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Returns to school quality and confidence: understanding pre labour market discrimination in South Africa

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Acknowledgements



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- Our views, not theirs!



Programme to Support Pro-Poor Policy Development
A partnership between the Presidency, Republic of South Africa and the European Union





Motivation



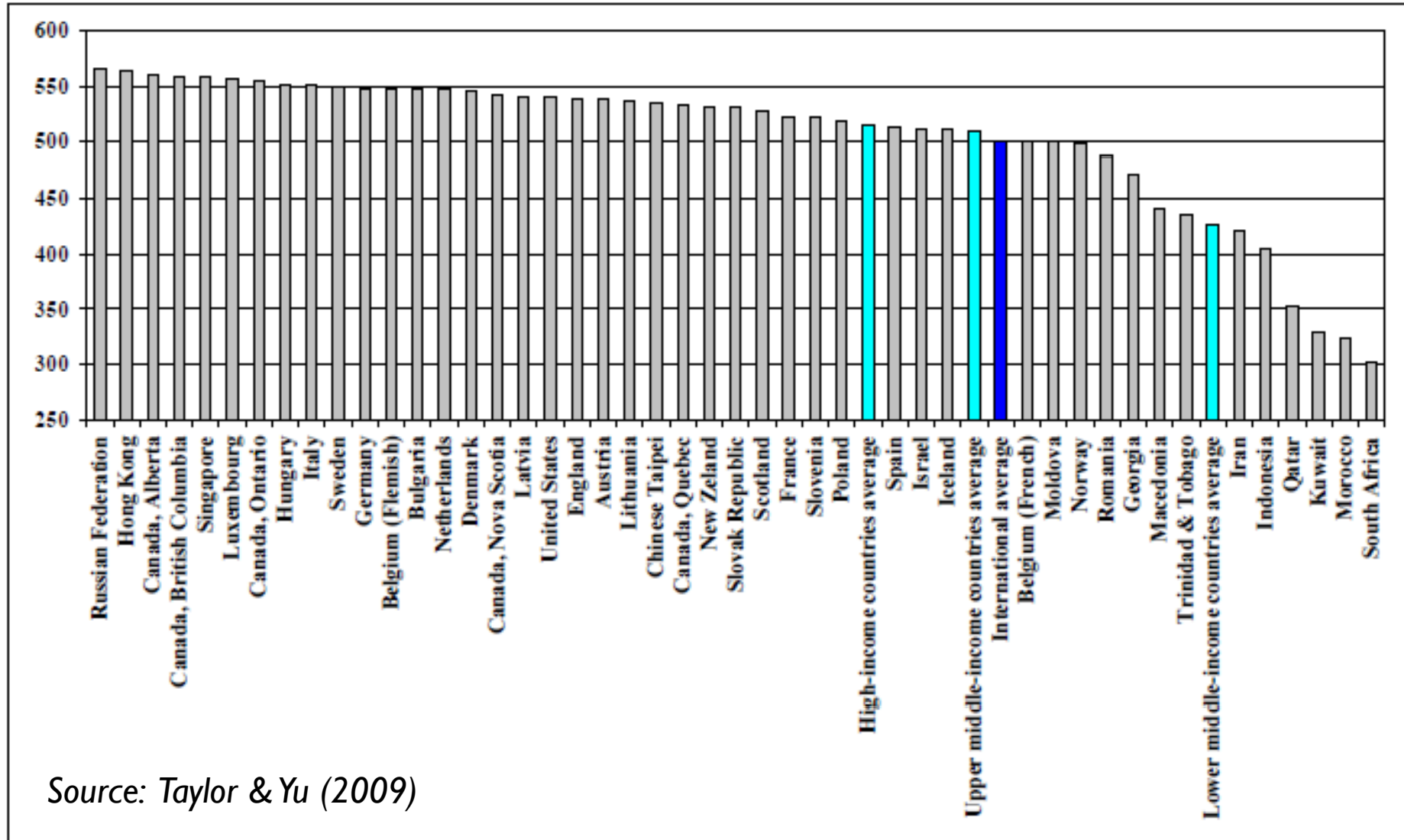
- Skills identified as a binding constraint to growth in South Africa
 - Developing appropriate skills for the needs of the labour market within the context of a skills shortage
 - High convexity of education-earnings profile (Keswell & Poswell, 2004)
 - Standard: shortage of highly skilled labour
 - Alternatively: quality schooling adds a premium for the select few – is it all just a story of “quality” bias?
- Given South Africa’s high levels of (secondary) enrollment and good *access* to education...
 - What defines this binding constraint?
 - The role of education *quality*?
 - South Africa’s performance in international standardised tests compares poorly with other developing countries
 - Access to education is successful; access to *quality* education is still limited



Quality of Education in Perspective



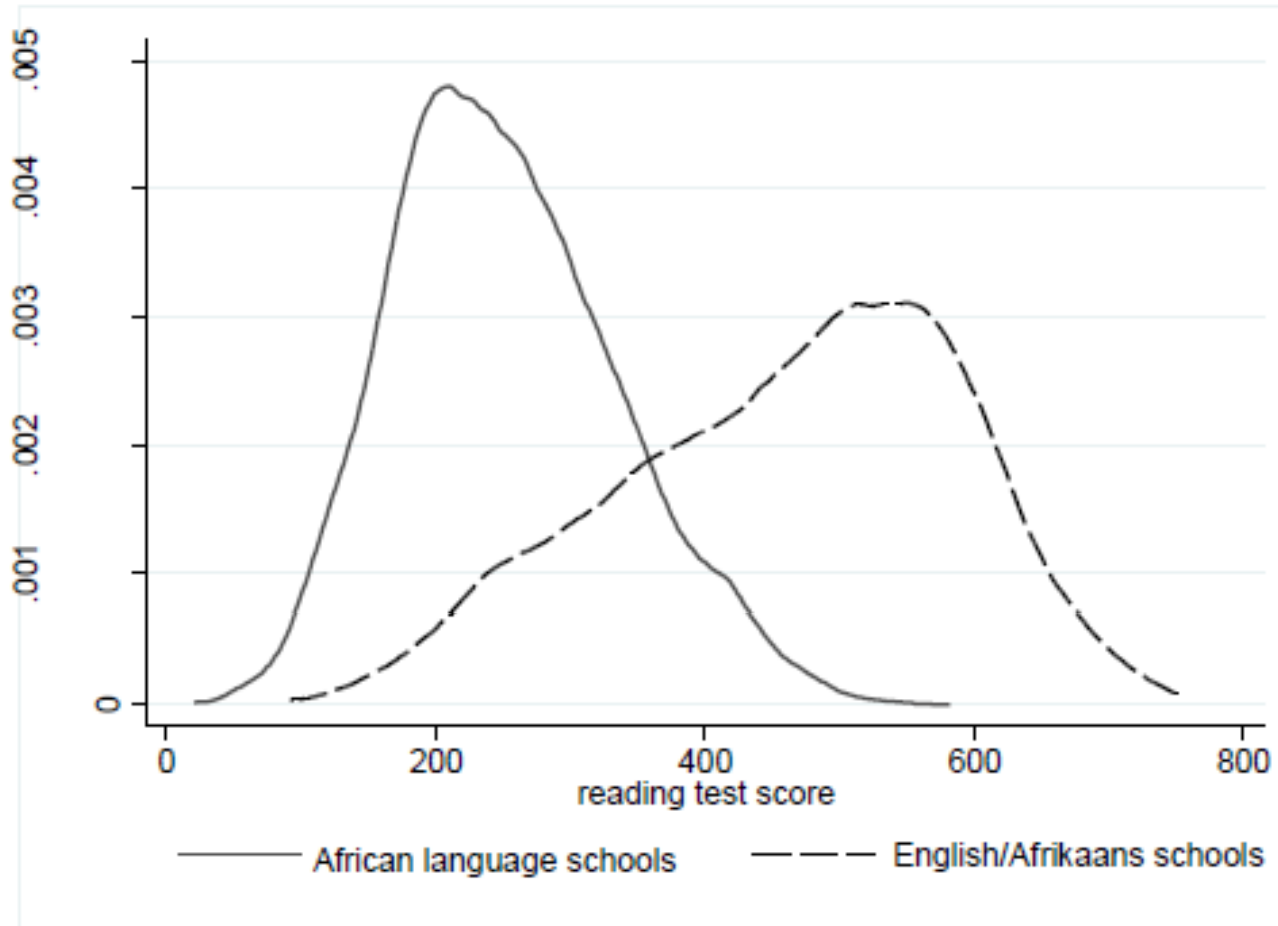
Figure 1: Mean overall reading achievement score



Source: Taylor & Yu (2009)



A tale of two education systems?



Source: own calculations, PIRLS 2006

Source: Shepherd (2011)



Empirical Goals



- Two focus areas:
 1. Split the return to “education” into returns to “attainment” and returns to “quality”
 - Do quality differentials explain convexity in earnings?
 - “Ability bias”
 2. How much of the racial wage differential that is *not* explained by educational *attainment* can be attributed to *quality*?
 - What is usually seen as labour market discrimination can be attributed to *quality* of education
 - “Pre-labour market” discrimination vs labour market discrimination
 - Education Policy vs Affirmative Action Policy



Measuring Quality and Ability



- A measure of Ability: **Numeracy score**
 - Reflects inherent ability **PLUS** value added by schools
 - numeracy test score as proxy for ability
 - Voluntary numeracy test in National Income Dynamic Study (NIDS)
 - response rate low (22%)
 - response pattern nonrandom
- A less noisy measure of School Quality?
 - Respondents provided name of last school attended
 - Linked with historical matric results as a proxy for quality



The NIDS Numeracy Test Selection Mechanism



- **Nature of Test**
 - Voluntary, no material incentive
 - Results confidential
- **Test Design**
 - 15 Multiple Choice questions, SA Curriculum
 - At end of questionnaire, approx 10 min
 - 4 difficulty levels
 - Assigned to 4 categories of math attainment
- **To encourage response...**
 - Respondents allowed to choose test level
- **Response pattern to numeracy test**
 - Selection into voluntary test taking (by design)
 - Selection of test level (by accident)
 - We look at 15 – 59 year-olds



Racial Response Rates & Patterns



	Black	Coloured	Asian	White	Total
Test Response					
Took Test	2829	534	18	116	3497
	23%	22%	7%	13%	22%
Total	12155	2450	272	864	15741



Racial Response Rates & Patterns



	Black	Coloured	Asian	White	Total
Test Response					
Took Test	2829	534	18	116	3497
	23%	22%	7%	13%	22%
Test Level Written					
Level 1	214	84	0	4	302
	8%	16%	0%	3%	9%
Level 2	473	141	2	9	625
	17%	26%	11%	8%	18%
Level 3	1,109	210	5	34	1,358
	39%	39%	28%	29%	39%
Level 4	1,033	99	11	69	1,212
	36%	19%	61%	60%	34%
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	36%	19%	61%	60%	34%
Relative Difficulty					
Too Easy Test	376	145	2	14	668
	13%	27%	11%	12%	19%
Correct Test	1852	301	14	90	2258
	65%	56%	78%	78%	65%
Too Difficult Test	504	57	1	10	572
	18%	11%	5%	8%	16%
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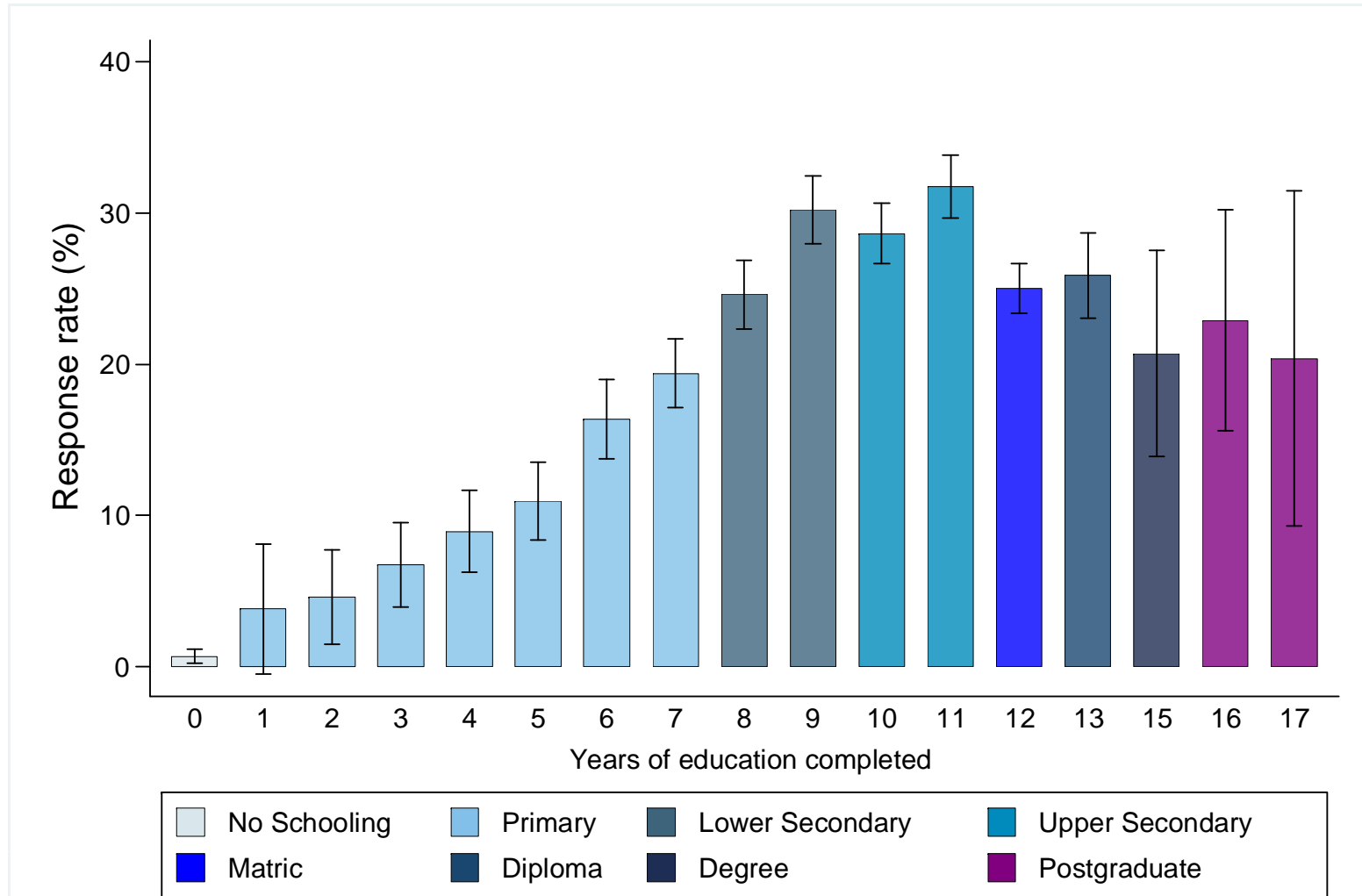


Descriptive Analysis – Education

A1



Numeracy Test Response Rates by Educational Attainment



A1

I don't see anything on age?

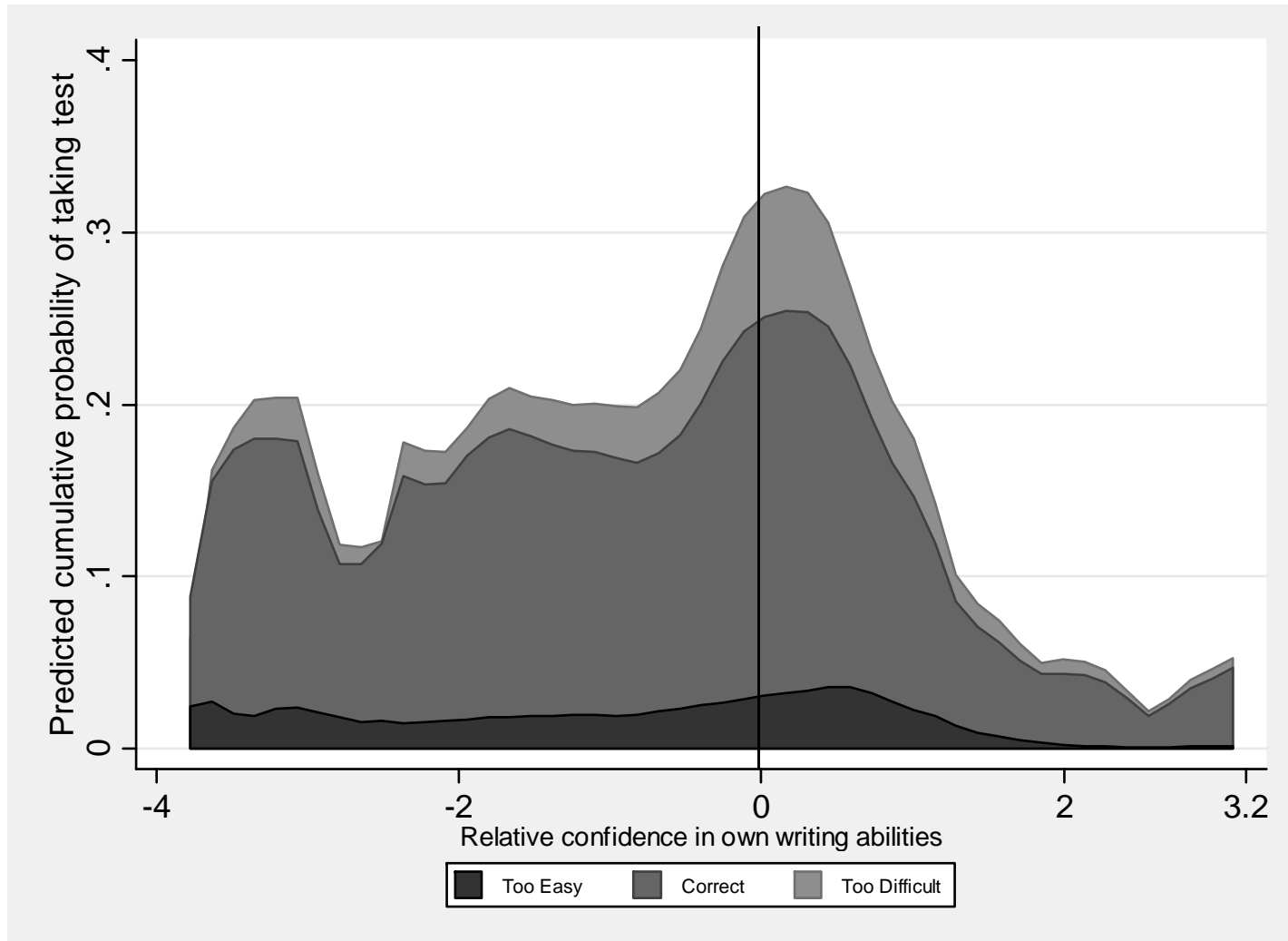
Author, 2011/04/01



Perceived Confidence



Predicted probability of taking the test by difficulty level and relative confidence in writing abilities



A2 Can you not show more of this? By education, age, emotional index, etc....

Rather than
Author, 2011/04/01



Sampling issues



- Additional selection issues
 - Those who provided **school quality data** were
 - More educated
 - Younger (as they had exited school more recently)
- All of these factors require corrections in the estimates of education returns
 - Instrumental variables (not successful)
 - Selection on explanatory variables can be corrected by IVs (Wooldridge, 2002)
 - Parental background (school quintiles) for (numeracy) school quality
 - Instruments themselves had few observations
 - Double Heckman estimates
 - Include an Inverse Mills Ratio for each of employment AND test selection processes
 - Full Information Maximum Likelihood – future work



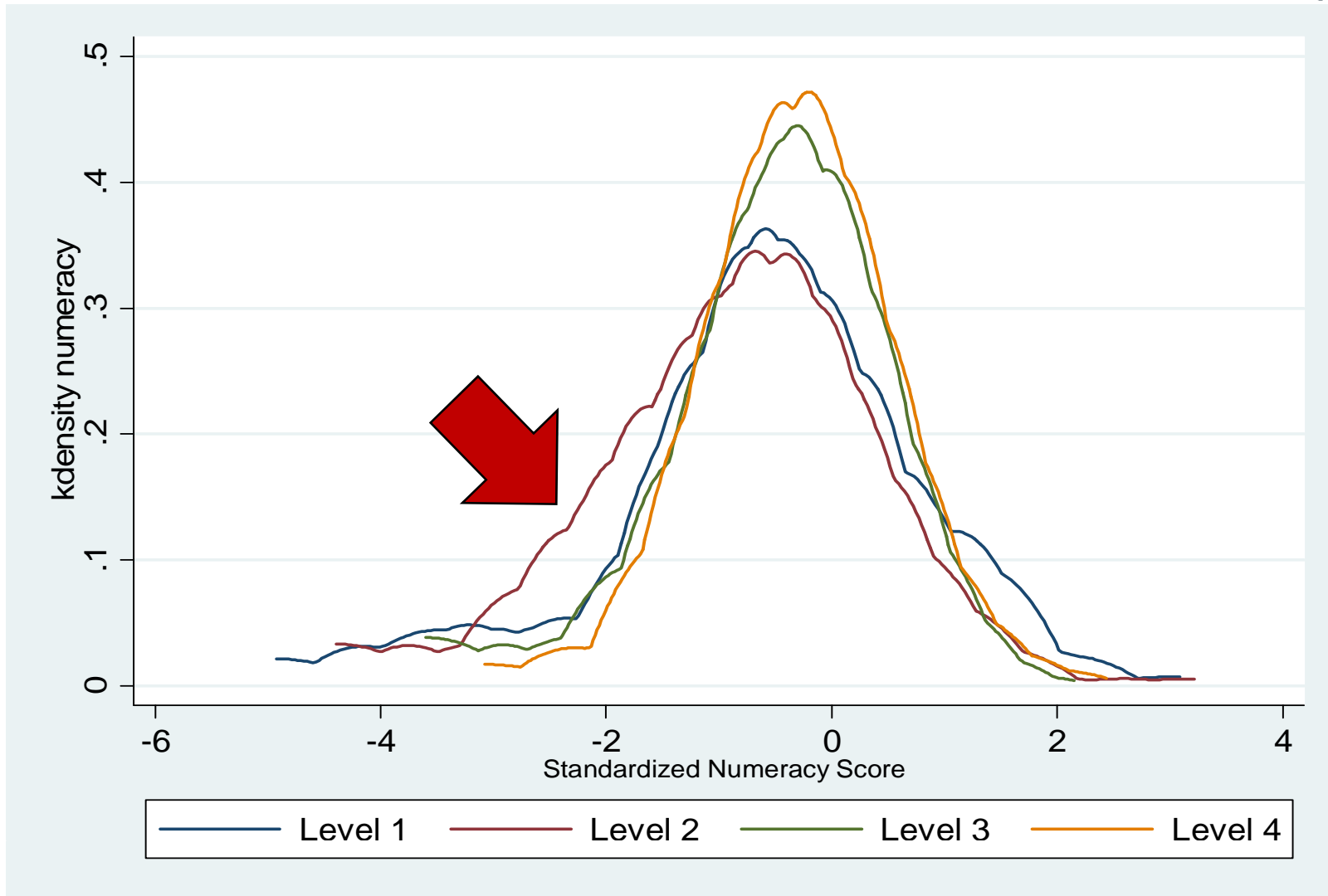
Calibration Issues – Test Choice and Scores



			Test Level Recommended					Total
			level 1	level 2	level 3	level 4	Unknown	
Test Level Taken by Respondent	level 1	Mean	-0.63449	-0.49596	0.102567	1.045667	-0.90322	-0.32057
		St. Dev.	1.42298	1.429694	1.207077	1.203556	2.045139	1.504114
		N	118	64	71	24	25	302
	level 2	Mean	-0.9329	-0.89124	-0.45712	-0.05074	-0.91098	-0.70003
		St. Dev.	0.983124	1.302227	1.30191	1.085839	1.049643	1.272745
		N	64	297	184	51	29	625
	level 3	Mean	-0.76142	-0.60878	-0.5339	-0.15658	-0.79331	-0.51561
		St. Dev.	1.067474	0.920386	1.017998	0.960671	1.23823	1.024462
		N	59	71	1045	143	40	1358
	level 4	Mean	-0.61752	-0.58422	-0.62424	-0.32549	-0.53207	-0.42286
		St. Dev.	0.655356	0.761062	0.82342	0.826269	1.019935	0.828703
		N	87	47	244	798	37	1213
Total	Mean	-0.71105	-0.76643	-0.50976	-0.25554	-0.76655	-0.49956	
	St. Dev.	1.113692	1.235209	1.046485	0.896367	1.334775	1.068245	
	N	328	479	1544	1016	131	3498	



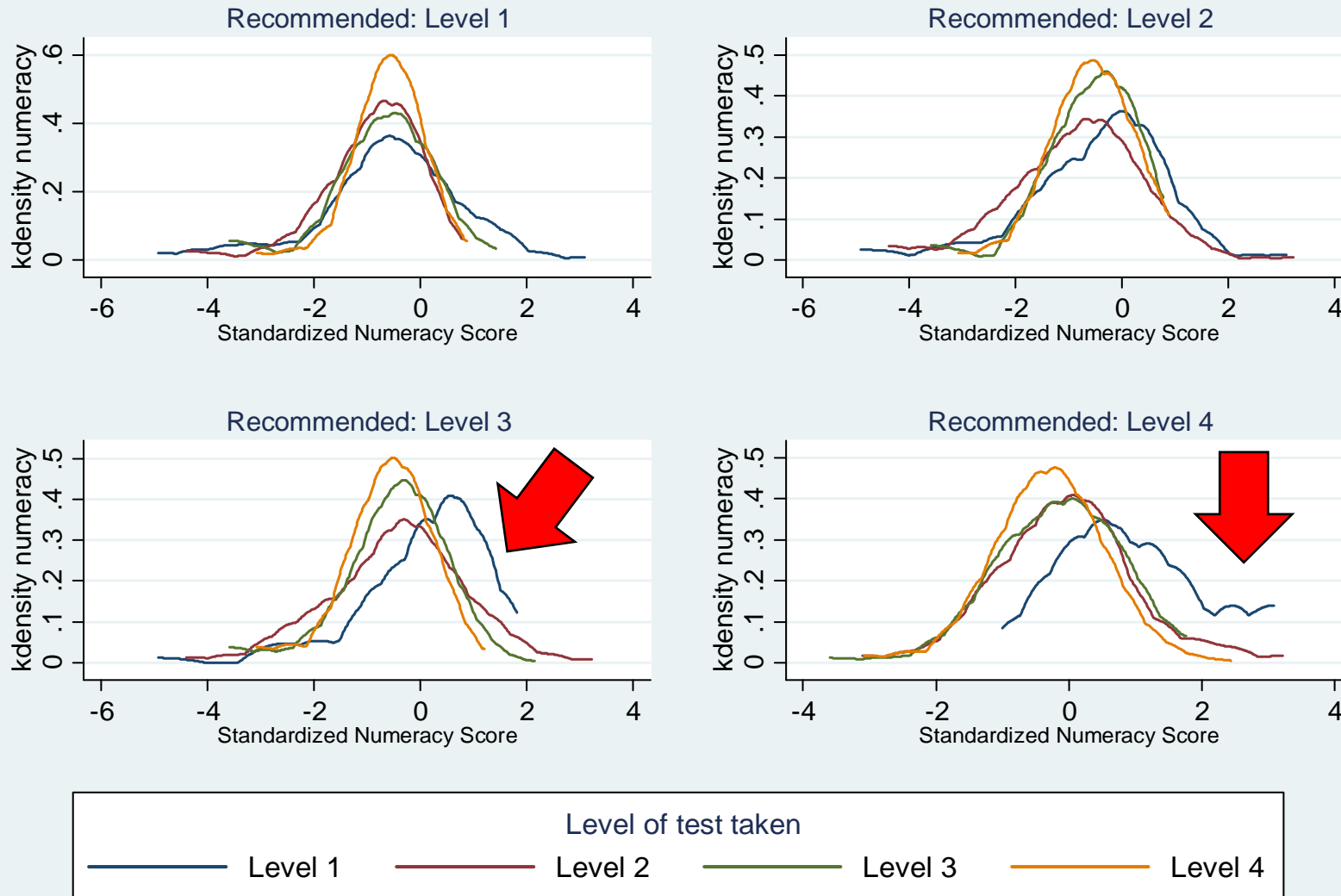
Test Scores of “Correct Test Writers”





Test Score Distributions – by revealed preference

by level actually taken

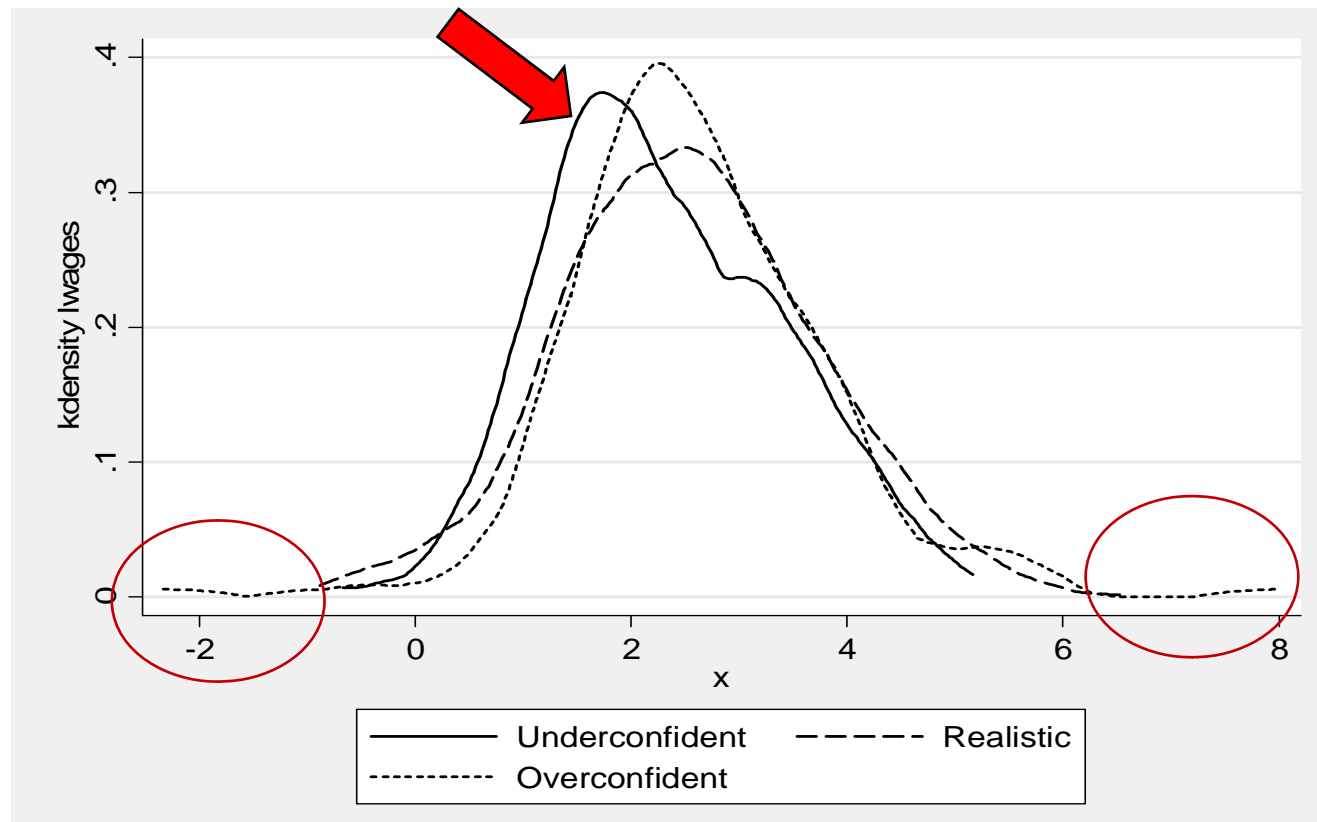




Wage returns to *revealed* confidence?



- Underconfident have lower wages on average
- Overconfident show extremes
 - Indication that perception must be backed up by actual ability – but confidence helps!





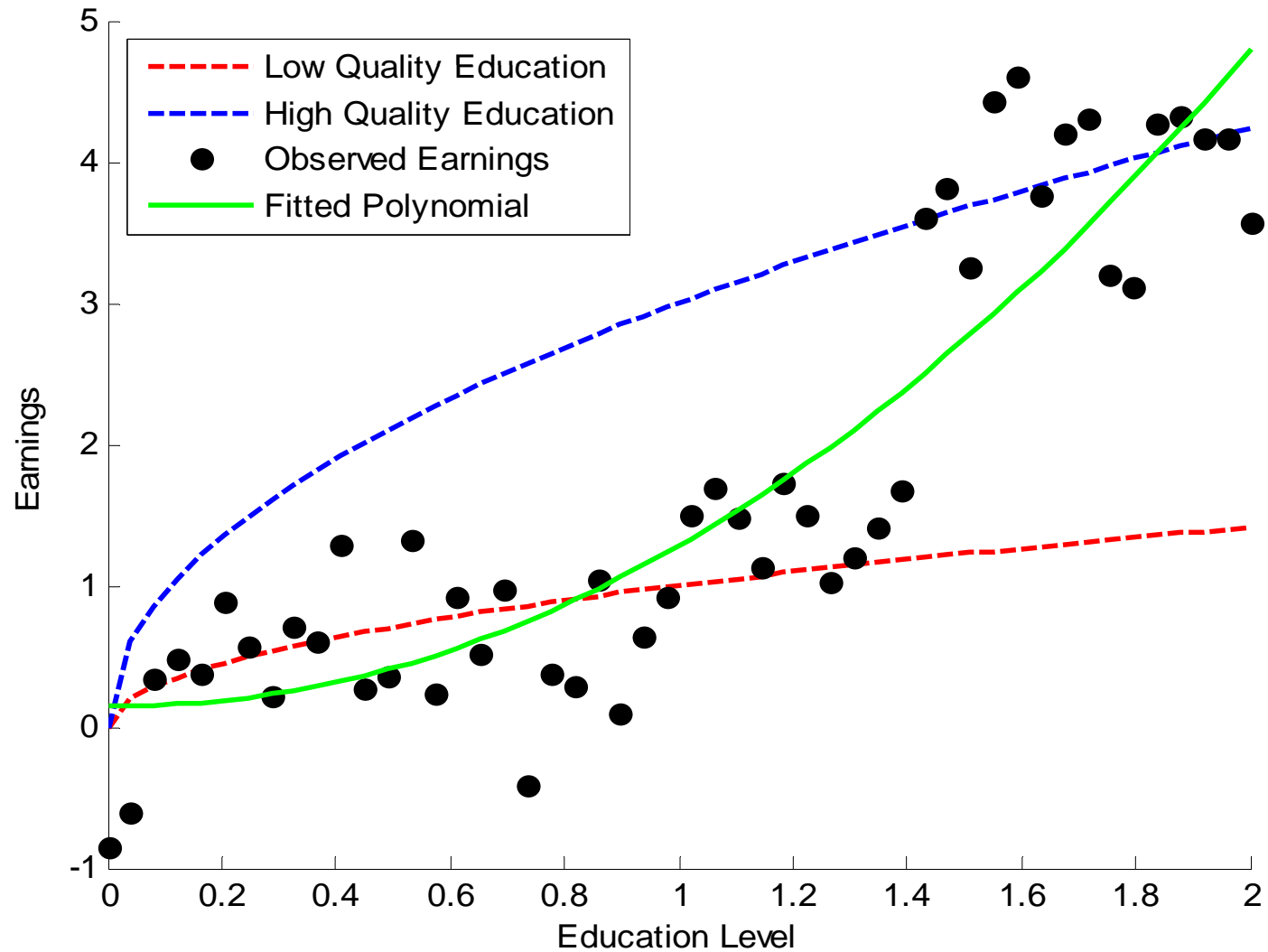
Wage Returns to Confidence?



Right Test	0.239**	0.081		0.385***	0.336***
Difficult Test	0.311**	0.145		0.542***	0.500***
Numeracy			0.269***	0.322***	0.287***
Numeracy²			0.023	0.043***	0.022
Right Test * Numeracy					0.058
Difficult Test * Numeracy					0.013
Right Test * Numeracy²					0.034
Difficult Test * Numeracy²					0.009
Controls	N	Y	N	N	N
R-squared	0.006	0.276	0.048	0.065	0.066
N	886	885	886	886	886

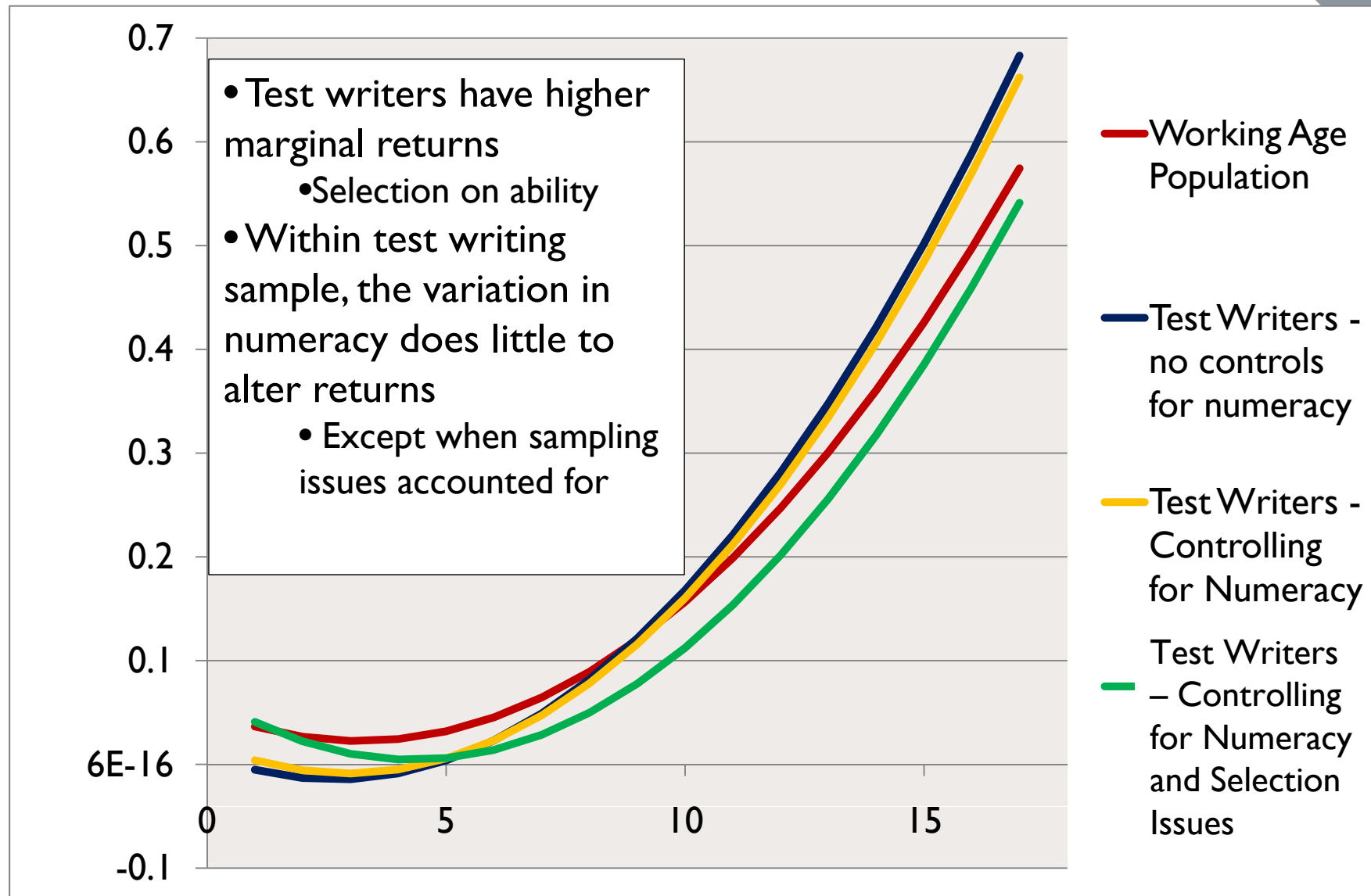


Convexity the result of quality?





Results – marginal returns to African schooling

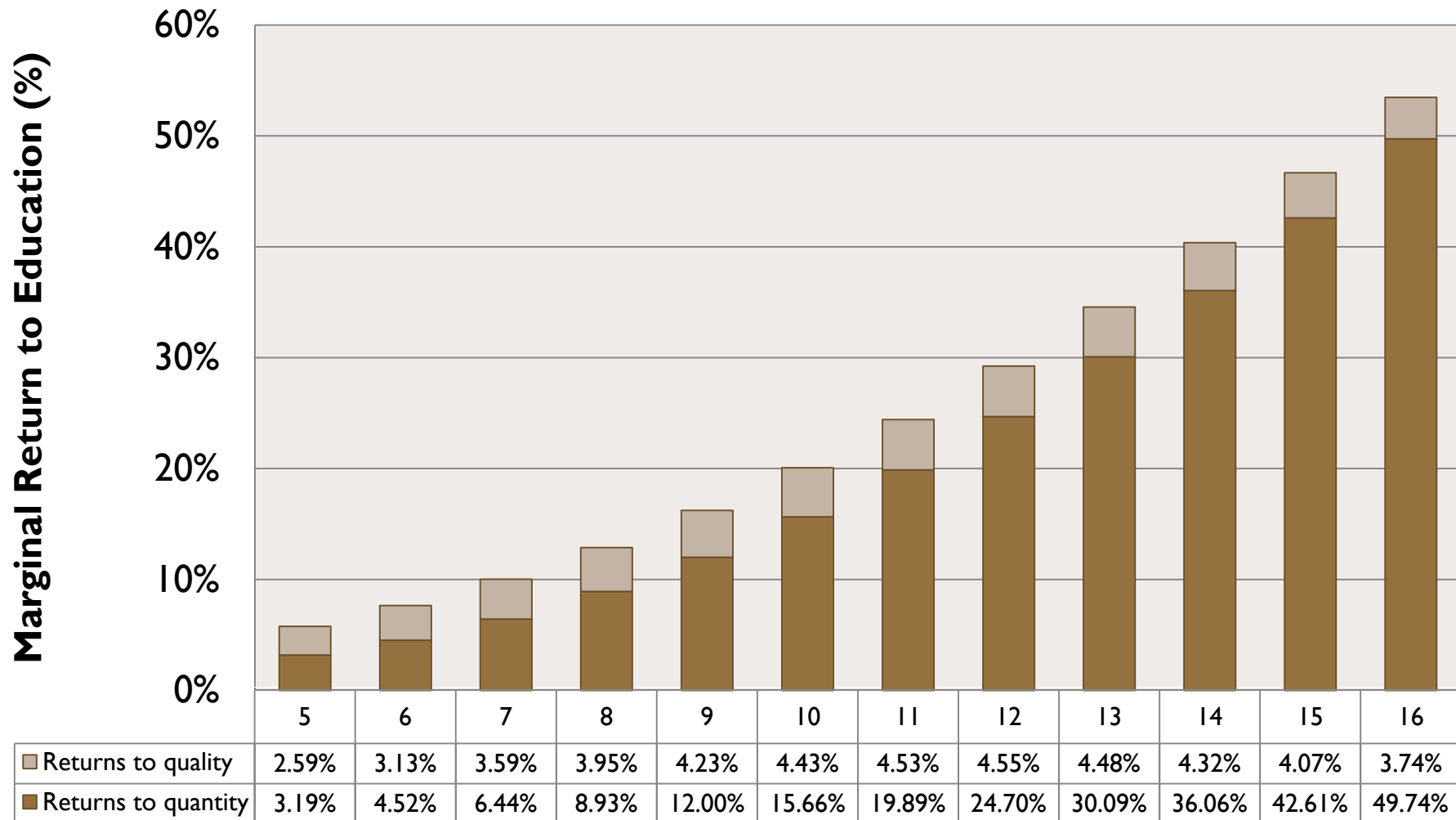




Results – returns to numeric skills

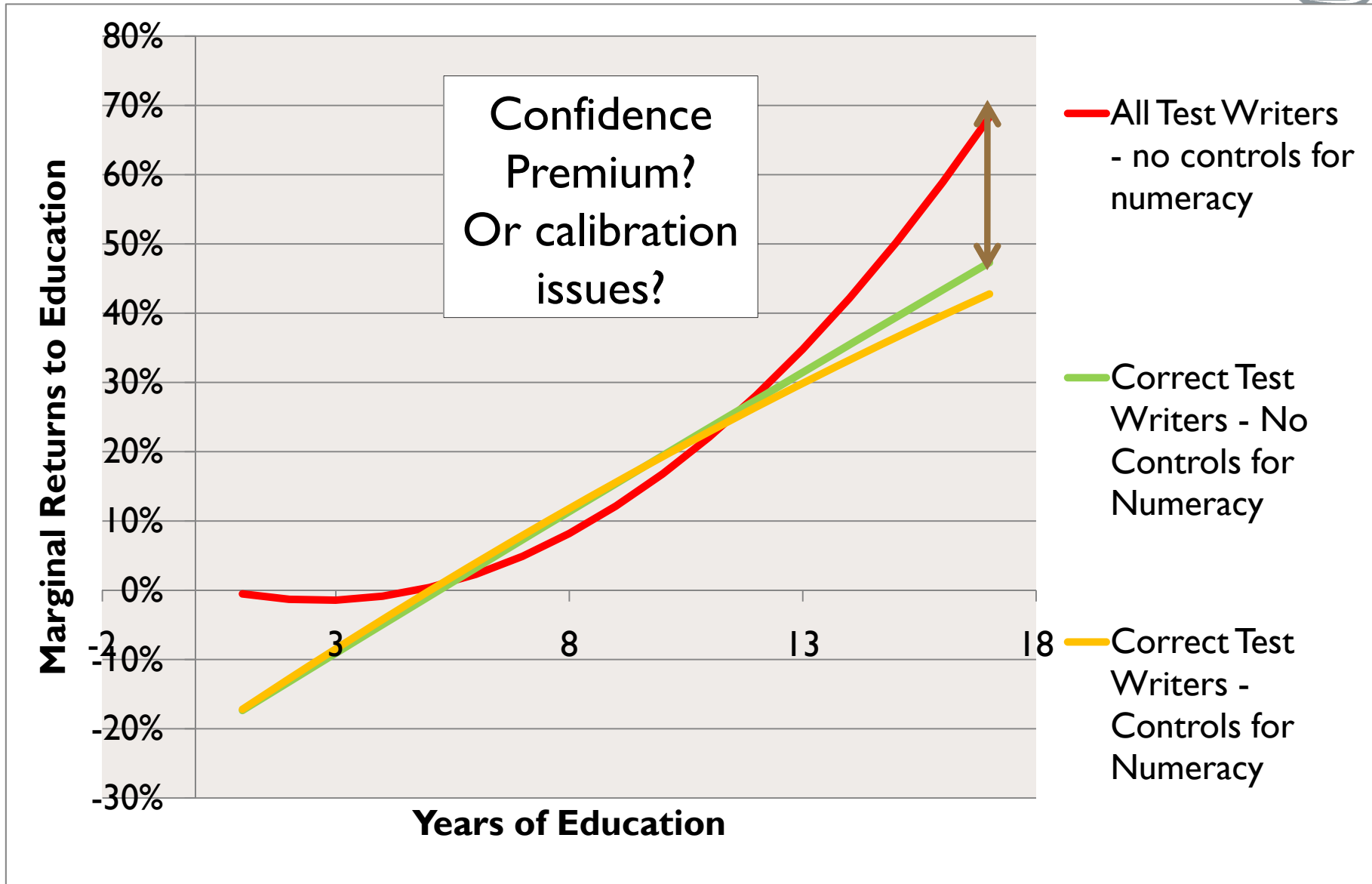


The Numeracy Score Component of Marginal Returns to Education – Black Population





Robustness checks - calibration





Results – returns to numeric skills



- Increasing marginal returns to an additional year of education, as usually found in South Africa
 - From about 5% at primary level to about 45% for a Bachelors degree
 - Reflective of the skills shortage
 - High return to scarce type of labour
- The numeric skills component ranges from 2.6% points to 4.5% points
 - But does not explain convex returns profile
 - Comparable to non-parametric estimates of ability bias by Mariotti & Meinecke (2009)
- Calibration of numeracy score seems fair
 - Those who wrote incorrect tests had higher returns at high levels of education
 - Complementarity of Confidence and Ability?



Racial Wage Gap



	(c)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
<i>Sample</i>	<i>Test Writers</i>			<i>With School Quality Data</i>				
<i>Estimator</i>	<i>Heckman</i>	<i>Heckman</i>	<i>Heckman</i>	<i>OLS</i>	<i>Heckman</i>	<i>Heckman</i>	<i>OLS</i>	<i>Heckman</i>
Numeracy		0.145**						
Numeracy²		0.037*						
School Quality						1.496***		-0.636
Coloured	-0.125	-0.162		0.061	0.069		-0.014	0.103
Asian	0.399	0.413		0.951***	1.005***		0.752**	1.097***
White	0.406**	0.330**		0.628***	0.689***		0.397***	0.799***
Constant	2.442**	2.452**	3.857**		2.442	3.085*		2.553*
Controls	Y	Y	Y	N	Y	Y	N	Y
Censored Observations	9753	9753	11889		11888	11889		
Uncensored Observations	922	922	1569	1569	1569	1569	1569	916
P-value of $H_0: \rho=0$	0.65	0.625	0.158		0.629	0.264		0.61

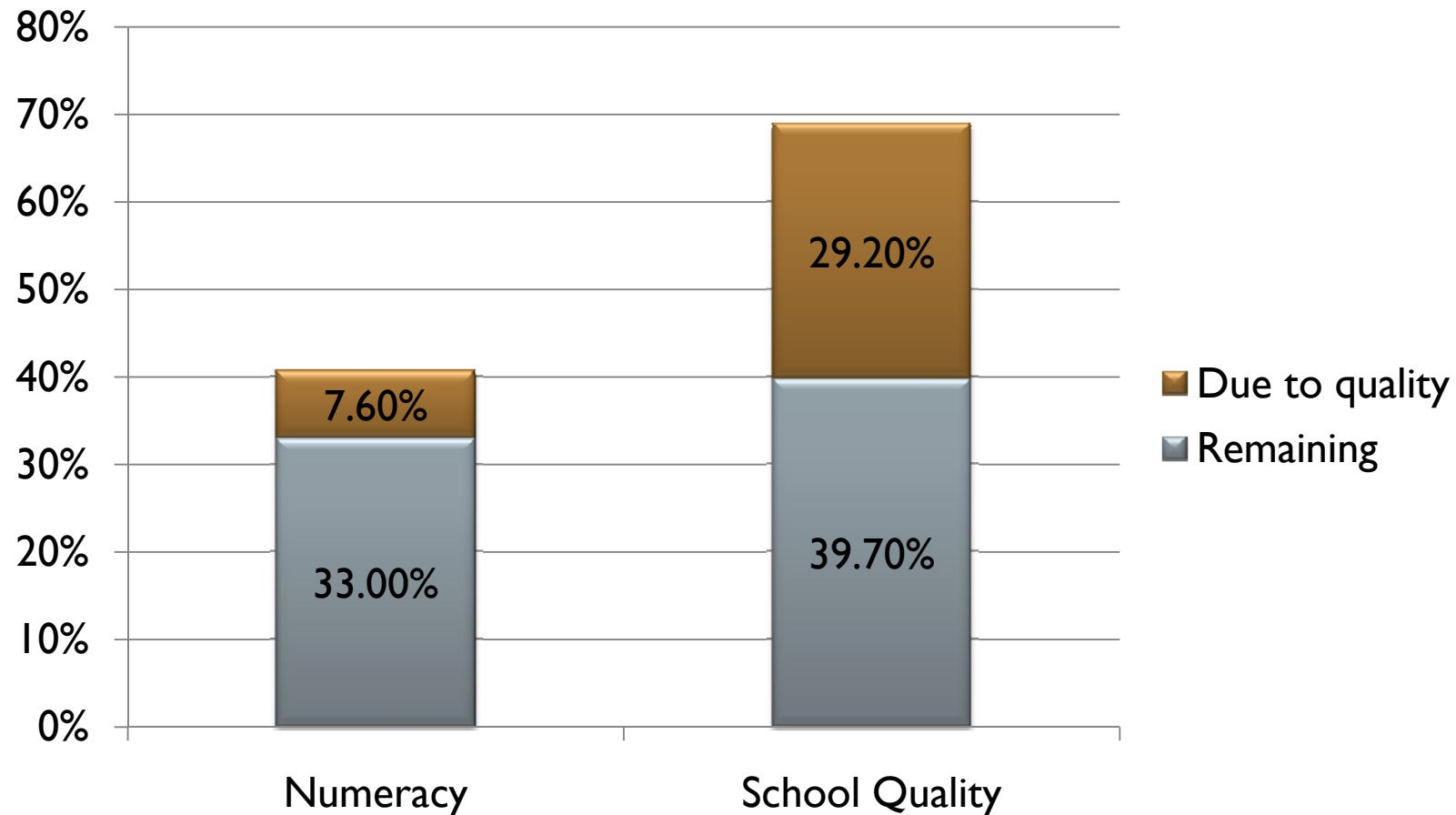
Controls: Cubic in Educ, Quadratic in Age, Gender



Results – labour market discrimination vs access to quality schools



- Unexplained white-black wage premia (discrimination) using different measures





Results - discrimination



- Different results due to different samples
- Reduction of wage premium from
 - 40.6% to 33% when controlling for numeric ability
 - A fall of 7.6 percentage points (or about 19% of the discrimination component)
 - 69% to 40% when controlling for historical school quality measures
 - A fall of 29 percentage points (or about 37% of the discrimination component)
- Separate “labour market discrimination” and “access to *quality* education” issues at play
 - Important in the context of “affirmative action policies” vs alleviation of “school quality differentials”



Conclusions



- High returns to higher levels of education are only partially explained by school quality
 - Though future work will capture this nuance a bit better
 - Interaction between attainment and quality
- Suggests that skills shortage is dominated by a lack of *quantity* of educated workers, though *quality* schooling nevertheless has an important indirect role to play
 - Bottleneck: *access* to tertiary (high return) education limited by quality of secondary education



Conclusions



- Racial discrimination (once controlling for educational *quantity* differences)
 - Has a large component that is explained by disparities in school quality
 - The extent differs by estimation strategy
 - Ranges from 20-74%
 - Upperbound is from work by Burger & van der Berg (2011) who simulate school quality distribution
 - Even the lowerbound is a high figure
 - Racial patterns of school outputs persist despite shifts in fiscal allocations
 - Suggests that at least some of the racial inequalities in wages is determined long before individuals enter the labour market
 - Therefore a combination of school and labour market policies required; affirmative action cannot solve many of the inequalities we observe in the labour market