

# Culture and school performance:

Evidence from second generation immigrants to Norway

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## Abstract

The current paper analyzes the influence of cultural background on students' school performance. We analyze the mathematics performance of second generation students to Norway, as measured by nationwide tests administered to all students in the 5th and 8th grades (2007-2011). Students' cultural background is captured by data on parents' country of origin.

The test scores differ significantly by country of origin, after controls for indicators of parents' human capital, school fixed effects and GDP per capita in the country of origin.

Culture is proxied by historical test scores in the country of ancestry, which exert a positive influence on math performance.

Finally, culture is measured by a survey instrument in the World Value Survey. Having a background in an achievement-oriented culture improves test results, while those coming from a traditional culture have weaker scores. The estimates for post-modern values are less precise. Some specifications suggest that a post-modern background yields better mathematics results.

These cultural effects are smaller when one of the parents has a native origin. Cultural background appears to have similar effects on boys and girls. These cultural effects do not differ significantly by the communities' ethnic densities.

# 1 Introduction

Similar to several Western countries, Norwegian students display mediocre scores on international tests such as PISA and TIMSS. Despite being one of the countries with highest per student educational expenditure, the most recent PISA and TIMSS reports indicate that Norwegian students score around the average in mathematics. These test results are published in a period where Western countries - including Norway - experience declining productivity and lower rates of economic growth. Governments have implemented a series of reforms to improve school quality, but with little effect on the achievement ranking. If ‘hard-wired’ cultural characteristics are a main determinant of educational performance, it might explain why reforms fail to improve results on achievement tests. The current paper provides empirical evidence suggesting that parents’ cultural background is an important determinant in children’s educational performance.

That cultural traits, school quality, and levels of human capital evolve together makes empirical testing challenging. Research designs based on cross-national data are unlikely to yield reliable estimates of cultural effects due to omitted variable bias and reverse causality. In line with Fernandez and Fogli (2009), we alternatively employ a so-called epidemiological approach. The key idea is to estimate cultural effects on school performance for second-generation immigrants from different cultures, but receive the same education and otherwise live in a similar environment in the new country. This research strategy allows us to isolate the effect of culture, and we find that parents’ cultural background is highly important to the school performance of their children.

The current paper relates to the literature on culture and economic outcomes. Cultural background affects women’s work participation (Fernandez and Fogli 2009;<sup>1</sup> Alesina and Giuliano 2010<sup>2</sup>), thriftiness (Guiso, Sapienza, and Zingales 2003), preferences for redistribution (Luttmer and Singhal 2011), interpersonal trust (for example, Knack and Keefer 1996), crime (Fisman and Miguel 2007), and the probability of becoming an entrepreneur (Guiso, Sapienza, and Zingales 2006). Other studies find that culture has a direct effect on rates of economic

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<sup>1</sup>Bratsberg and Terrell (2002) employ the epidemiological approach to analyze the effect of school resources on labor market outcomes. Using data on second generation immigrants, they find substantial variation in the returns to education depending on country of origin. Additional analyses include country-level data on school resources, measured as the ratio of pupils to teachers and education expenditures. After controlling for home country GDP per capita, language and other controls, more school resources in the country of origin appear to improve labour market performance in the US.

<sup>2</sup>Alesina and Giuliano (2010) study the impact of family ties on home production, labor force participation and geographic mobility. Using data from the World Value Survey to measure the strength of family ties, they find that strong ties increase women’s home production, but reduce work participation and mobility.

growth (Gratano et al. 1996; Barro and McCleary 2003; Becker and Woessmann 2009; Tabellini 2010; Algan and Cahuc 2010).

Furthermore, a handful of papers have challenged the common practice of equating the nation's human capital with average years of schooling (Hanushek and Kimko 2000; Hanushek and Woessmann 2008, 2012). These papers suggest that the quality of the workforce should be measured differently, for example by standardized tests of cognitive skills. These refined human capital indicators appear to have a large impact on rates of economic growth, even when controlling for years of schooling. Furthermore, the standard Mincer models of earnings determination employ years of schooling as indicator of human capital. Hanushek and Zhang (2009) argue that standardized achievement tests can be used to develop better measures of human capital. They report that quality-adjusted years of schooling have a larger, positive impact on wages. These results accentuate the importance of culture for student learning, which is a missing link in the literature.

The existing literature on school performance has little to offer on analyses of culture. We know of one exception only: Levels et al. (2008) analyze data on 7,400 immigrant students' performance in mathematics based on the 2003 PISA study. The analysis includes data on immigrants to 13 host countries (mostly Western-European countries) from 35 different countries of origin. This design allows for analyses of both country of origin and destination effects. Immigrants doing well in the country of origin tend to have high test scores in the new country as well. The analysis is limited by the small sample of immigrant students, particularly from the second generation. Importantly, the study does not explicitly address the students' cultural background.<sup>3</sup>

We analyze the test scores of second-generation immigrant students to Norway. We use individual level data on national tests conducted in the 5th and 8th grades, and annual data are available for nearly all students for the 2007-2011 period. These data include information on more than 30,000 students who are born in Norway of two immigrant parents, and, in addition, more than 50,000 students born in Norway one of whose parents is of immigrant background, and one a native of Norway. These data have been merged with register data on parents' country of ancestry, education levels and other characteristics.

We therefore look at the educational performance of students with parents

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<sup>3</sup>A related working paper uses data on immigrants to Australia. Jerrim (2014) focuses on second-generation East Asian immigrants, who appear to do extremely well as measured by international test scores. These immigrants are born and raised in Australia, and educated by the Australian school system. The data includes about 14,000 students, only 276 of which are second-generation immigrants of East Asian origin. Interestingly, these students obtain mathematics scores that are substantially higher than their native peers (about 100 PISA test points). Again, the study has a small sample of immigrants, and it addresses the influence of cultural background only indirectly.

who have arrived from all parts of the world, and which represent very different cultures. These parents and their offspring face a public school system with a standardized curriculum in an otherwise well-developed welfare state and highly egalitarian society.

A first indication that culture matters is that immigrant students from particular countries attain better test scores than natives attending the same school. Moreover, we measure culture in two ways, by a 'cultural proxy' measured by achievement tests in the country of origin (Fernandez and Fogli 2009; Hanushek and Woessmann 2009), and, alternatively, by means of a survey instrument in the World Value Survey (WVS). Both approaches yield highly significant effects of culture on test scores in mathematics. The WVS indicators show that an achievement-oriented culture improves school performance, traditional values lead to a lowering of performance, while post-materialist values have relatively modest - mostly positive - effects. These effects are robust to a number of controls, including a number of individual-level characteristics (parents' level of education and income levels), community-level variables (municipality and school fixed effects) and country-of-origin controls (GDP per capita). Importantly, we find smaller - but statistically significant effects - when one parent is native (Norwegian).

The ensuing section provides information on immigration, school system and the national tests. Subsequent sections describe the measurement of cultural indicators, outline the research design, and finally present the empirical results.

## **2 The institutional setting**

In this section, we provide a brief description of the school system, the national testing regime and key aspects of immigration and immigration policies.

### **2.1 The school system**

The institutional setting is a two-tier system comprising a central government, 19 county governments and 429 municipalities (2011). Education is a shared responsibility of central government, counties and municipalities. Primary and lower secondary education comprise a unified school system, and private school enrollment is extremely low. Schools operate on the basis of a fairly standardized curriculum defined by central government. Compulsory schooling starts at the age of six, and lasts for ten years.

Importantly, Norway has a system with compulsory education for children aged 6-16, nearly all schools are public schools and owned and operated by the municipalities. Primary and lower secondary education are subject to extensive national

regulation, including a standardized core curriculum defining a common learning content for all students. Students generally attend the closest primary and upper secondary school, which means that students from different cultural backgrounds work in the same schools and classrooms.

## 2.2 The school testing system

The national school testing system was established in 2004 as part of a national quality assessment system. Due to resistance from subgroups of students and the teachers' unions, the tests were withdrawn in 2005, but reintroduced in 2007. Data are available from 2007 and onwards. The aim of the test regime is to inform political decision-makers and school leaders on school results, possibly initiating action when needed. The national tests are standardized tests that test all pupils in mathematics, English, and reading at the beginning of grades 5 and 8, and in mathematics and reading in the beginning of grade 9. The tests in the 9th grade are identical to the 8th grade tests.

We analyze individual-level data on test scores in mathematics for 5th and 8th grade pupils from the years 2007 to 2011. The mathematics test results are particularly useful as the percentage of students exempted from the test is lowest in mathematics and English (about 1.9% in 2011) and higher in reading Norwegian (about 2.7% in 2011). These data have been combined with extensive data on school and parental characteristics, including parents with immigrant background. We focus on the performance of students with two immigrant parents as well as on students with one native and one immigrant parent. Some supplementary analyses include the performance of students with two native parents. We present descriptive statistics in Table 1.

## 2.3 Immigration policies

Immigration to Norway has been extensive over the last generation.<sup>4</sup> The number of immigrants in 1970 was about 60,000, and most of them came from other Western-European and Scandinavian countries. The current immigrant population consists of about 740,000 people (2014), and accounts for nearly 15 percent of the

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<sup>4</sup>Following Statistics Norway, the immigrant population has been defined as "*persons with two foreign-born parents, both of whom have immigrated to Norway and those born in Norway of two foreign-born parents*". Data on immigrant populations at the municipal and national levels derive from the national population register. For further documentation on definition and background statistics, see the relevant homepage of Statistics Norway: <http://www.ssb.no/en/innvandring-og-innvandrer/nokkeltall/immigration-and-immigrants>

total population. One group of immigrants are job seekers, mostly from the European Union /European Economic Area (EU/EEA). The other group is refugees including their family members. They have been granted permanent residence as asylum seekers and through family reunions.

The legal framework for the handling of asylum seekers and family reunions is at the national level. The UDI (the Norwegian Directorate of Immigration) processes applications for protection, family reunions and residence permits. When a refugee has been granted permanent residence, the Directorate of Integration and Diversity (IMDi) has responsibility for the resettlement of refugees. It submits requests to the municipalities, which decide whether they will accommodate the IMDi's settlement request. A matching grant scheme has been designed to induce municipalities to take responsibility for refugee settlements. Significant numbers relocate to new municipalities after a few years, and many move from the rural communities to larger population centers, particularly in the Oslo-fjord area.

### **3 The impact of culture**

Culture is a broad concept, and no "standard" definition is available.<sup>5</sup> For example, culture can be defined as "those customary beliefs and values that ethnic, religious and social groups transmit fairly unchanged from generation to generation" (Guiso, Sapienza and Zingales 2006:23). We conceptualize culture as those beliefs and values that motivate behavior (see for example, Polavieja 2015: 169). In the current context, it refers to students' motivation to improve their educational performance. The definition implies that cultural patterns originating in a more or less distant past can impact on current behavior. We assume a modest degree of cultural persistence, but only assume that parents' culture has an impact on their children when they are young.

#### **3.1 School performance in the country of ancestry**

In their seminal work, Fernandez and Fogli (2009) analyze fertility and work participation of second-generation immigrants to the U.S. They suggests the use of quantitative "cultural proxies," namely rates of female labor force participation and fertility in the immigrants' country of origin. Such quantitative indicators capture a mix of individual preferences and beliefs as well as institutional and economic characteristics of the country. As was indicated above, second-generation

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<sup>5</sup>Culture has been defined as "the integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations" (see Fernandez 2010: 2).

immigrants coming from different cultures bring their culture to the new country, while leaving other dimensions of the home country behind.

In a similar way, we exploit data on students school performance in the country of ancestry. We use an indicator of cognitive skills developed by Hanushek and Woessmann (2008). The indicator covers international tests in mathematics and science, and is available for 77 countries.<sup>6</sup> It is calculated as a simple average of multiple tests over a time period of 40 years up to 2003. This means that it captures skill levels for the entire population, which is appropriate in the current setting. We combine this test score with the dataset on immigrant students and their parents, which allows us to see whether these scores influence the performance of second-generation immigrants in the Norwegian school system.

### 3.2 Cultural values in the country of ancestry

Cultures differ in their valuation of education and development of cognitive skills. Following Gratano, Inglehart, and Leblang (1996) and Inglehart (1997), traditional cultures discourage individual ambitions in education and work. People yield to the family's preferences, and accept religious rules and traditional customs. In contrast, modern, materialistic cultures value individual achievement and accumulation of economic wealth. The family has less influence on children's life choices, while the state plays a major role in shaping choice opportunities. Finally, post-modern culture - often referred to as post-materialistic culture - is secular and individualistic. It emphasizes the individual's right to self-expression and to enjoy high quality of life in all spheres of life. People can realize their life projects and subjective well-being without excelling in school exams.

Gratano, Inglehart, and Leblang (1996) utilize data from the World Value Survey to measure of the extent to which people adhere to achievement and post-materialist values, and these indicators are used to estimate the cultural influences on economic growth. They develop an index with higher values on "thrift" and "determination," lower on "religious faith" and "obedience." Post-materialism is measured by Inglehart's post-materialism index. The analysis is based on a cross-section of 25 countries, and it indicates that achievement-oriented values promote economic growth, while post-material values cause a reduction in growth.<sup>7</sup>

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<sup>6</sup>Hanushek and Woessmann (2009) use the test score as a measure of workforce cognitive skills, and analyze the growth in GDP per capita in the 1960-2000 period. Controlling for initial levels of GDP and average years of schooling, the authors find that the skills indicator exerts a positive impact on economic growth.

<sup>7</sup>It can be argued that culture changes slowly from one generation to the next, and that people therefore have limited control over their cultural inheritance. Still, it is questionable whether

Doepke and Zilibotti (2014) develop a theory on the determinants of "parenting styles," and how these styles affect human capital accumulation. They outline three types parenting style, each corresponding to equilibria determined by degrees of occupational mobility and returns to human capital investments (c.f. Doepke and Zilibotti 2014, Figure 1). The parenting types are: a) the authoritarian style where parents constrain children's choices; b) the authoritative style where parents try to shape children's preferences; and c) the permissive style where children are allowed to make their own choices without authoritarian or authoritative influence. They propose that the authoritarian style dominates in traditional societies with low mobility. Children benefit from choosing the same occupation as their parents. Authoritative parenting implies that parents seek to form children's preferences in a way that motivates them to do well in school and have a successful working carrier. When parents instill a high degree of future-orientation in their children, they are more willing to take schooling seriously. This is beneficial in economies with high mobility and high returns to human capital investments. Permissive parenting is better in economies where mobility is high, but the returns to human capital investment are low. The Scandinavian countries are typical cases: they offer relatively modest returns to schooling due to a compressed wage structure and high tax rates. Parents therefore give children more independence and greater opportunities for self-realization. Doepke and Zilibotti correlate GDP per capita and income disparities (measured by a Gini index) with WVS measures of parenting style, and the cross-national data appear to support the suggested hypotheses.<sup>8</sup>

The concepts offered by Gratano-Inglehart-Leblang and Doepke-Zilibotti are clearly related. Yet the papers offer different stories as to why parenting behaviors differ. Inglehart (1997; 2008) builds on Maslow's theory of human needs ordering. Materialism has higher priority under scarcity, while post-materialist goals are more important when basic needs are satisfied.<sup>9</sup> Doepke and Zilibotti (2014) assume that parents respond to economic incentives<sup>10</sup>, and we would ex-

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cross-national analyses allow for causal inferences (see also Gratano et al. 1996: 613). Subsequent studies have used instrument variables such as ethnicity, religion or geographical distance to estimate causal effects (for a review, see [Gusio et. al 2006]; see also [Becker and Woessmann 2009]).

<sup>8</sup>This evidence is rather tentative since GDP per capita and income disparities are crude proxies for occupational mobility and returns to human capital investments. Falch and Fischer (2008) analyze the impact of public-sector size on student performance. They estimate models with country and year fixed effects for a period of 30 years, and find that increasing the size of government spending 10 percent reduces student achievement by 0.1 standard deviations.

<sup>9</sup>In the words of Inglehart (2008:131): "*It holds that postmaterialist values emerge as people come to place increasing emphasis on autonomy, self-expression and the quality of life. This shift is linked with changing existential conditions – above all, the change from growing up with the feeling that survival is precarious, to growing up with the feeling that survival can be taken for granted.*"

<sup>10</sup>For example, this is how they account for the decline in authoritarian parenting: "*We argue*



pect immigrants to respond swiftly to new economic environments (for empirical analyses, see [Giavazzi et al 2014]). Both models suggest that a traditional-authoritarian culture will curtail student ambitions and lower school effort. The modern-authoritative culture is more achievement-oriented and motivates school effort, while the post-modern/ post-materialist might reduces students drive to perform well in school as compared to the modern-authoritative culture.

Following these lines of research, we use data from the World Value Survey (WVS) to measure cultural background. The WVS-data derive from the integrated, longitudinal file covering six waves (1981-1984, 1989-1993, 1994-1999, 1999-2004, 2005-2006, 2008-2010,2010-2014). We use data from the four last waves, comprising nearly 300.000 respondents and 113 countries<sup>11</sup>.

Parents have a key role in developing their children's cognitive and noncognitive abilities[Flavio and Heckman 2007], and we therefore use data from a survey instrument that taps child-rearing values:

*Here is a list of qualities that children can be encouraged to learn at home.*

*Which, if any, do you consider to be especially important? Please choose up to five!*

The respondents had the following eleven characteristics to choose from: Independence, Hard work, Feeling of responsibility, Imagination, Tolerance and respect for other people, Thrift - saving money and things, Determination - perseverance, Religious faith, Unselfishness, Obedience and Self-expression. We use eighth of these dummy variables to define three composite indicators. The first is denoted *Achievement*, which is defined by hard work and thrift. It captures parents desire to have their children invest in the future. The second indicator is labeled *PostModern*, and is defined by independence, tolerance, imagination and determination. These characteristics indicate that parents prefer their children to make their own choices, and realize themselves. As a third dimension we define traditional cultural values, denoted *Traditional*, by religious faith and obedience.<sup>12</sup>

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*that the decline in authoritarian parenting is driven by rising economic returns to independence. The continuous increase in the division of labor in industrialized societies has greatly increased the number of occupations, making it less likely that a child's talents are well matched with the occupation of the parent."*(Doepke and Zilibotti 2014: 4)

<sup>11</sup>The World Values Survey (WVS) is a large set of national surveys that have been developed to understand how cultural change affect political and economic outcomes. A baseline questionnaire has been translated to the relevant languages, and administered to the national samples. Source: World Values Survey 1981-2014 Longitudinal Aggregate v.20150418. World Values Survey Association ([www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)). Aggregate File Producer: JDSystems, Madrid SPAIN. Version history:

- v2015-04-18: Current official release

<sup>12</sup>Some studies have found that religious beliefs correlate positively with economic growth

We therefore define the following indices (subscripts for respondents, years and countries suppressed):

$$Achievement = \frac{1}{2}(HardWork + Thrift)$$

$$PostModern = \frac{1}{4}(Independence + Tolerance + Imagination + Determination)$$

$$Traditional = \frac{1}{2}(Religiousfaith + Obedience)$$

The indices take values between 0 and 1, and indicate whether the country-populations ascribe to an achievement-oriented culture, a post-modern culture or a traditional culture. Using the WVS, these indices are estimated for respondents in all the country-surveys conducted after 1999, and we calculate the average scores for each country.<sup>13</sup>

In Figure 1, the upper panel shows binned scatterplots based on individual-level, within country variations, and the lower panel displays the average country positions on the three cultural dimensions. Following the factor analyses, the individual-level data show that the achievement index and post-modern indexes correlate negatively with traditional values, particularly the post-modern index. The post-modern values appear harder to reconcile with religious faith and obedience. Individual self-expression is likely to encounter opposition from parents and religious authorities, who seek to impose particular choices on the younger generation. Achievement values - working hard and saving money for the future - can promote both post-modern values and traditional values.

The country-level data yield similar, although considerably lower correlations<sup>14</sup>. The achievement-oriented values are essentially uncorrelated to traditional and post-modern values, and we observe a negative correlation between the indices for post-modernity and traditionalism.

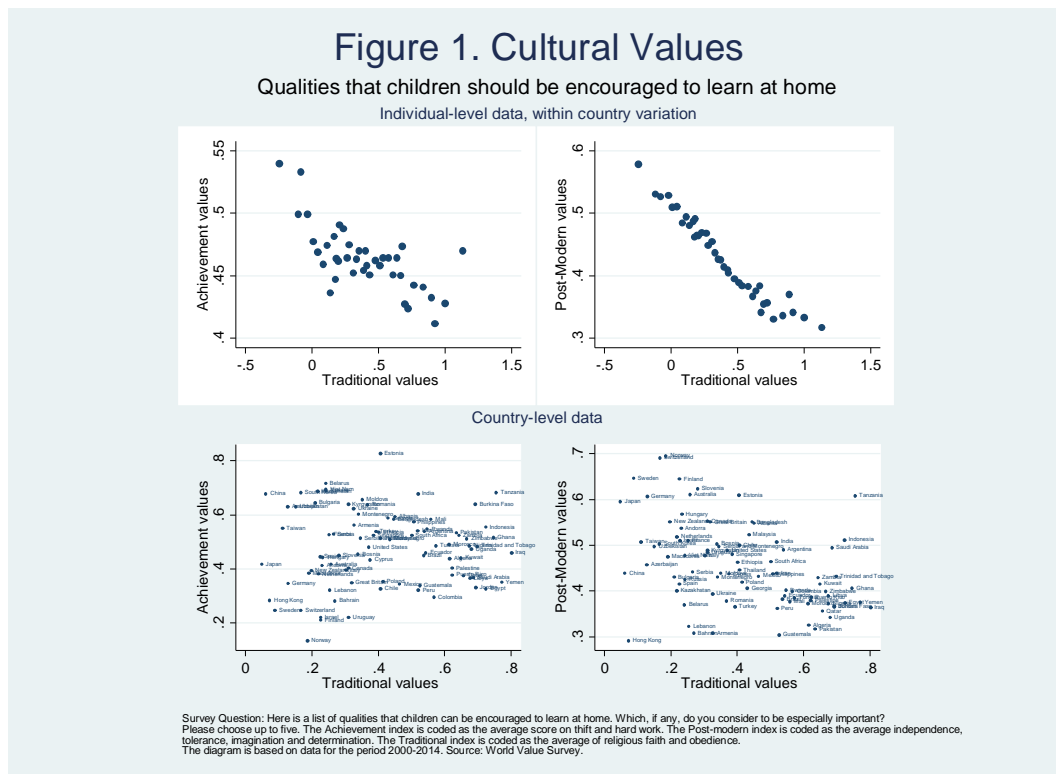
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(Barro and McCleary 2004). Other studies have analyzed differences between religions. For example, Becker and Woessman (2009) show that the Reformation caused higher levels of economic growth in Prussian municipalities, primarily through higher literacy rates. When controlling for levels of education, religion had no impact on rates of economic growth.

<sup>13</sup>In Appendix A, we present the results of a factor analysis using the average country scores of the eight indicators (n=98). The number of factors has been constrained to three, and the diagrams display the rotated factor loadings. Factor 1 can be interpreted as the traditional dimension; factor 2 as the post-modern dimension; and factor 3 as the achievement dimension. The upper-left diagram suggests a negative correlation between post-modern and traditional values, while achievement values are largely independent of the post-modern vs. traditional cultural dimension.

<sup>14</sup>The country-level bivariate correlations between the indexes are: Achievement-Post Modern: 0.11; Achievement-Traditional: 0.03; Post-Modern-Traditional: -0.44.

Figure 1 shows that the Scandinavian countries have low scores on Achievement and Traditional, and high on the Post-Modern index. The dominant values in most Western-European and English-speaking countries are close to average. Many Eastern-European and East-Asian countries have high scores on achievement values, but low on traditional and post-modern values. Several countries in Africa and the Middle East have high scores on traditional values and low on post-modern and achievement values.



## 4 Empirical strategy

The main idea in the "epidemiological approach" is that immigrants bring with them different cultures from their country of origin, and parents transmit their values and beliefs to the next generation. Since the immigrants face similar economic, institutional and other conditions in their new homeland, analyses of immigrants allow us to isolate the impact of culture on a number of social and economic outcomes. In this context, the standardized Norwegian school system is a useful testing ground.

Let  $Y_{ikct}$  be the students test score in mathematics,  $i$  denotes student,  $k$  municipality,  $c$  country of origin, and  $t$  is the relevant year. We rescale the original test scores so the response variable has a mean of zero and a standard deviation of one. The standardized variables are calculated for each year using data on all students, including non-immigrant students.

A student's school achievement (measured by test scores) results from parents' early and later childhood investments in cognitive and non-cognitive skills [Flavio and Heckman 2007], subsequent or concurrent investments in pre-school institutions [Havnes and Mogstad 2011], and finally investments made by parents, teachers and the teenager during school years. The abilities created in the first years of life are highly correlated with parents' socio-economic status and human capital. The model therefore includes a vector  $\mathbf{X}$  which measures parental characteristics, the most important being parents' level of formal education.<sup>15</sup>

Moreover, the quality of different countries' educational systems differs considerably, which means that immigrants with similar levels of formal education can have different skill levels. For example, Hanushek and Woessmann (2012) analyze wage levels of immigrants to the U.S. with schooling from the U.S. versus the country of origin. This design eliminates the influence of cultural background by comparing immigrants from the same home country, thereby facilitating the causal effects of school systems on wages. The design applied in the current paper controls for parents' human capital using education and income level. Hence, we would expect immigrants coming from better school systems to do better in the Norwegian labor market, and we therefore include income per capita as a proxy for school quality in the homeland (also similar to Fernandez and Fogli 2009).<sup>16</sup>

We also include GDP per capita in the country of origin as a control variable.<sup>17</sup> High-income countries can provide better school facilities and higher-quality teaching, which are likely to improve test results. And, at the same time, economic

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<sup>15</sup>Levels of education were measured on an eight point scale, using the International Standard Classification of Education (ISCED).

<sup>16</sup>Parents can exert cultural influence as role models for their children. For example, a daughter may emulate her mother's lifestyle by considering school work less important since she is not intending to pursue a career outside the home. This means that parents' income levels may capture a cultural component as well. In supplementary analyses (NOT PRESENTED), we test whether the baseline specification controls for 'too much.' We also estimate regressions with no controls for income levels.

<sup>17</sup>Another potential confounder is the "linguistic distance" to the Norwegian language. If parents speak their native language at home, and the distance to Norwegian is large, it could impair students' classroom learning. In a robustness test (NOT PRESENTED), we include the percentage of the population that understands English in the country of origin. Most natives speak and understand English, and the English language is relatively close to Norwegian. Immigrants who speak English as a first or second language will not have problems learning Norwegian. As a control variable, we include percentage of population speaking English.

development impacts on cultural values and beliefs [Barro and McCleary 2003] [Inglehart 2008] [Doepke and Zilibotti 2008]. Yet, culture can also affect levels of economic development, possibly generating a downward bias in estimates [Gratano1996]. Following papers employing a similar research design [Alesina and Giuliano 2014] [Fernandez and Fogli 2009] [Fishman and Miguel 2007] [Gratano1996] [Zhan 2015], we estimate models with and without GDP per capita.

Finally, the model comprises year ( $\lambda_t$ ) and municipality ( $\theta_k$ ) fixed effects, and in additional specifications we include school fixed effects.<sup>18</sup> These are likely to capture at least two important confounders. One is human capital embedded in the neighborhood, which impacts on students school performance. This could either be due to the ethnic network of the neighborhood, or levels of human capital in the native population [Borjas 1995]. Another is immigrants' choice of residence. Ambitious immigrant parents may choose to live in municipalities with high-quality schools, and may buy housing within the catchment area of particular schools. This could be seen as an effect of parental culture on children's school performance, possibly indicating that it should not be controlled for.

We start out with an analysis where we estimate differences in test scores by parental country fixed effects ( $\alpha_c$ ), controlling for the relevant covariates, municipality and year fixed effects:

$$Y_{ikct} = \alpha_c + \mathbf{X}_{ikct}\boldsymbol{\mu} + \delta GDP_c + \theta_k + \lambda_t + \epsilon_{ikct}$$

The hypothesis is that  $\alpha_c \neq 0, c = 1, 2, \dots$ . We replace country fixed effects with explicit measures of culture based on parents' country of origin, the assumption being that the country of origin cultures influence student behavior in Norway. Since we do not measure the students' values and beliefs, this approach can be understood as a reduced-form model.

The first of these models relies on the Hanushek-Woessmann indicator as a "cultural proxy" ( $Testscore_c$ ). Note that all immigrant students with parents coming from country  $c$  are assigned the same test score.

$$Y_{ikct} = \beta Testscore_c + \mathbf{X}_{ikct}\boldsymbol{\nu} + \varphi GDP_c + \theta_k + \lambda_t + \epsilon_{ikct}$$

We therefore test the hypothesis is that  $\beta > 0$ .

Next, we estimate the model where culture is measured by data from the World Value Survey.

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<sup>18</sup>In models with municipality fixed effects, we include explicit measures of school characteristics, number of students in school, share of boys, parents' average education level, and share of students with immigrant parents. Note that subscript for schools are skipped in the regression equations below.

$$Y_{ikct} = \gamma_1 Achievement_c + \gamma_2 PostModern_c + \gamma_3 Traditional_c + \mathbf{X}_{ikct} \phi + \varsigma GDP_c + \theta_k + \lambda_t + \epsilon_{ikct}$$

The key hypothesis is  $\gamma_1 > 0$ . Having post-modern values can improve learning since they encourage students to think for themselves, keep an open mind, and realize their individual potential. This leads to the hypothesis that  $\gamma_2 > 0$ : If parenting is "permissive," it could alternatively induce children to explore more joyful types of self-realization than mathematics, such as social or creative activities. This would imply that  $\gamma_2 \leq 0$ . Finally, traditional cultures lead children to obey parents and religious authorities, and we expect traditional values to cause a lower score on the mathematics test. This means that  $\gamma_3 < 0$ .

Immigrants who came to Norway as refugees (mostly from Asian, African and Latin American countries) and labor migrants (mostly from Europe) sometimes arrived as couples, or found a spouse from their country of origin. Norway also comprises a large share of families with one native and one immigrant parent. In the both cases, cultural values are coded by data on the immigrants' country of origin. We therefore compare the cultural effects across the two family types, expecting a Norwegian parent to attenuate the effects. The selection of immigrants to these two groups are different. If the cultural indicators impact in the same direction, it suggests that selection is not a major concern.

A dataset comprising these Hanushek-Woessmann and World Value Survey indicators is merged with the individual-level dataset on immigrants to Norway, containing information on parents' country of origin.

One concern is whether teachers' expectations or teacher sorting into classes with different types of minority student might drive the estimated effects. We believe school fixed effects ameliorate this worry. Students from different cultures usually attend the same classes, which limits teachers' capacity to express culture-specific expectations. If teachers have different expectations to students from different cultures, these expectations are probably generated by personal experience. Teacher expectations can therefore be a consequence of observed cultural effects.

Another concern is whether different types of native student are sorted into schools comprising different categories of immigrant student. Ambitious parents opt out of neighborhoods with underperforming schools, and settle in areas where published tests scores are higher [Black 1999] [Fiva and Kirkebøen 2011]. One might therefore wonder whether peer effects account for correlations between students' cultural background and school performance. Yet again, this requires an explanation as to why particular schools obtain weak test results. If differences between schools are caused by cultural factors, sorting can be considered an indirect effect of students' cultural background.

## 5 Empirical results

We present three sets of empirical analyses, first the analyses of parental country-of-origin fixed effects, next the analyses of school performance in the country of ancestry as measured by the Hanushek-Woessmann indicator, and finally, the influence of the culture as measured by the WVS indicators.

Table 1. Descriptive statistics

	One immigrant parent			Both immigrant parents		
	N	Mean	SD	N	Mean	SD
<i>Individual-level variables:</i>						
Parity	50,377	1.830	0.992	28,269	2.209	1.320
Number of siblings	49,649	1.356	1.002	28,028	1.922	1.219
Father's income	46,541	51.16	51.21	27,129	32.06	28.24
Mother's income	49,656	29.88	23.22	28,032	17.76	18.37
Father's Education	43,385	4.624	1.799	24,048	3.777	1.830
Mother's Education	47,434	4.728	1.743	23,455	3.483	1.762
Gender (Share of boys)	50,399	0.488	0.500	28,269	0.489	0.500
<i>School-level variables:</i>						
Number of students at school	49,642	341.1	144.3	27,970	385.5	132.2
Share of immigrants at school	50,399	0.109	0.130	28,269	0.313	0.245
Average level of parental education at school	50,399	4.491	0.631	28,269	4.197	0.582
Share of boys at the grade level	31,987	0.512	0.107	18,529	0.509	0.0853
<i>Country-of-origin level variables:</i>						
GDP per capita 2000 (PPP)	49,497	20,574	11,793	26,256	6,105	6,802
Share of English speaking in home country	44,827	64.75	31.40	19,362	31.67	22.86
Number of imm. from home country in mun.	49,980	44.28	56.25	28,188	108.7	108.9
Achievement index	38,269	0.401	0.136	20,537	0.530	0.112
Post-Modern index	38,269	0.522	0.0993	20,537	0.418	0.0821
Traditional index	38,269	0.299	0.176	20,537	0.456	0.192
Hanushek-Woessmann Cognitive skills	44,454	4.742	0.470	10,431	4.239	0.505
<i>Response variables:</i>						
Standardized achievement in Math 5th grade	24,752	-0.230	0.800	14,084	-0.504	0.807
Standardized achievement in Math 8th grade	22,926	0.317	1.114	12,352	-0.0244	1.073

Notes. The descriptive statistics refer to all students in grades 5 and 8 in the years 2007-2011. The mathematics test scores have been rescaled to a mean of zero and a standard deviation of one using the entire sample including native students. Parity refers to the birth number among the siblings. Income is measured at the pre-tax monthly wage level (NOK, current prices). Levels of education are measured as follows: 0: No education and pre-school education; 1: Primary education; 2: Lower secondary education; 3 Upper secondary education, basic education; 4: Upper secondary, final year; 5: Post-secondary non-tertiary education; 6: First stage of tertiary education, undergraduate level; 7: First stage of tertiary education, graduate level; 8: Second stage of tertiary education (postgraduate education). The Hanushek-Woessmann indicator of cognitive skills is taken from Hanushek and Woessmann (2008). GDP per capita is measured in PPP in 2010, and the data comes from the database of the World Bank. Number of immigrants



from the parents country of origin is measured per 10.000 inhabitants at the municipality level.

The descriptive table shows that immigrant students with one immigrant parent perform better than those with two immigrant parents. Both groups perform lower than the average score in the 5th grade. In the 8th grade, students with one immigrant parent do better than the average while the others cluster round the average. Many of the two-immigrant parents arrived as asylum seekers/refugees or entered the family reunion scheme, often from conflict-ridden and poor countries. The descriptives show that this is not the case for mixed native-immigrant couples. Students with one immigrant parent have relatively resource-rich parents, both in terms of income and education. They also attend schools with more educated parents, and relatively small shares of immigrant students. Their immigrant parent came from countries with relatively high levels of GDP per capita, large English-speaking populations, and they live in municipalities with fewer immigrants from their country of origin. Finally, they come from countries with high scores on the Hanushek-Woessmann index, high values on the Post-Modern index and marginally higher values on the Achievement index.

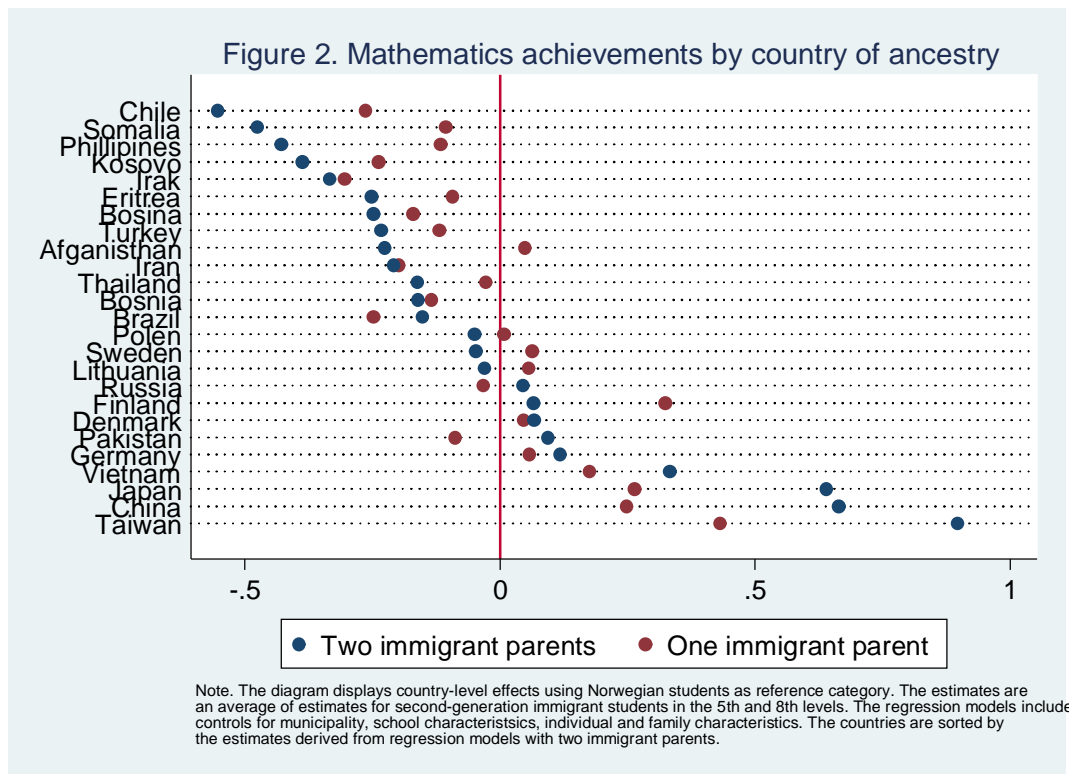
## 5.1 The impact of parents' country-of-origin

In Figure 2, we display estimates for country fixed effects, using the mathematics scores for Norwegian students as reference. The diagram presents estimates for countries with relatively high numbers of second-generation immigrant students, and we also include countries which display substantial deviations from the natives' achievement level. The pattern is similar for the 5th and 8th grade levels. The diagram displays average effects for students with one and two immigrant parents, which are marked with red and blue dots.

As was to be expected, students with backgrounds in the other Scandinavian countries and Germany obtain scores that are comparable to those of the native students. Students with parents coming from the East-Asian countries - Vietnam, Japan, China and Taiwan - perform extremely well. The East-Asian students achieve test scores that are more than half a standard deviation higher than native students. Those with parents from other parts of Asia (Philippines, Iraq, Afghanistan, Thailand), Latin America (Chile, Brazil), Africa (Somalia, Eritrea), Middle East (Iran, Iraq), former Yugoslavia (Kosovo, Bosnia-Herzegovina), and former Soviet-Union (Russia, Lithuania) score lower than the Norwegian students. It is perhaps somewhat surprising that students with parents from Pakistan obtain results similar to native students.

Moreover, the country effects tend to be smaller (in absolute values) for students with one immigrant parent than for those with two immigrant parents from

the same country. The native parent appears to dissipate part of the cultural effect induced by the spouse.



### 5.1.1 The impact of school performance in the parents' country of ancestry

The diagram above shows that parents' country of origin has important effects on the educational performance of their children. Yet, the dummy variable approach does not explain why. Following Fernandez and Fogli (2009), Table 2 displays the effects of educational performance in the homecountry using the Hanushek-Woessmann (H-W) indicator. All models are estimated on individual-level data with standard errors clustered on country of origin.

Table 2. Educational performance in the country of origin

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Both parents immigrants			One immigrant parent		
<i>Fifth grade:</i>						
Hanushek-Woessmann indicator	0.379*** (0.125)	0.484*** (0.137)	0.476*** (0.126)	0.194*** (0.0291)	0.238*** (0.0437)	0.239*** (0.0448)
Observations	4,865	4,861	4,914	19,533	19,477	19,820
R-squared	0.261	0.268	0.410	0.236	0.236	0.321
<i>Eighth grade:</i>						
Hanushek-Woessmann indicator	0.446*** (0.128)	0.581*** (0.149)	0.560*** (0.137)	0.188*** (0.0305)	0.240*** (0.0506)	0.235*** (0.0531)
Observations	4,185	4,179	4,282	18,007	17,945	18,318
R-squared	0.307	0.315	0.377	0.284	0.284	0.310
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	No	Yes	Yes	No
School FE	No	No	Yes	No	No	Yes
School controls	Yes	Yes	No	Yes	Yes	No
Individual and family controls	Yes	Yes	Yes	Yes	Yes	Yes
Country level controls	No	Yes	Yes	No	Yes	Yes

The standard errors (in parentheses) are clustered at the country of origin.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Notes. For description of individual-level, school-level and country-level controls, see Table 1.

Models (1)-(3) display regression results for the sample of students with two immigrant parents, and (4)-(6) students with one immigrant parent. The H-W indicator has a consistently positive and highly significant effect in all models. The estimates are comparable for the two grade levels. When GDP per capita (measured in PPP) is added to the model (see (2) and (5)), the H-W indicator yields a somewhat larger, positive effect. Finally, the addition of school fixed effects (3,6) does not affect the estimates much, suggesting that school selection plays no important role.

The estimates indicate that the cultural proxy is important. Consider the case of two immigrant parents with a child in the 5th grade. A positive shift in the H-W indicator of one standard deviation ( $=0.47$ )<sup>19</sup> corresponds to comparing an average student with parents from Denmark (or Norway) with a comparable student from Korea. The estimates in Table 1, column (3) suggests the shift would cause school

<sup>19</sup>This standard deviation has been calculated using the individual-level student data. The standard deviation based on cross-national data is somewhat larger, 0,57.

performance to increase by 0.21 standard deviations. In the case of one immigrant parent, a similar shift would lead to an increase of 0.09 standard deviations (Table 1, column (6)).

## **5.2 The impact of culture in the parents' country of origin**

In Table 3, we present corresponding models for mathematics test results for students in the the 5th and 8th grade, using the two cultural indicators from WVS, the Achievement index and the Post-Modern index. Students with two native parents are not included in the ensuing analyses.

Table 3. The impact of culture on school performance

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Both parents immigrants			One immigrant parent		
Fifth grade:						
Achievement index	1.014*** (0.254)	0.973*** (0.357)	1.010*** (0.319)	0.338*** (0.108)	0.405*** (0.107)	0.345*** (0.113)
Post-Modern index	0.487 (0.508)	0.496 (0.501)	0.479 (0.441)	0.449** (0.203)	0.397** (0.194)	0.394* (0.212)
Traditional index	-0.615** (0.239)	-0.616*** (0.227)	-0.605*** (0.203)	-0.403*** (0.0844)	-0.353*** (0.0889)	-0.329*** (0.0954)
Observations	9,531	9,527	9,619	16,938	16,882	17,191
R-squared	0.221	0.222	0.317	0.238	0.238	0.328
Eighth grade:						
Achievement index	1.384*** (0.239)	1.339*** (0.341)	1.411*** (0.344)	0.365** (0.143)	0.391** (0.151)	0.379** (0.158)
Post-Modern index	-0.276 (0.521)	-0.290 (0.502)	-0.375 (0.499)	0.450* (0.250)	0.400 (0.254)	0.433* (0.256)
Traditional index	-0.876*** (0.233)	-0.884*** (0.225)	-0.873*** (0.223)	-0.482*** (0.104)	-0.457*** (0.100)	-0.436*** (0.100)
Observations	8,524	8,518	8,685	15,172	15,110	15,447
R-squared	0.262	0.262	0.306	0.291	0.291	0.319
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	No	Yes	Yes	No
School FE	No	No	Yes	No	No	Yes
School controls	Yes	Yes	No	Yes	Yes	No
Individual and family controls	Yes	Yes	Yes	Yes	Yes	Yes
Country level controls	No	Yes	Yes	No	Yes	Yes

The standard errors (in parentheses) are clustered at the country of origin.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The key observation from Table 3 is the positive effects of the Achievement index, and the negative effects of the Traditional index. For example, students with parents from India benefit from an achievement-orientation, but score high on traditional values, which leads to a lower math performance. Many countries in the Middle-East put less emphasis on achievement and great emphasis on traditional values, leading to poor mathematics scores.

The less precise estimates for post-modern cultural values are obviously due to the negative correlation with the indicator for traditional values. Nonetheless, it

displays positive and statistically significant effects in the sample with one immigrant parent. The Scandinavian countries have quite a low achievement-orientation (but low scores on traditional values), but it appears that great emphasis on values such as independence, determination and imagination can be an advantage in math classes. Briefly stated, the problem is not post-modern values, but a culture with low degree of achievement orientation.

### **5.3 The impact of culture on boys and girls**

Some traditional cultures ascribe very different roles to men and women, suggesting that cultures might affect boys and girls very differently. Traditional cultures tend to see the woman's role as tending the home rather than out in a workplace. Girls may have weaker incentives to do well at school and in achievement tests. We test this hypothesis by estimating gender-specific cultural effects.

Table 4. Gender, culture and educational performance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Both parents immigrants				One immigrant parent			
Grade level:	Fifth grade		Eighth grade		Fifth grade		Eighth grade	
Gender:	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
H-W indicator	0.394*** (0.104)	0.419*** (0.124)	0.403*** (0.0892)	0.559*** (0.178)	0.233*** (0.0411)	0.188*** (0.0441)	0.226*** (0.0570)	0.248*** (0.0451)
Observations	2,519	2,395	2,206	2,076	10,057	9,763	9,371	8,947
R-squared	0.474	0.484	0.434	0.434	0.388	0.383	0.333	0.360
Achievement i.	1.239*** (0.341)	0.693** (0.315)	1.638*** (0.340)	1.335*** (0.415)	0.345*** (0.130)	0.357** (0.157)	0.463*** (0.161)	0.320* (0.185)
Post-Modern i.	0.526 (0.506)	0.488 (0.386)	-0.776 (0.492)	-0.137 (0.642)	0.189 (0.262)	0.666** (0.282)	0.460* (0.246)	0.468 (0.317)
Traditional i.	-0.535** (0.253)	-0.688*** (0.168)	-0.983*** (0.174)	-0.774** (0.310)	-0.492*** (0.136)	-0.157* (0.0837)	-0.520*** (0.123)	-0.319** (0.106)
Observations	4,881	4,738	4,411	4,274	8,712	8,479	7,872	7,575
R-squared	0.352	0.378	0.341	0.341	0.400	0.396	0.353	0.371
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ind.and family c.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country c.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The standard errors (in parentheses) are clustered at the country of origin.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note. H-W indicator: Hanushek-Woessmann indicator.

The descriptive statistics show that girls generally achieve better grades than boys, but differences are relatively small in mathematics [Stoeren 2006] [Egge and Hoveid 2015]. The estimates presented in Table 4 suggest that cultural effects do not differ between boys and girls. We observe that an achievement-oriented cultural background has a stronger impact on boys than girls in the fifth grade. The other cultural effects are strikingly similar for boys and girls. Further, the effects of country of ancestry cognitive skills (Hanushek-Woessman indicator) are *not* gender-specific.

This could be a school-system effect. Norwegian culture is very focused on gender equality, and boys and girls receive the same education from the same teacher - usually with a native background. Moreover, parents with a background from a country with a traditional culture are probably not worried about daughters taking school work as seriously as sons. Their cultural dispositions are likely at kick in at a later stage.

Finally, Norwegian integration policies are emphasize labor market participation. Though women from immigrant groups are less active in the labour market,

most take a job outside home. The expectation that women are expected to work might motivate girls to achieve test scores on par with the boys.

This might indicate that both male and female students with non-western background are better integrated into the school system in Norway than in many other European countries, such as Germany and Denmark.

## 5.4 The impact of ethnic density

Immigrant students are subjected to vertical cultural influences from parents and other family members, and to horizontal impressions from society at large. This could lead to a downward bias in the estimates. Yet, immigrants live in very different neighborhoods. The Norwegian resettlement policies for refugees aim at distributing across the country, one motive being a more rapid integration. Like in other countries, immigrants tend over time to settle down in cluster, often in the larger cities. Similar to others studying immigrant behavior ([Borjas 1995] [Fernandez and Fogli 2009] [Giavazzi et al 2014]), we are interested in how residential segregation interacts with the cultural indicators. We therefore include the population from the country of ancestry (measured per 10.000 inhabitants in the municipality) as an interaction variable in the regression models.



Table 5. The impact of ethnic density

VARIABLES	(2)	(3)	(5)	(6)
	Both parents	immigrants	One immigrant parent	
<i>Fifth grade:</i>				
Hanushek-Woessmann indicator	0.322*** (0.107)	0.401*** (0.129)	0.193*** (0.0372)	0.171*** (0.0389)
Immigrants per 10000 inhabitants	-0.000228 (0.000401)	0.00520 (0.00355)	-5.98e-05 (0.000177)	-0.00423** (0.00191)
Interaction term		-0.00129 (0.000877)		0.000865** (0.000393)
Observations	4,906	4,906	18,429	18,429
R-squared	0.403	0.404	0.331	0.331
<i>Eighth grade:</i>				
Hanushek-Woessmann indicator	0.374*** (0.113)	0.536*** (0.130)	0.230*** (0.0504)	0.211*** (0.0507)
Immigrants per 10000 inhabitants	-0.000470 (0.000484)	0.0111** (0.00457)	3.59e-05 (0.000168)	-0.00372 (0.00277)
Interaction term		-0.00274** (0.00110)		0.000776 (0.000567)
Observations	4,277	4,277	16,933	16,933
R-squared	0.371	0.374	0.313	0.313
Year FE	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes
Ind. and fam. contr.	Yes	Yes	Yes	Yes
Country level controls	Yes	Yes	Yes	Yes

The standard errors (in parentheses) are clustered at the country of origin.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Notes. For description of individual-level, school-level and country-level controls, see Table 1. Immigrants per 10.000 inhabitants refer to total number of residential immigrants from the parents country of origin, measured at the municipality level. The interaction term refers to the interaction between the Hanushek-Woessmann index of cognitive skills and the size of the immigrant population in the municipality.

The results in Table 4 indicate that ethnic densities have little impact if the fifth grade. The effect is positive and significant for one immigrant parent, but an increase of one standard deviation( about 56, see Table 1) implies very little effect. In the eighth grade. the interaction term is negative and significant in the case of two immigrant parents. Overall, this indicates that shares of immigrants

from the parents' country of origin do not cause larger cultural effects<sup>20</sup>. This is in line with a study of upper secondary schools in Oslo ([Fekjaer 2007]). After controlling for parents' education level, they find that the ethnic composition of school have little impact on students' grades and their subsequent educational choices. While studies from the US [Card and Rothstein 2007] suggest that ethnic networks play an important role for school achievement, a related study using data on English schools indicate that segregation has little influence on school achievements[Burgess et al 2008].

## 6 Conclusions

Cultural background has a major influence on students' school performance. We observe substantial differences in mathematics achievement scores when students are classified by country of ancestry. These effects are estimated in regression models that include controls for homecountry GDP per capita, parental levels of education and income, and municipality or school fixed effects. These country effects correspond broadly to cross-national patterns observed in international achievement tests, including PISA and TIMSS.

Using the Hanushek-Woessmann's indicator of cognitive skills for 77 countries as a cultural proxy, we find that country-of-origin skill achievements exert a positive influence on test scores in Norway. We use the World Value Survey to identify traditional, achievement oriented and post-modern cultures. These cultural dimensions can be measured on 96 countries. The regression estimates indicate that an achievement-oriented culture improves performance, while traditional values have a negative impact. Post-modern values and traditional values are negatively correlated in individual-level survey data as well as in the country-level data, which makes it hard to estimate the partial effect of post-modern values precisely. Overall, it seems that a post-modern culture contributes to somewhat better scores on the mathematics tests.

The analysis indicates that children receive cultural impulses from both parents. We see significantly larger cultural effects in families with two immigrant parents as compared to one native and one immigrant parent. The differences between these family types are clear when we compare countries as well as when we estimate effects by the Hanushek-Woessmann skills index and the Inglehart indicators.

Surprisingly, the separate analyses for boys and girls indicate comparable cultural effects. Boys and girls respond similarly to their cultural heritage. We con-

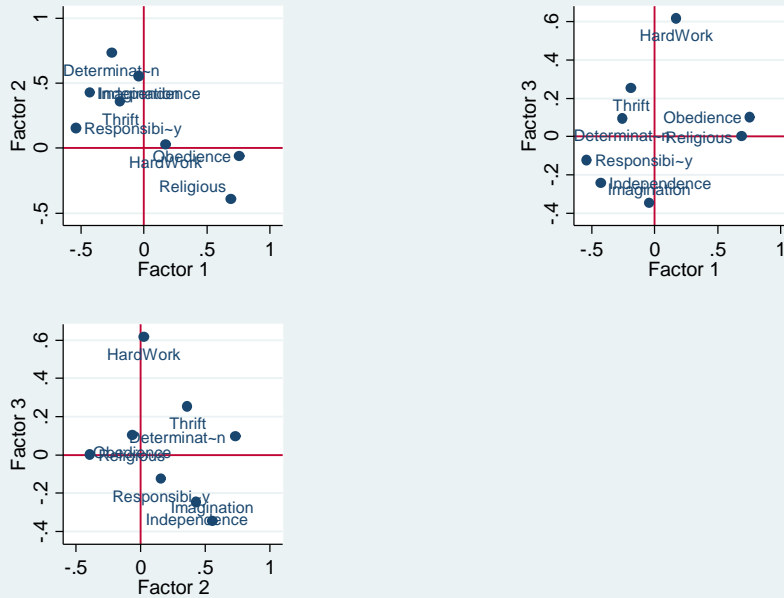
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<sup>20</sup>We obtain similar results when the WVS-indicators are interacted with share of immigrants from the students country of origin.

jecture that this is partly due to a school system with great emphasis on gender equality, and partly due to the fact that immigrant women have quite high rates of labour participation. A preliminary analysis indicate that the cultural effects on school performance are insensitive to the ethnic densities.

# 7 Appendix

## Appendix A. Rotated factor loadings, country-level data



Rotation: orthogonal varimax  
 Method: principal factors

Appendix B. Number of second generation immigrant students with one and two immigrant parents (incomplete)

Appendix C. Regression estimates with country of origin fixed effects

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