New Zealand	2012	664.88	570.05	499.75	428.14	340.31
New Zealand	2015	645.77	559.97	495.22	430.61	342.26

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
United Kingdo	2000	676.00	592.00	529.00	470.00	374.00
United Kingdo	2003	659.34	572.60	508.26	444.10	356.08
United Kingdo	2006	642.96	556.51	495.44	434.48	351.17
United Kingdo	2009	634.72	551.96	492.41	433.84	348.08
United Kingdo	2012	648.26	559.86	493.93	429.17	336.18
United Kingdo	2015	640.52	556.46	492.48	429.78	337.42

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
United States	2000	652.00	562.00	493.00	427.00	327.00
United States	2003	637.97	549.70	482.89	417.99	322.96
United States	2006	624.89	537.23	474.35	411.24	328.38
United States	2009	636.70	550.64	487.40	424.68	337.05
United States	2012	633.75	543.29	481.37	417.71	339.20
United States	2015	613.28	531.78	469.63	408.10	323.49

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Trinidad and To	2009	580.33	484.09	414.04	342.07	252.34
Trinidad and To	2012					
Trinidad and To	2015	578.31	484.11	417.24	348.08	264.52

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
United Arab Er	2012	590.74	493.92	..	369.55	297.05
United Arab Er	2015	593.28	492.54	427.48	359.67	275.16

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Singapore	2009	724.58	637.79	562.02	490.26	382.92
Singapore	2012	737.41	649.59	573.47	500.80	393.03
Singapore	2015	710.79	632.34	564.19	500.40	398.74

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Hong Kong SAR	2000	699.00	626.00	560.00	502.00	390.00
Hong Kong SAR	2003	699.52	621.84	550.38	484.80	373.83
Hong Kong SAR	2006	691.88	614.11	547.46	486.16	385.61
Hong Kong SAR	2009	702.97	621.58	554.53	492.50	389.80
Hong Kong SAR	2012	708.73	628.59	561.24	498.84	390.52
Hong Kong SAR	2015	686.87	610.67	547.93	490.41	389.26

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Argentina	2000	574.00	474.00	388.00	307.00	180.00
Argentina	2001					
Argentina	2003					
Argentina	2006	542.80	450.55	381.25	315.65	209.43
Argentina	2009	542.65	450.65	388.07	327.22	230.88
Argentina	2012	514.09	440.39	388.43	336.52	264.02
Argentina	2015					

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Brazil	2000	499.00	399.00	334.00	266.00	179.00
Brazil	2003	528.29	419.32	356.02	285.76	202.62
Brazil	2006	529.95	426.88	369.52	307.59	225.48
Brazil	2009	531.18	434.97	385.81	330.93	261.08
Brazil	2012	529.55	439.98	391.46	337.37	274.51
Brazil	2015	533.49	434.02	377.07	314.72	240.25

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Chile	2000	532.00	449.00	384.00	321.00	222.00
Chile	2003					
Chile	2006	560.56	470.07	411.35	350.20	273.49
Chile	2009	559.11	473.48	421.06	365.89	293.37
Chile	2012	563.18	476.48	422.63	365.00	299.42
Chile	2015	563.02	482.81	422.67	363.19	284.08

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Colombia	2000					
Colombia	2003					
Colombia	2006	515.26	428.27	369.98	311.32	225.71
Colombia	2009	509.18	430.81	380.85	329.72	259.08
Colombia	2012	506.02	423.19	376.49	325.79	262.29
Colombia	2015	521.91	441.38	389.64	335.47	268.58

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Costa Rica	2000					
Costa Rica	2003					
Costa Rica	2006					
Costa Rica	2009		457.01	409.39	360.62	
Costa Rica	2012	525.45	449.36	407.00	360.55	301.15
Costa Rica	2015	516.90	445.00	400.25	352.87	292.32

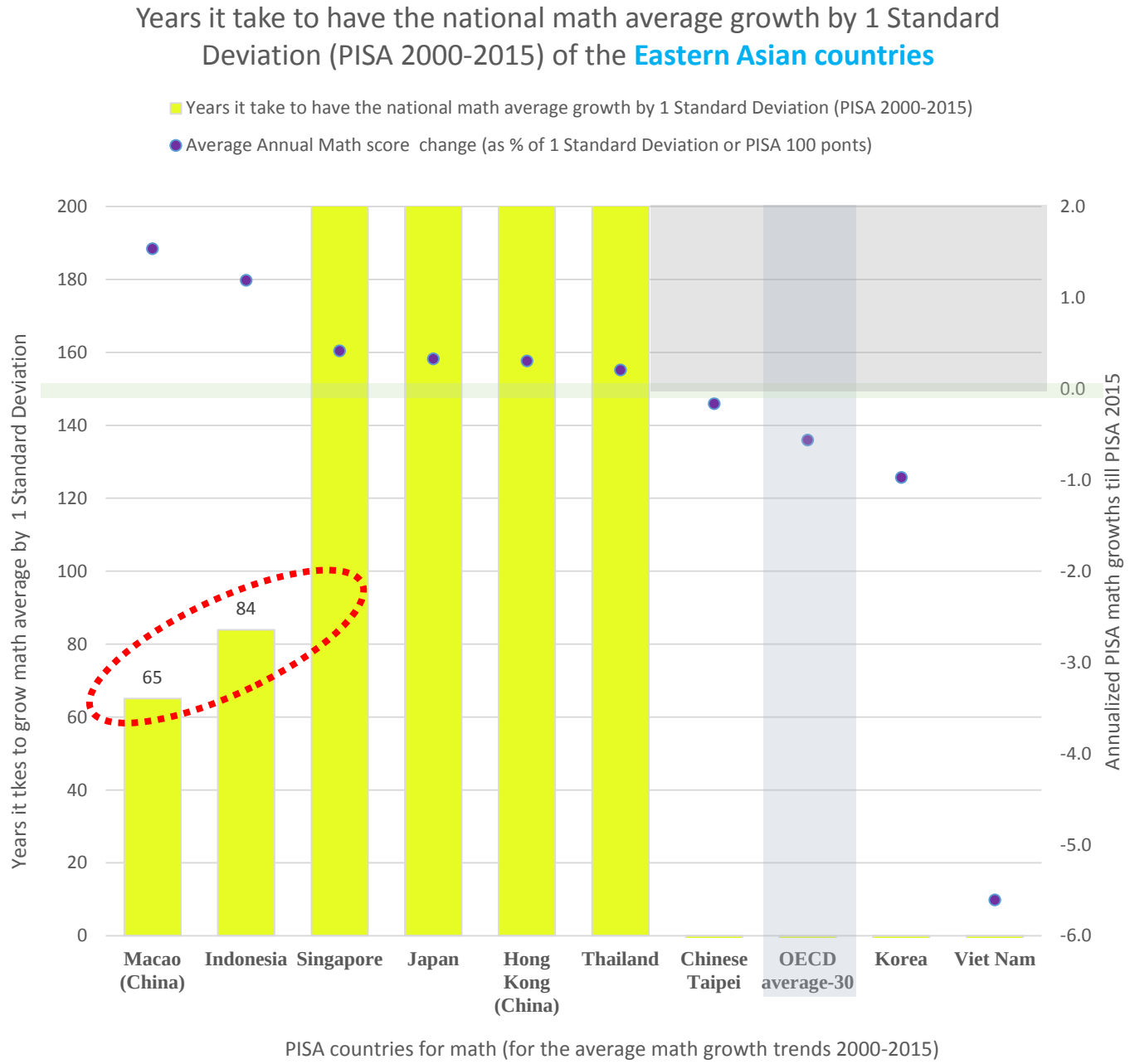
Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Dominican Repu	2015	445.81	372.67	327.70	280.72	220.49

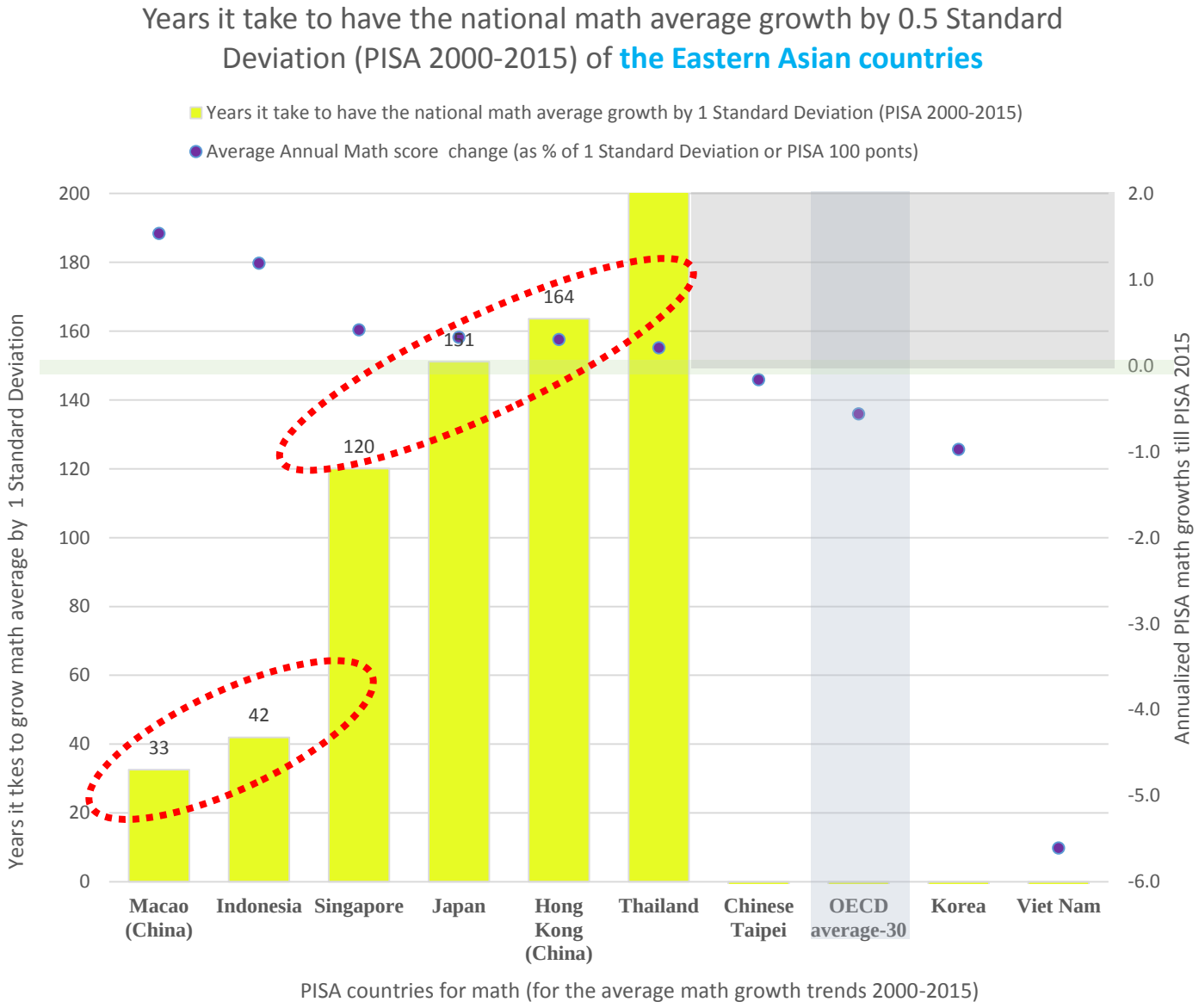
Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Mexico	2000	527.00	445.00	387.00	329.00	254.00
Mexico	2003	526.90	443.57	385.22	326.64	247.11
Mexico	2006	545.53	462.99	405.65	349.05	267.56
Mexico	2009	547.30	471.76	418.51	366.00	288.79
Mexico	2012	539.30	461.98	413.28	362.46	294.54
Mexico	2015	532.74	459.21	408.02	356.55	284.47

Country	Time	math 95 percentile	math 75 percentile	Average PISA math	math 25 percentile	math 5 percentile
Uruguay	2000					
Uruguay	2003	583.41	490.67	422.20	353.34	255.27
Uruguay	2006	587.02	495.32	426.80	359.85	261.31
Uruguay	2009	577.88	489.59	426.72	363.74	278.24
Uruguay	2012	558.24	470.02	409.29	347.34	266.58
Uruguay	2015	565.49	476.98	417.99	356.60	280.84

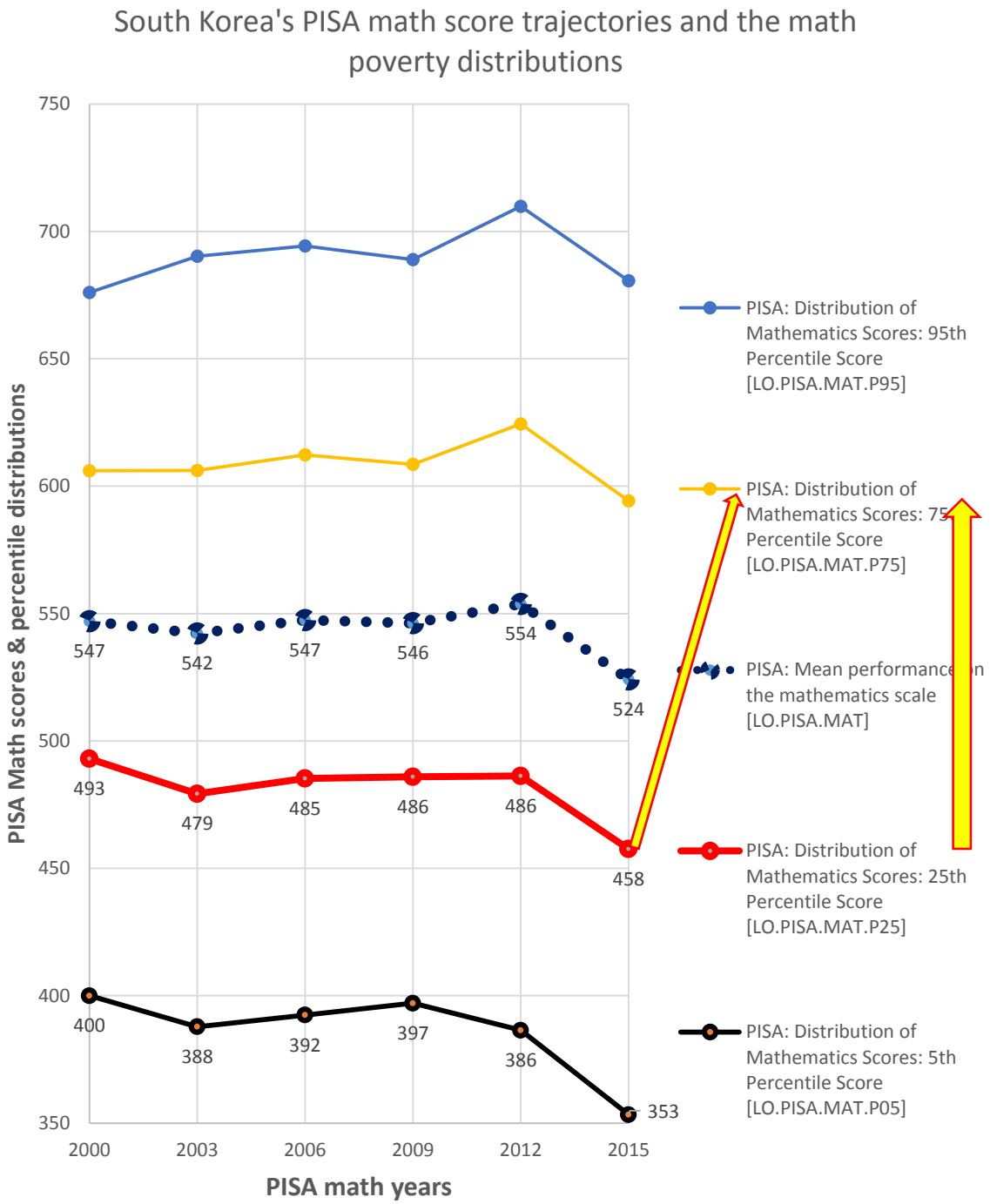
Source: OECD's PISA data for PISA math growths 2000-2015:

PISA math growths 2000-2015:
Asian Tigers: developed countries

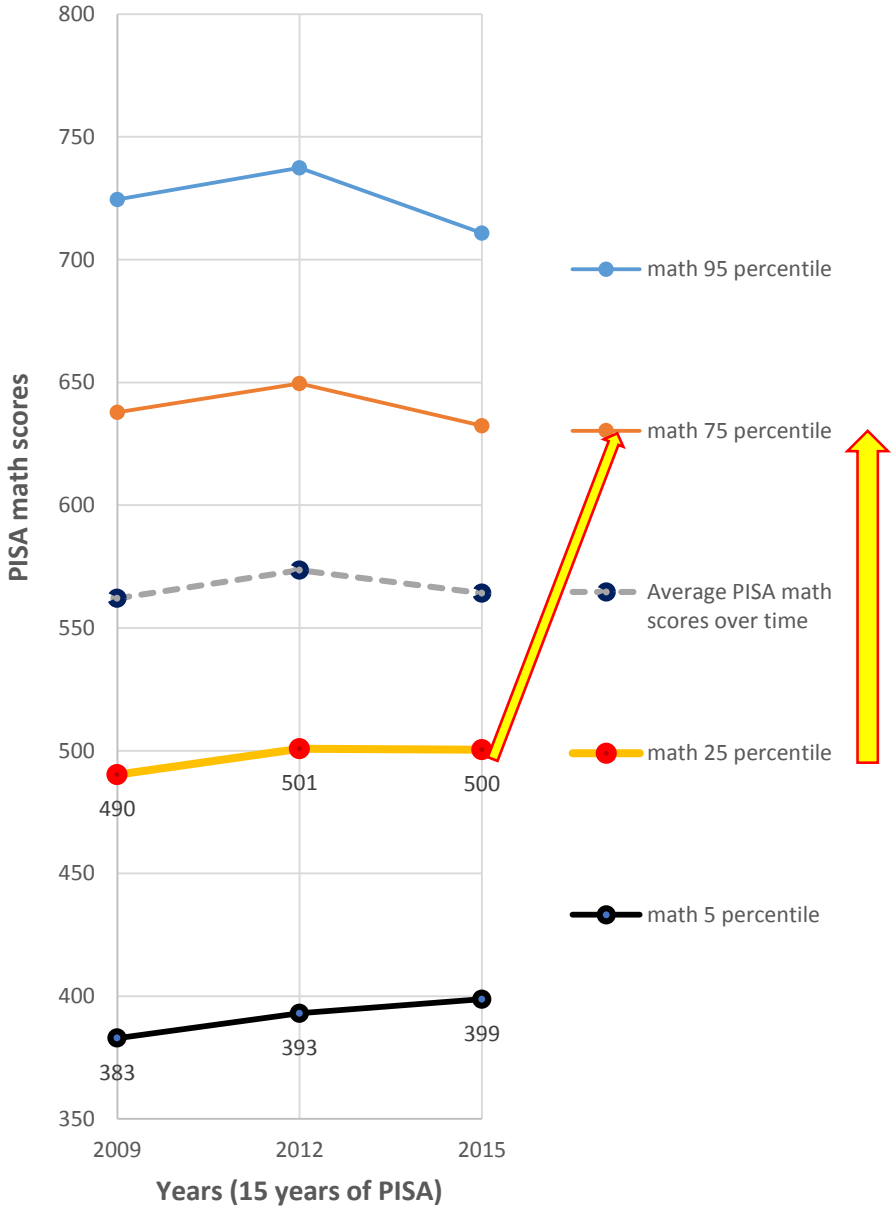

Years it take to have the national math average growth by 1 Standard Deviation (PISA 2000-2015) of the Eastern Asian countries
Years it take to have the national math average growth by 1 Standard Deviation (PISA 2000-2015)
Average Annual Math score change (as % of 1 Standard Deviation or PISA 100 ponts)
Years it tkes to grow math average by 1 Standard Deviation
Annualized PISA math growths till PISA 2015
200
180
160
140
120
100
80
60
40
20
0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
65
84
Macao (China)
Indonesia
Singapore
Japan
Hong Kong (China)
Thailand
Chinese Taipei
OECD average-30
Korea
Viet Nam
PISA countries for math (for the average math growth trends 2000-2015)


Years it take to have the national math average growth by 0.5 Standard Deviation (PISA 2000-2015) of the Eastern Asian countries
Years it take to have the national math average growth by 1 Standard Deviation (PISA 2000-2015)
Average Annual Math score change (as % of 1 Standard Deviation or PISA 100 ponts)
Years it tkes to grow math average by 1 Standard Deviation
Annualized PISA math growths till PISA 2015
200
180
160
140
120
100
80
60
40
20
0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
33
42
120
151
164
Macao (China)
Indonesia
Singapore
Japan
Hong Kong (China)
Thailand
Chinese Taipei
OECD average-30
Korea
Viet Nam
PISA countries for math (for the average math growth trends 2000-2015)

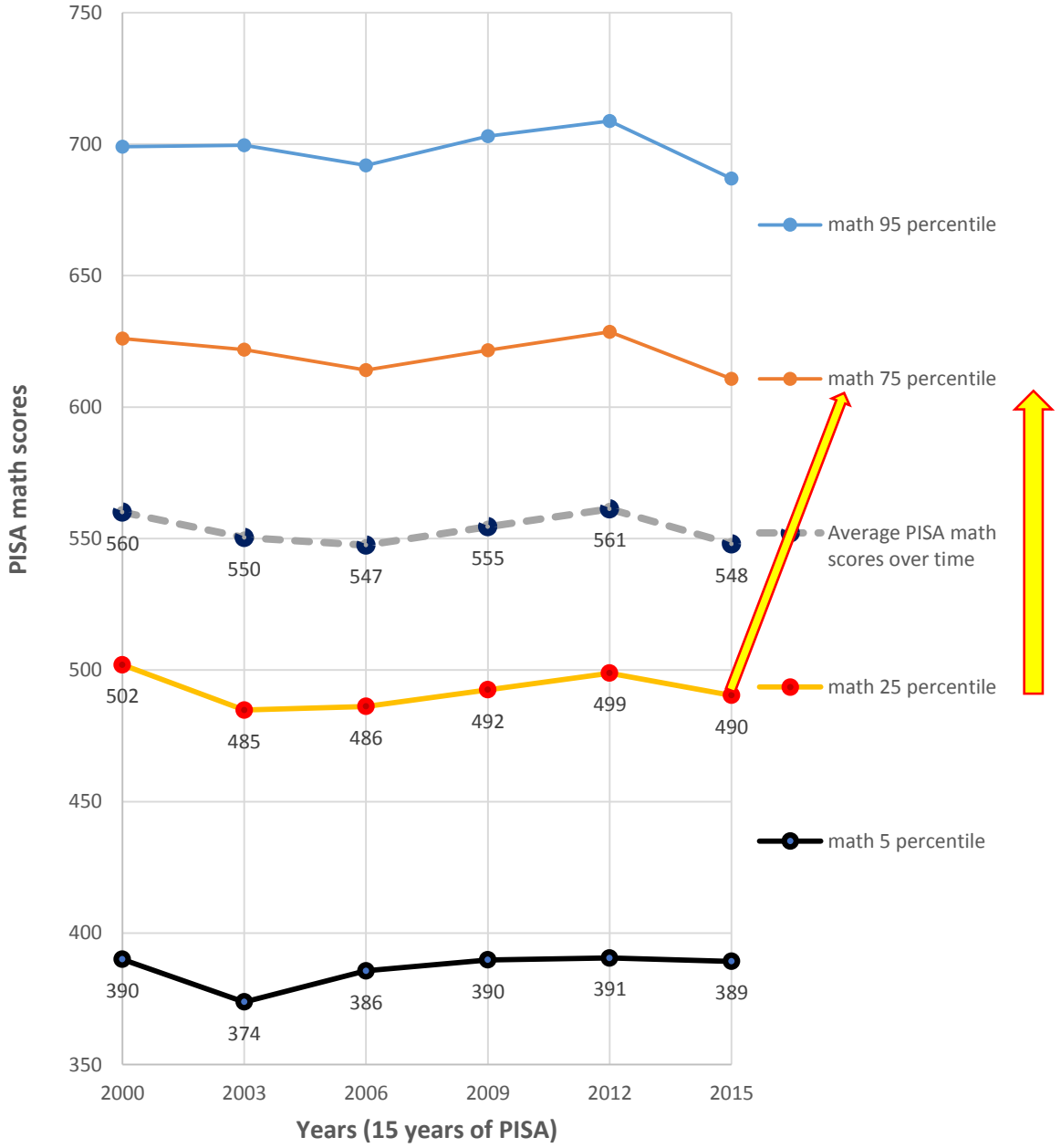
The red arrow is the math chasm between the top math countries and poorest math countries in the entire PISA and TIMSS tests



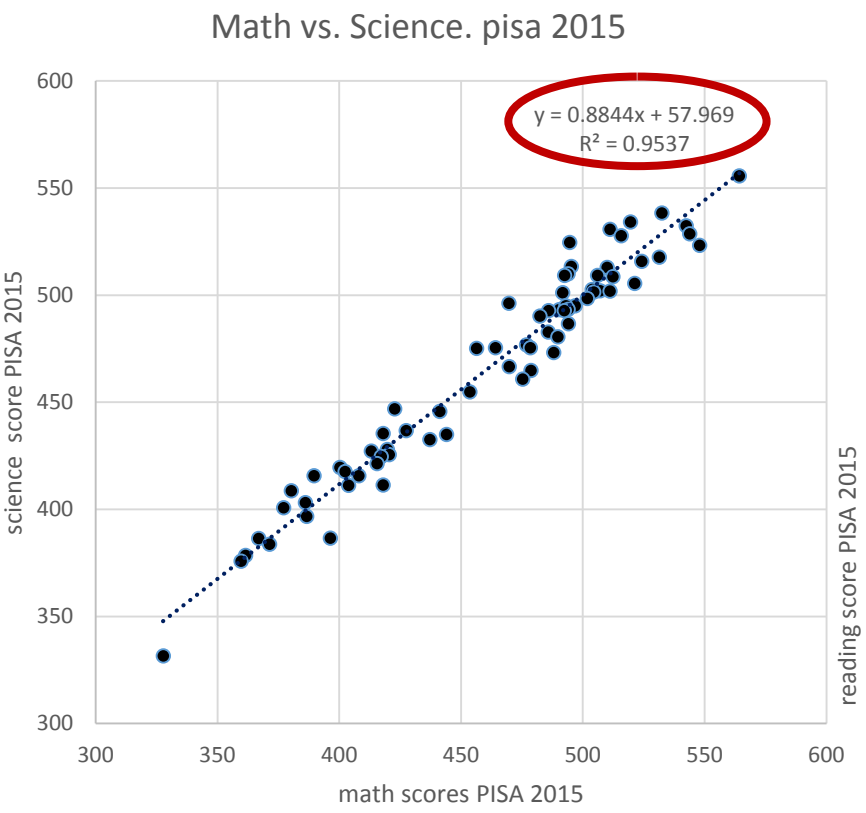
SINGAPORE: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)

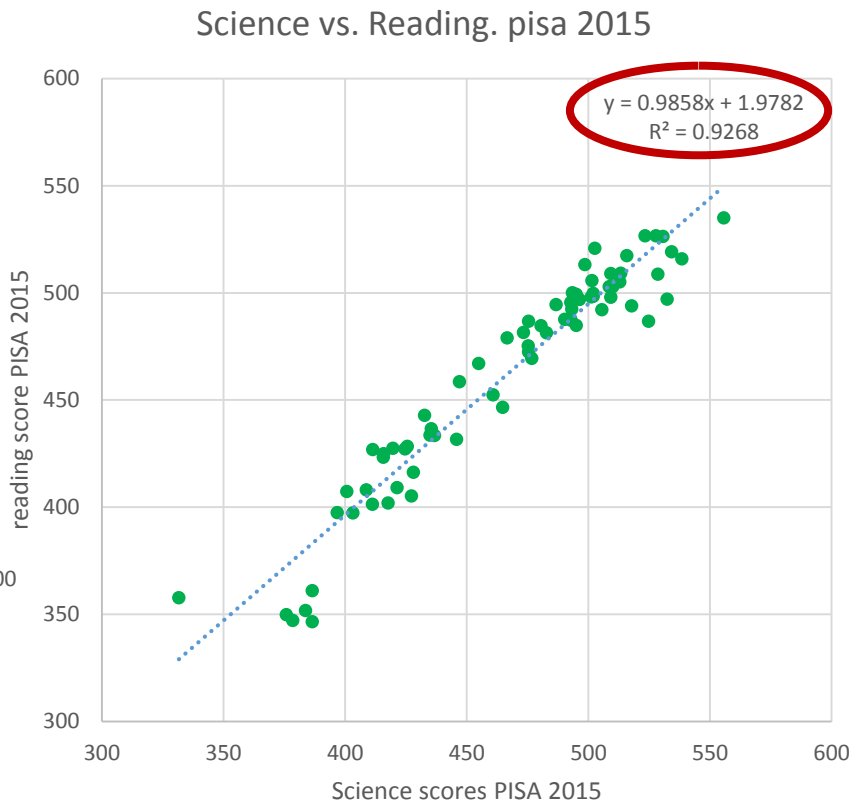


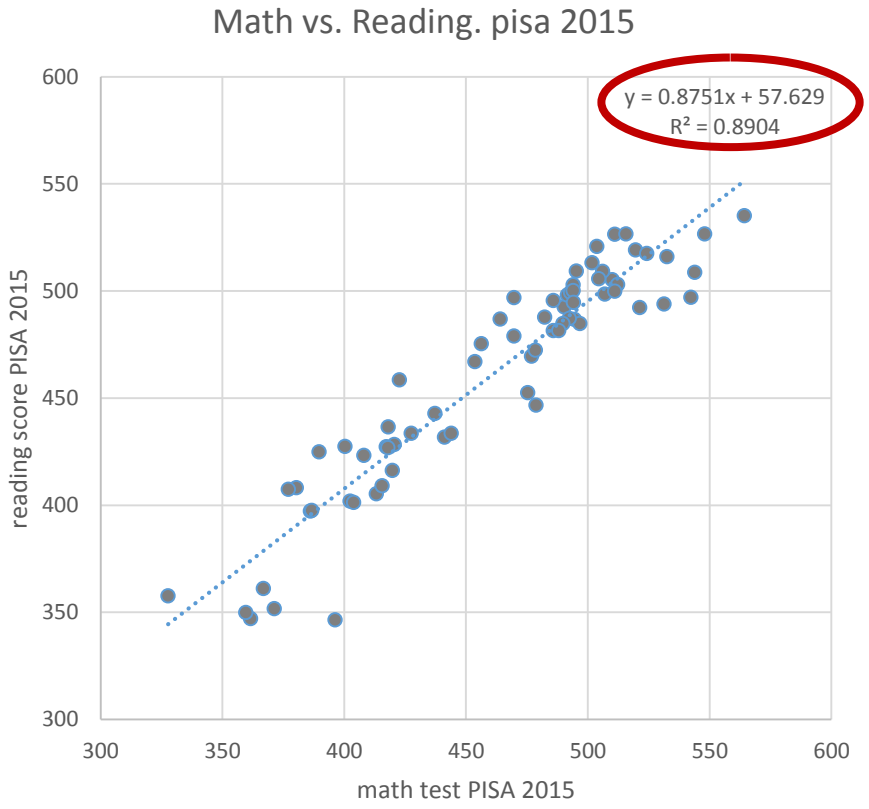
HONG KONG: PISA math trajectories: **Math poverty levels & percentile distributions 2000-2015** (entire history)



How much can the dominance of math average over that of reading average can impact the GDP per capita as time goes on?

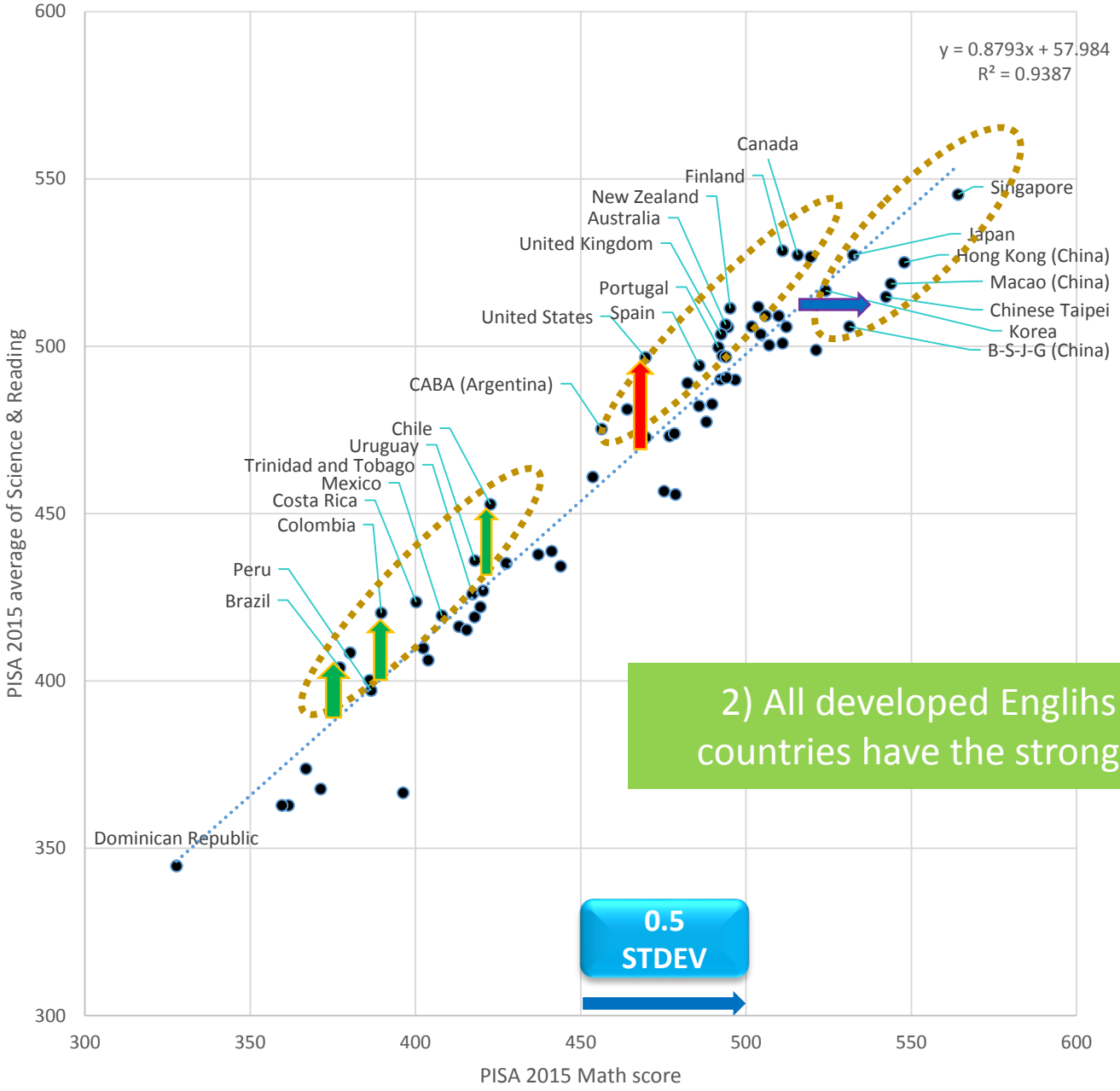






Source: OECD, PISA 2015 Database, Tables I.2.4a, I.2.6, I.2.7, I.4.4a and I.5.4a.

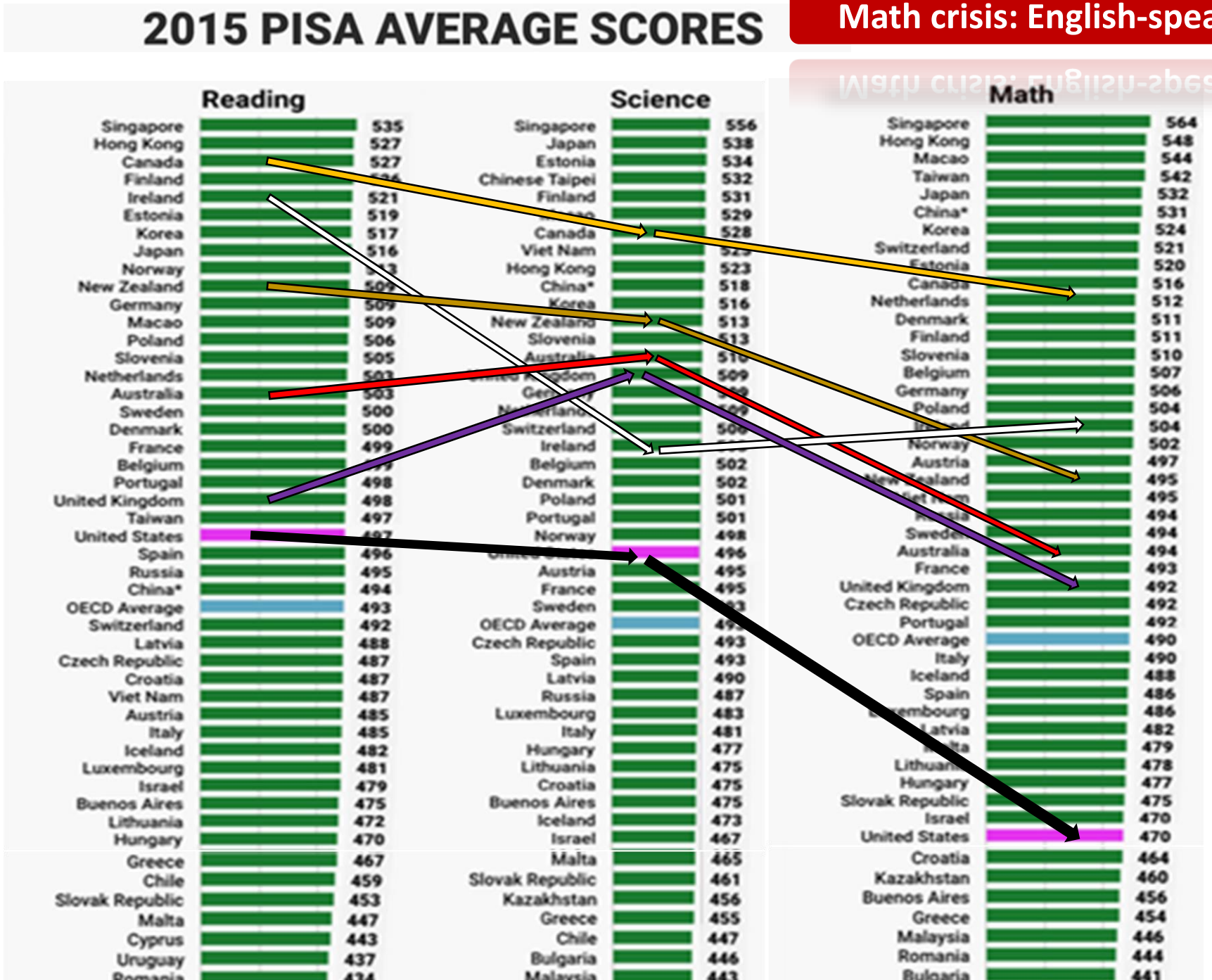
Correlations between **PISA 2015 Math vs. the average of Reading & Science**



2) All developed Englihs speaking countries and most of the Latin American countries have the stronger reading scores than math scores by large margins.

Source: OECD, PISA 2015 Database, Tables I.2.4a, I.2.6, I.2.7, I.4.4a and I.5.4a.

Math crisis: English-speaking countries



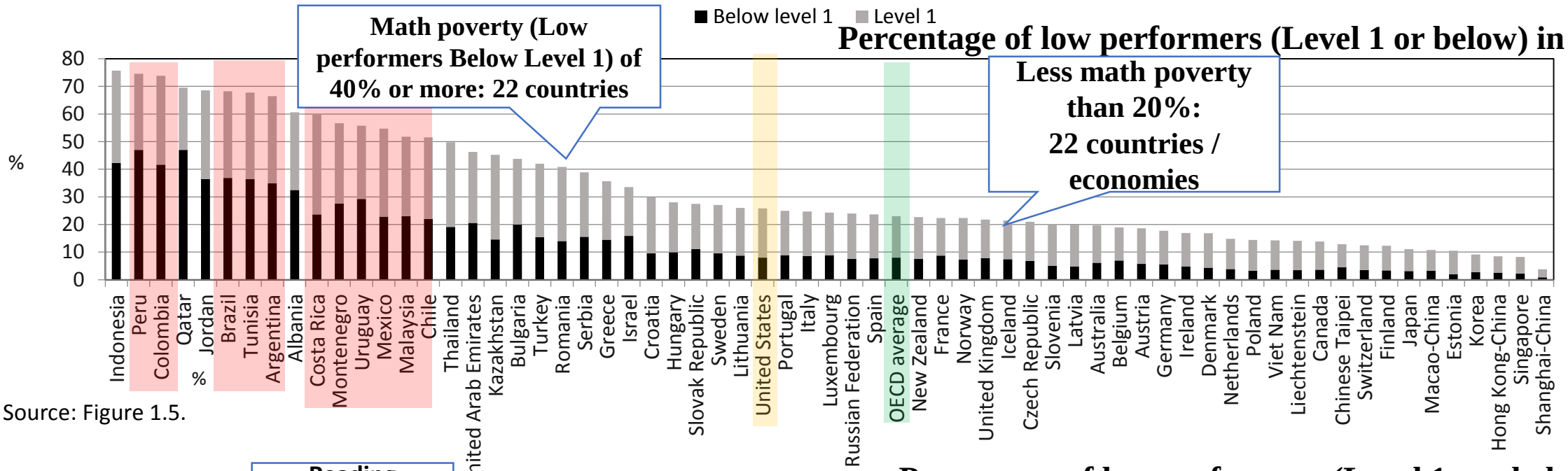
2) All developed Englihs speaking countries and most of the Latin American countries have the stronger reading scores than math scores by large margins.

PISA 2015: Math dominance vs. others' by regions: English or Spanish speaking countries vs. the North-Eastern Asia

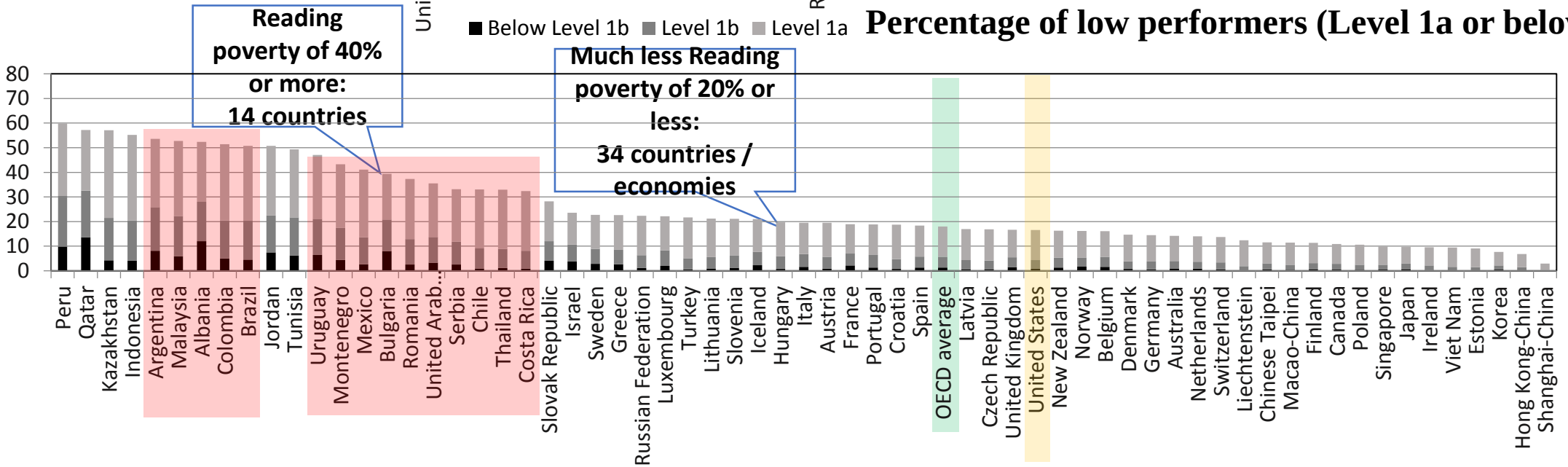
Mean score in PISA 2015	Math -Reading (PISA 2015)	Math - Science	Math - Science & reading average
Chile	-36	-24	-30
Colombia	-35	-26	-31
Brazil	-30	-24	-27
Dominican Republic	-30	-4	-17
Costa Rica	-27	-19	-23
CABA (Argentina)	-19	-19	-19
Uruguay	-19	-17	-18
Mexico	-15	-8	-11
Peru	-11	-10	-11
Trinidad and Tobago	-10	-7	-9
United States	-27	-27	-27
Ireland	-17	1	-8
New Zealand	-14	-18	-16
Canada	-11	-12	-12
Australia	-9	-16	-13
United Kingdom	-5	-17	-11
Spain	-10	-7	-8
Portugal	-7	-9	-8
Korea	7	8	7
Japan	16	-6	5
Hong Kong (China)	21	25	23
Singapore	29	9	19
Macao (China)	35	15	25
B-S-J-G (China)	37	14	25
Chinese Taipei	45	10	28

Source: OECD, PISA 2015 Database, Tables I.2.4a, I.2.6, I.2.7, I.4.4a and I.5.4a.

In PISA (2012), the shares of math poverty (low performers) are much higher than that of Reading poverty



Source: Figure 1.5.



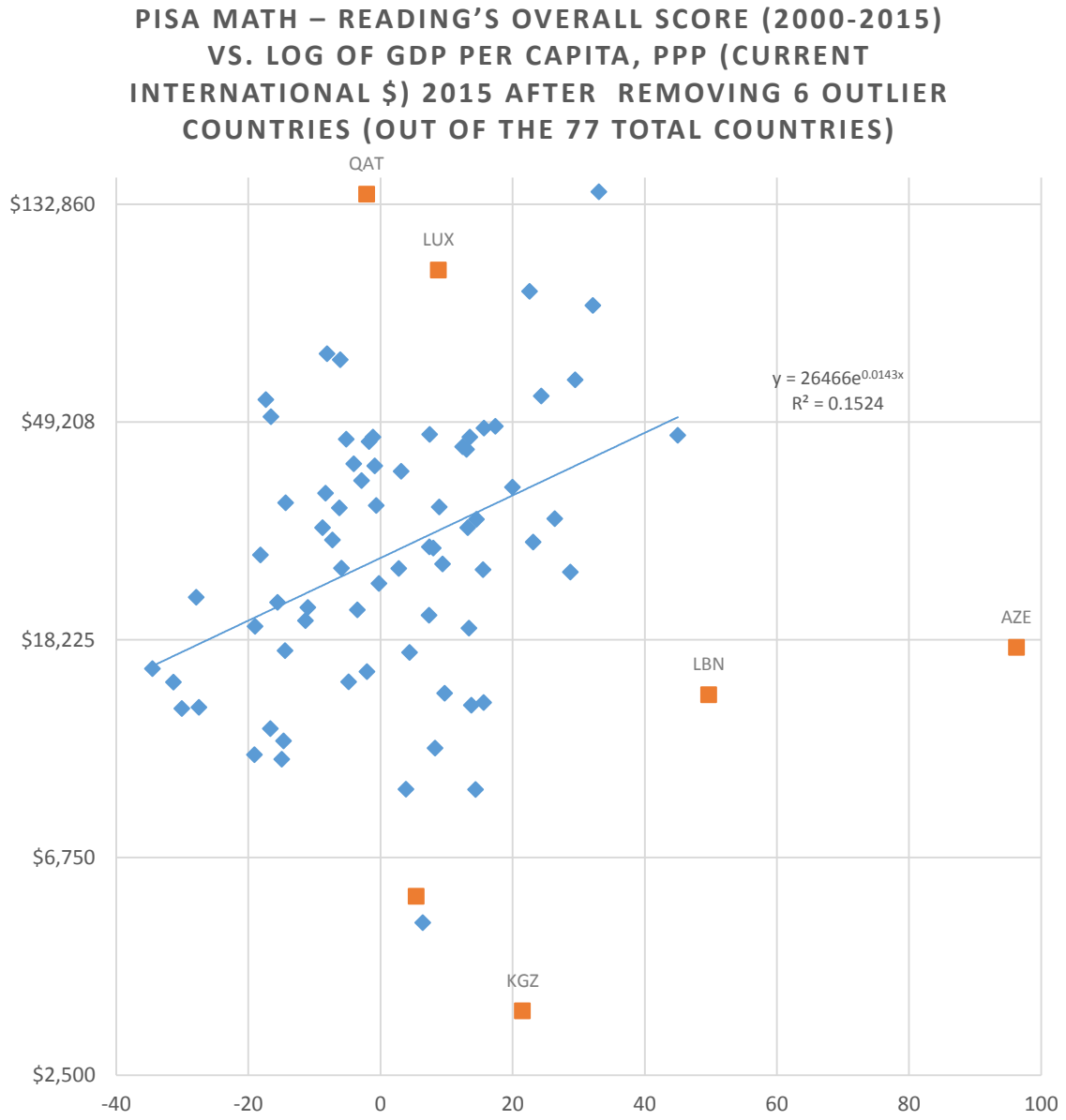
In the following regressions, you have to be aware that the typical correlation or growth coefficients of GDP per capita vs. the Mean school years is about R^2 ~ 0.25.

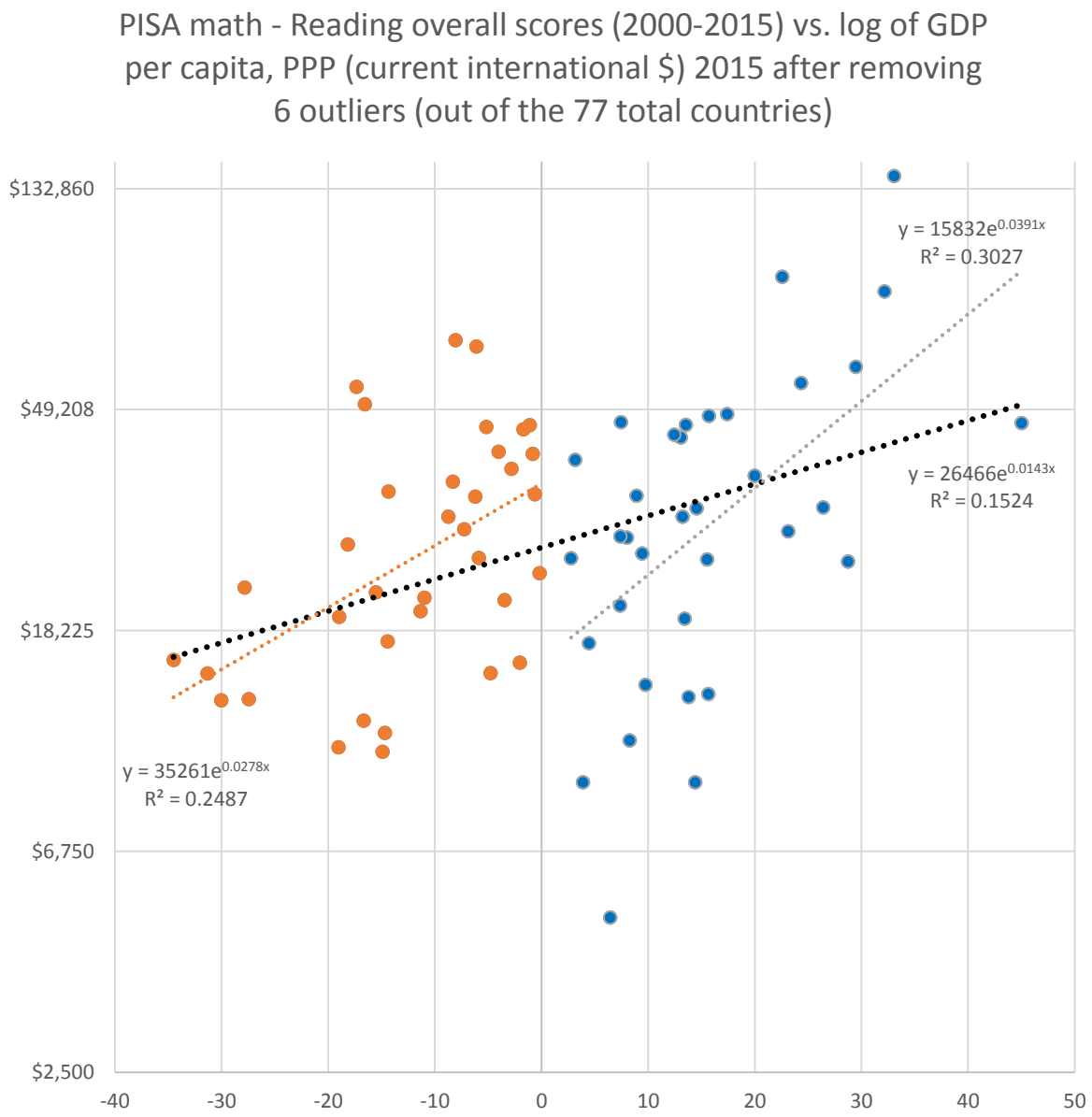
For instance, according to Hanushek & Woessmann's regressions about the linear correlation between these 2 factors without including cognitive skills at all, the growth coefficient is about 0.35 and the R^2 ~ 0.25 (meaning that the mean school year alone can explain only about 25% of the GDP per capita grwoths (at least based on their regression based on 50 countries between 1960-2000).

Keeping this in mind that the PISA math – reading score difference against the GDP per capita based on PPP leads to about similar magnitude of R^2 when about 3-5 outliers are taken out.

How much can the dominance of math average over that of reading average can impact the GDP per capita as time goes on?

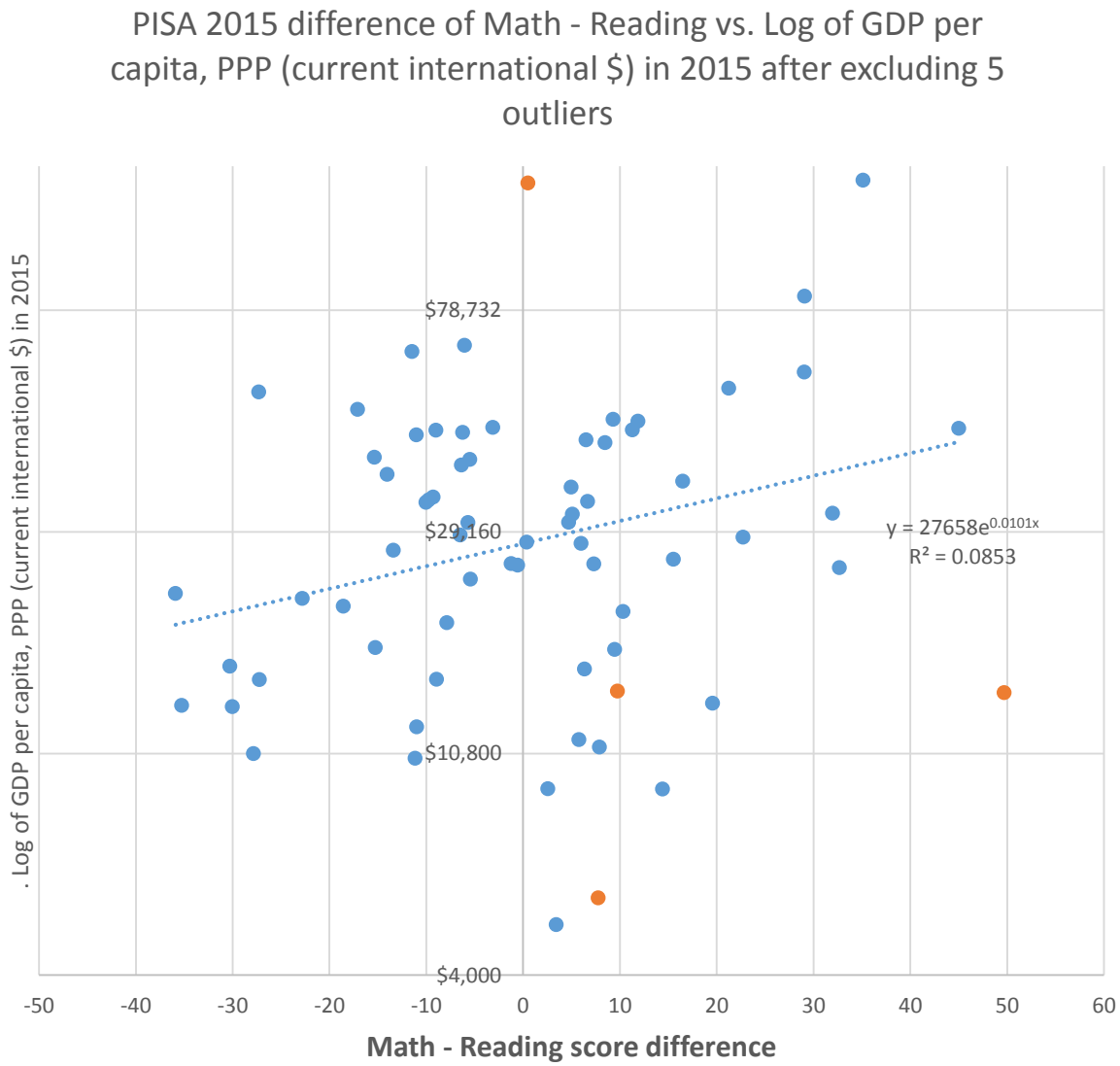
Math overall average of PISA math 2000-2015 impacts on GDP per capita



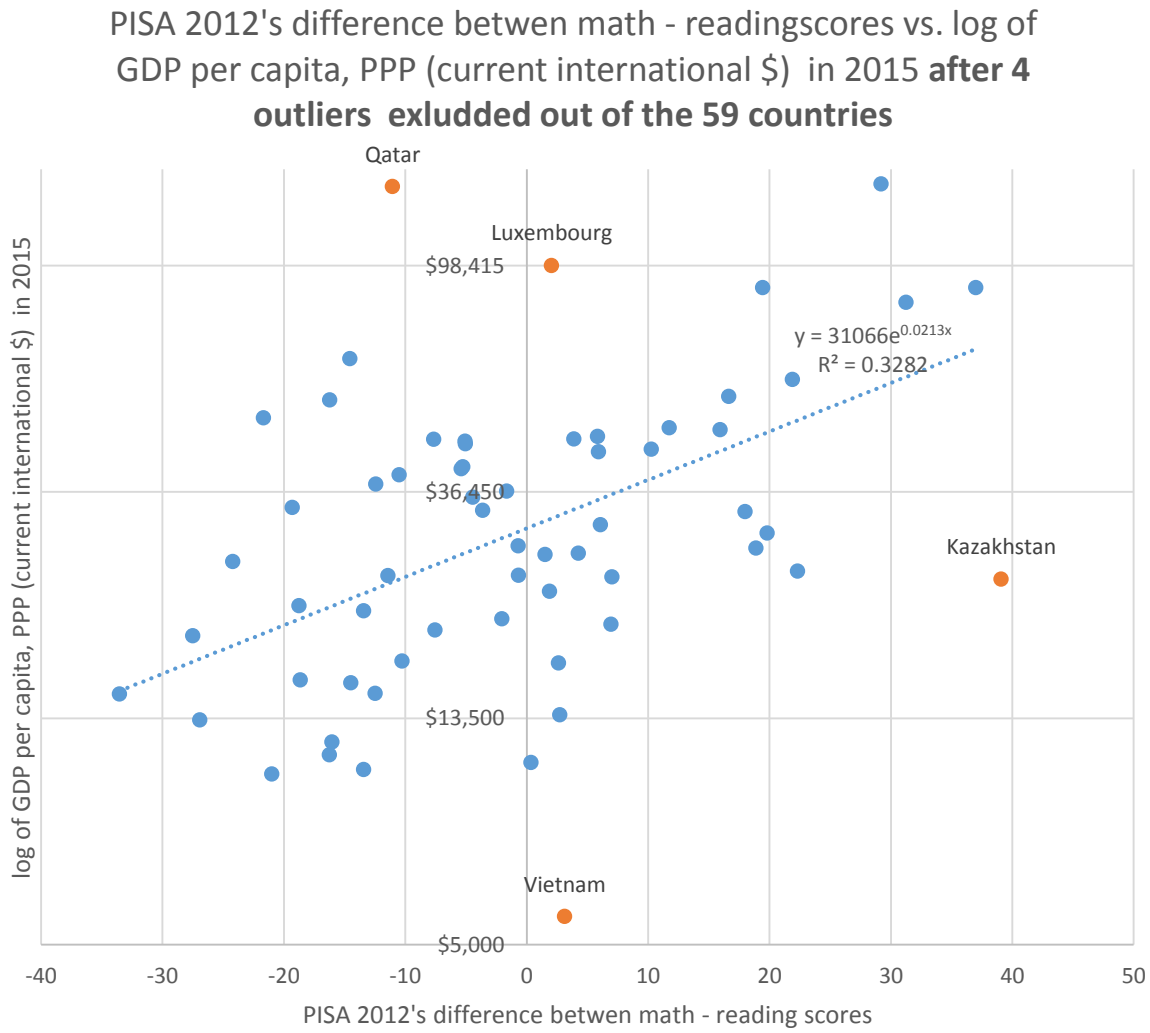


After eliminating typically 3, 4, or 6 outliers out of about 50-70 participating nations over the last 12 years (2003-2015 PISA math and reading)

Time lag in 0 years
No significant changes ☹

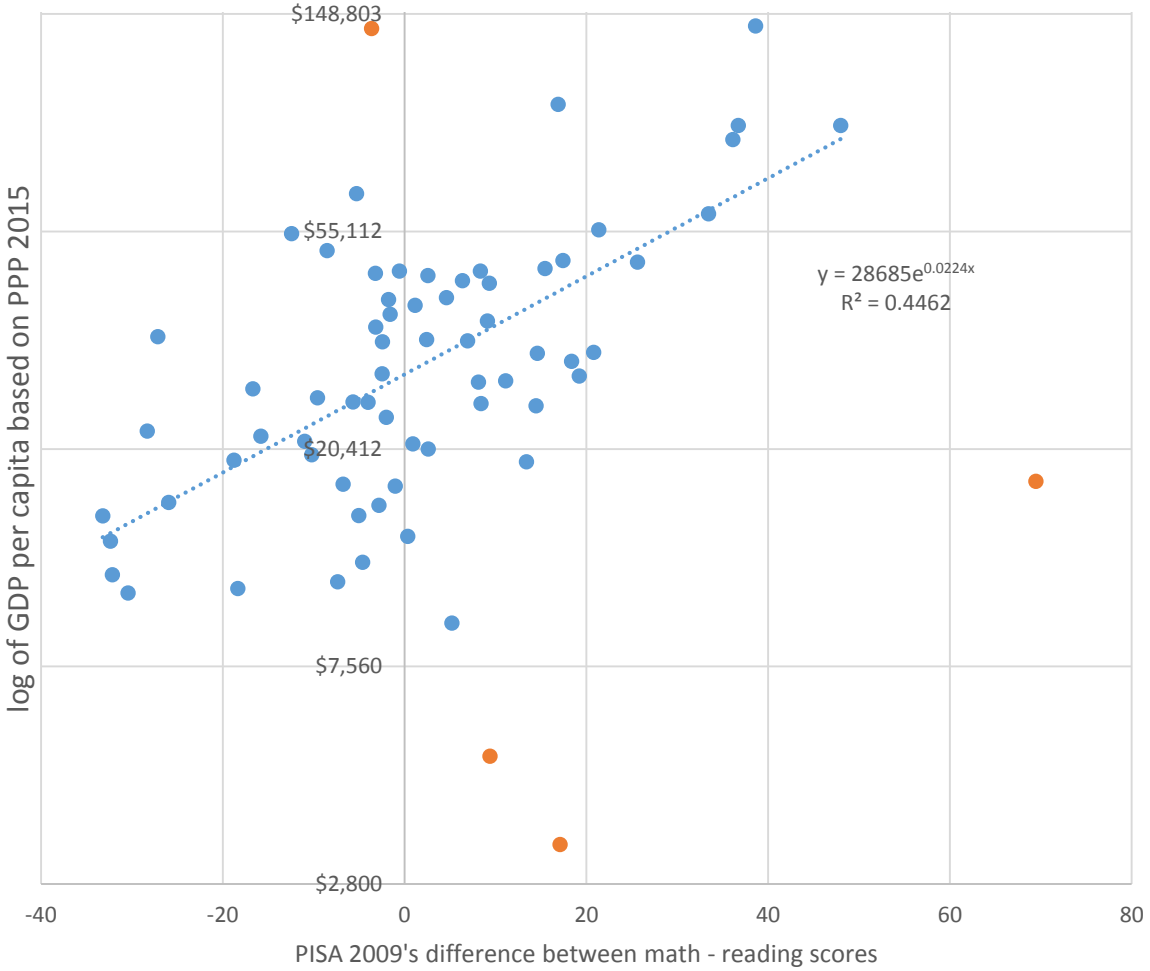


Time lag in 3 years



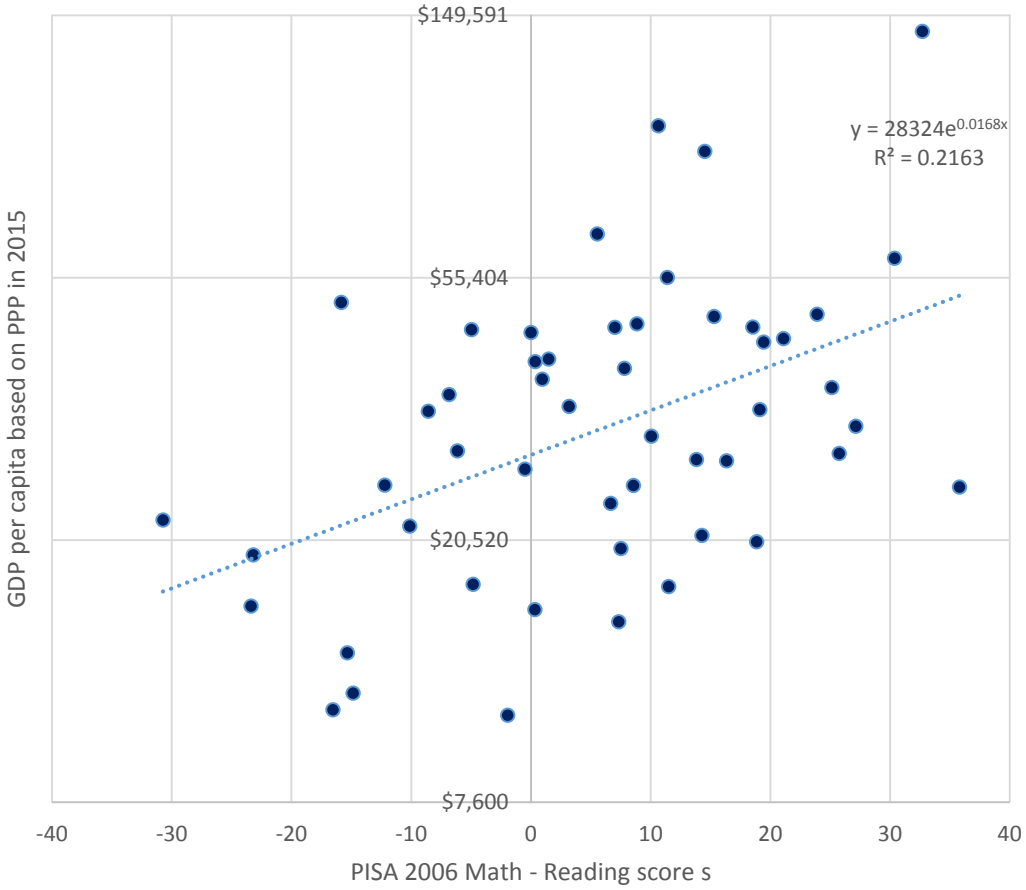
Time lag in 6 years

PISA 2009's difference between math - reading scores vs. log of GDP per capita, PPP (current international $) in 2015, **after removing 4 outliers**

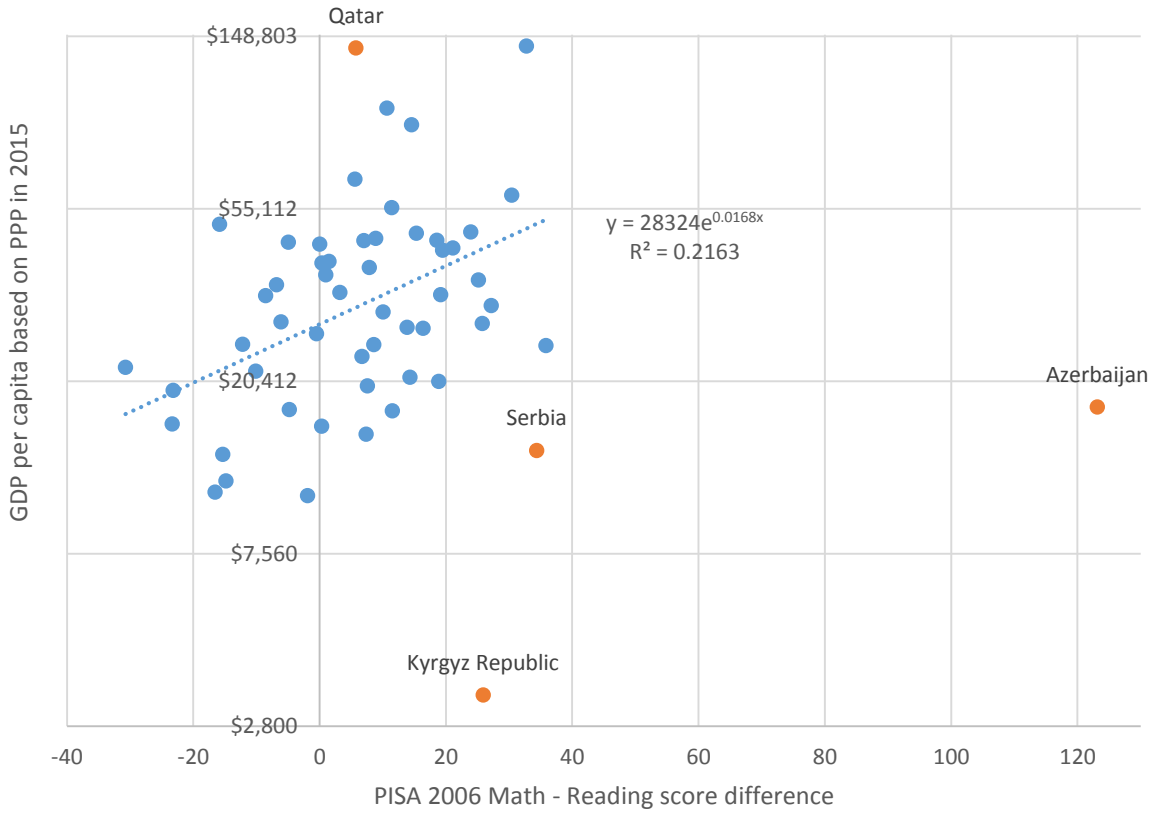


Time lag in 9 years

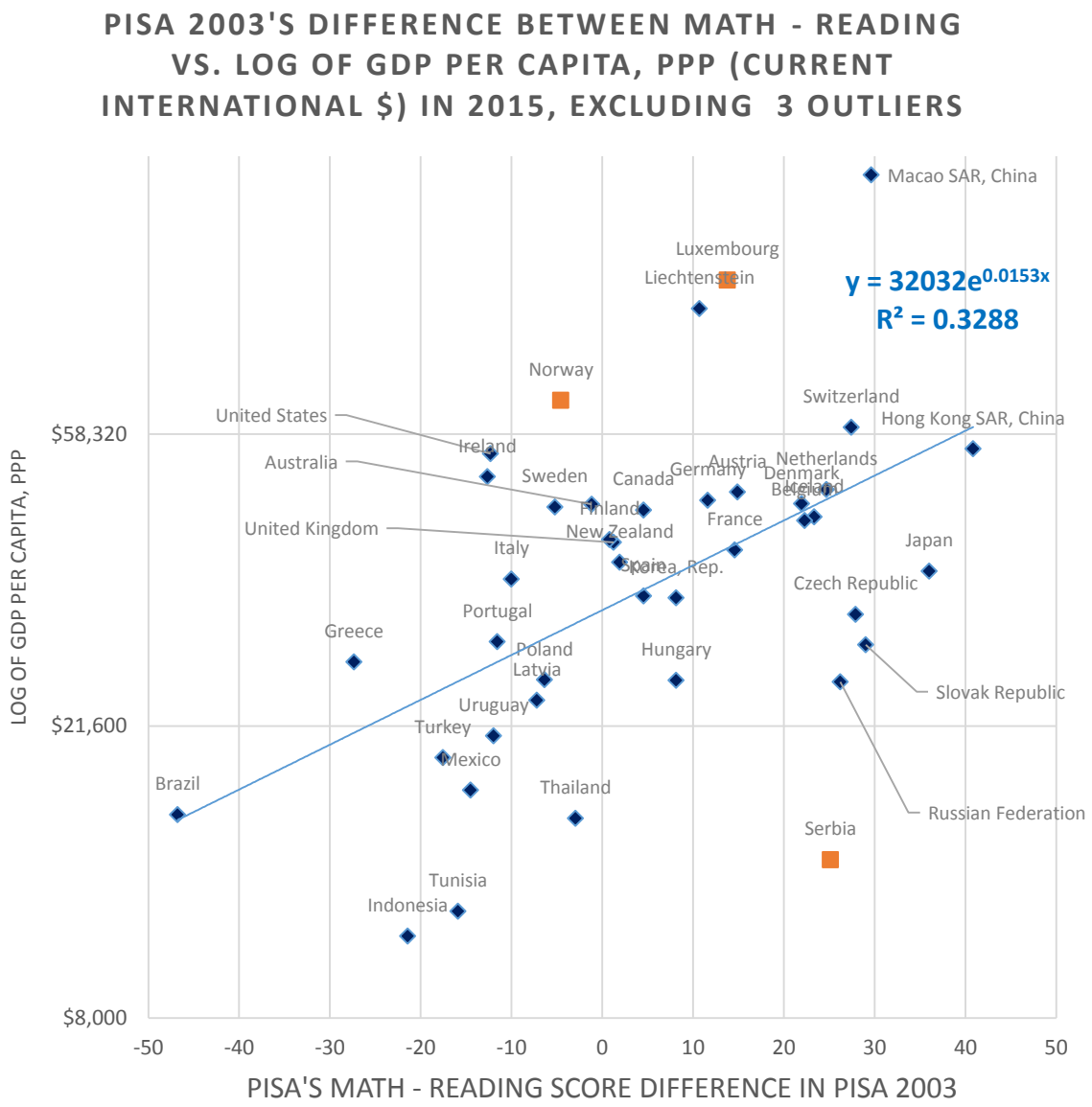
PISA 2006 difference between the math - Reading vs. GDP per capita, PPP (current international $) in 2015 after removing 4 outliers



PISA 2006 difference between the math - Reading vs. GDP per capita, PPP (current international $) in 2015 after removing 3 outliers



Time lag in 12 years with the district GDP per capita without 3 outliers in 2015



Key conclusions

Solutions: USL (Unified Super Learning), starting with MMU1 (Mini Mini USL1 as a series of pilot studies to convince all to end the math poverty rapidy)

MMU1 (Mini Mini USL1, Sep-Oct 2016)

USL original pilot studies (Oct 2013, Jan-Feb 2014)

Far beyond the efficiencies of the best math apps, the best math average nations

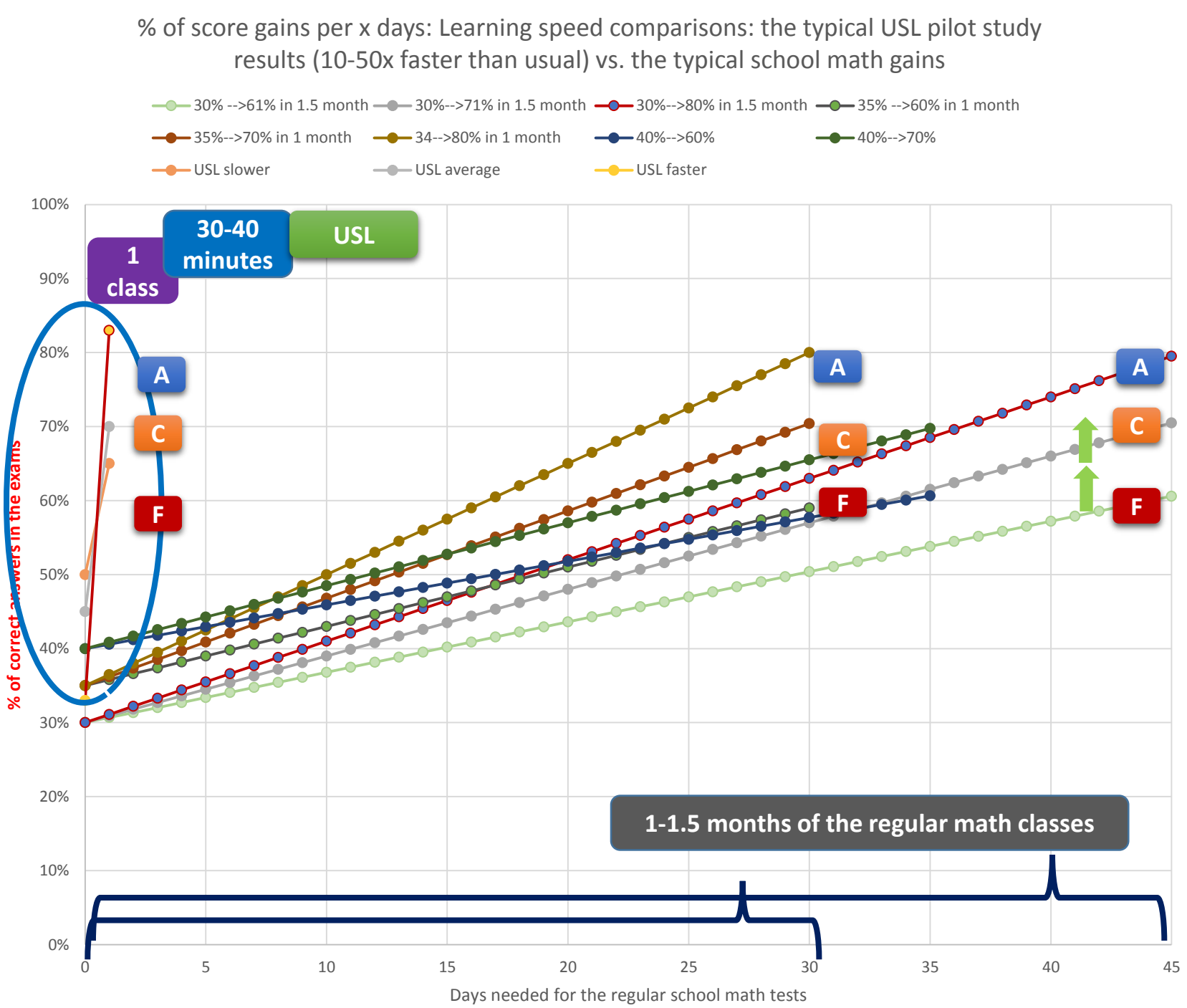
The best way to end the global math poverty in 2-5 years

The best way to end the global poverty in 10-15 years, not just extreme poverty in 50-100 years

By Dongchan Lee

10-70x time compressions for earning the math (from the USL pilot studies)

Evidences



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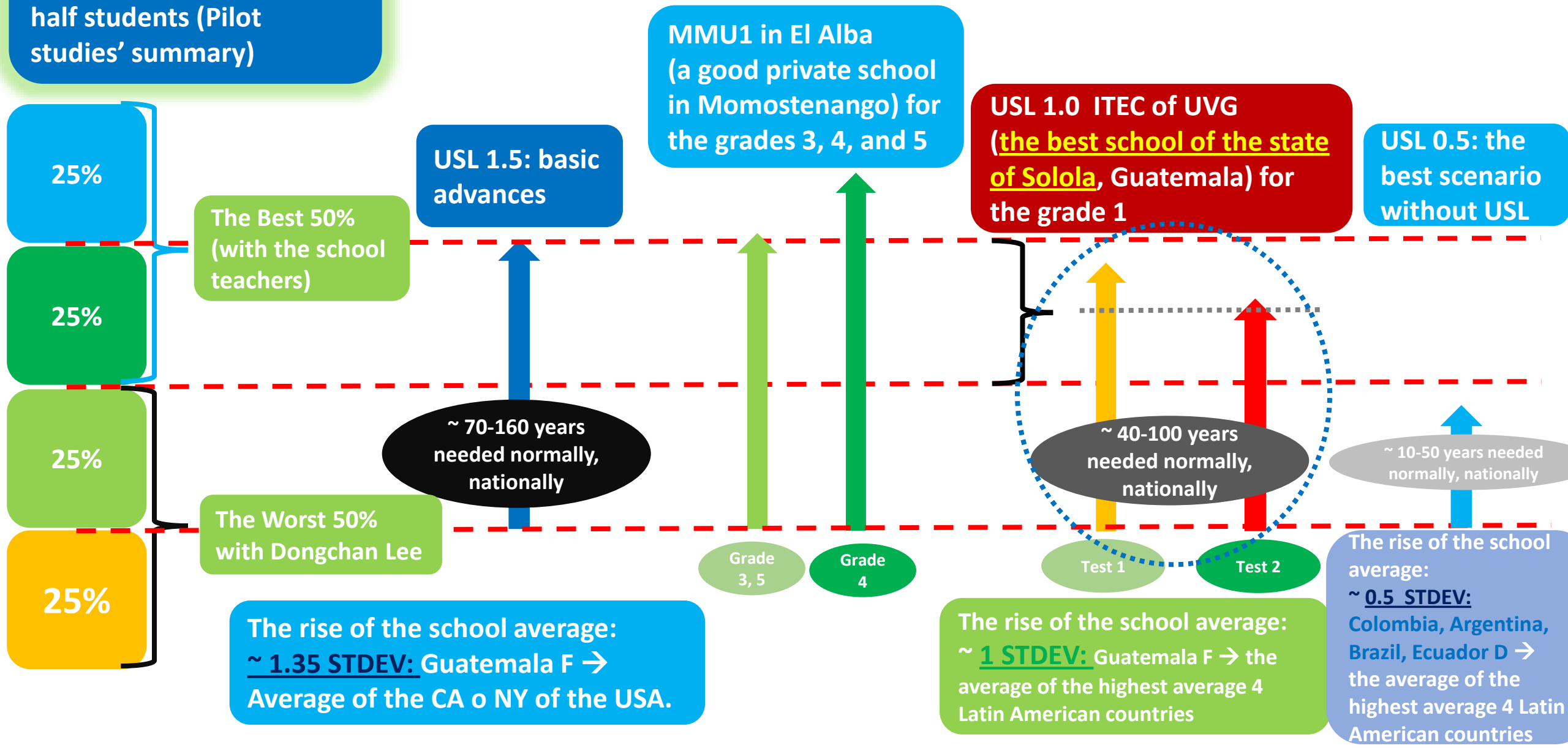
MMU1 (Mini Mini USL1) from 2 good private schools with Dongchan Lee

Rule of thumb for MMU1: very rapid rise of the worst math students to the best half students (Pilot studies' summary)

Still using only ~ 4-8% of the original original USL capacity of 2014



The rise of the school average: ~ 1.35 STDEV: Guatemala F → Average of the CA o NY of the USA.

The rise of the school average: ~ 1 STDEV: Guatemala F → the average of the highest average 4 Latin American countries

The rise of the school average: ~ 0.5 STDEV: Colombia, Argentina, Brazil, Ecuador D → the average of the highest average 4 Latin American countries

MMU1 (Mini Mini USL1) proposals to Americas 2017

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With Dongchan Lee

Ending Math Poverty → **Ending Poverty** → **Sustainable Growths**

25%

25%

25%

25%

Very quickly

The Best math 50% (with the school teachers)

as appetizers

~ 1.35 STDEV advances

The Worst math 50% with Dongchan Lee

Evidence-based only

Massive Math boosts by MMU1

100% internet-based

(~100% tablet or computer-based)

Charged from Solar Panels

Purified Water from Solar panels

Public-Private Partnership

With the national & state governments & MOEs of the English, Spanish, Portuguese-speaking countries first.

with the UN

Invite Dongchan Lee

To run MMU1 Pilot studies

In your country

With your Ministries Of Edu

Support him.

Give him media publicities.

To make USL go global.

Fund him.

Bring him philanthropists.

Bring him Investors.

Help him end the math poverty.

To end the poverty.

Faster than anyone else can

.. In the entire world.

Make him demonstrate to the UNESCO

To the General Assembly of the UN.

Help him create his own 1 NGO per country

Help him accelerate the SDGs of the UN

far faster than currently possible.

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