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 estimate effects on the mathematics performance of second generation immigrants to Norway, as measured by nationwide tests administered to all students in the 5th and 8th grades (2007-2011).

The test scores differ significantly by parents' country of origin, after controls for school fixed effects and several measures of parents' human capital.

We distinguish between cultures where parents value child aspirations (hard work and thrifiness), autonomy (independence and imagination) or auhoritarian values (child obedience). We measure these cultural dimensions with a survey instrument in the World Value Survey. The cultural indicators are measured at the country level, and merged with register data on parents' country of origin and their childrens school performance.

Aspirational values and to a lesser extent autonomy cause better school performance, while authoritatarian values lead to to weaker results. These effects are smaller when one parent has a native origin.

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. These children have parents who have arrived from all parts of the world, and which represent very different cultures. The children are raised differently as a result of parents' cultural backgrounds. At the same time, they attend a public school system with a standardized curriculum in an otherwise well-developed welfare state and highly egalitarian society, and they face the similar labor market opportunities. This identification strategy allows us to isolate the effect of culture.

The current paper relates to the literature on culture and economic outcomes. Cultural background affects women's work participation (Fernandez and Fogli 2009;[1] Alesina and Giuliano 2010[2]), 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),

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[1]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 origion appear to improve labour market performance in the US.

[2]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.

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

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 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.[3]

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.

Immigrant parents can only bring two resources from the country of origin, their cultural valuesand human capital. It is therefore crucial to control for parent's human capital. The analyses of school performance include controls for parents' human capital (parents' level of education and levels of wage income in Norway), family characteristics and school fixed effects. We present additional empirical estimates of cultural effects that include controls for on school quality, share born with low birth-weight and GDP per capita (measured in PPP) in the parents' country of origin.

We show that students from East-Asia achieve better test scores than the native students; students from West-European countries obtain scores on par with the Norwegian students, and students from Central Asia, the middle East and

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[3]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.

Africa get significantly weaker results. For example, the scores of students with parents from China and Japan are more than half a standard deviation better than the Norwegian students, while those with a background from Chile, Somalia and Kosovo are half a standard deviation below the results of the native students. We observe a similar, yet weaker pattern, for students with one immigrant and one native parent.

The key analyses estimate the effects of the cultural indicators [Inglehart 2008] [Doepke and Zilibotti 2014] expressed as different types of parenting [Barumrind 1971], and measured by data from the World Value Survey. Students who have parents appreciating childrens' economic aspirations - as measured by valuing hard work and thriftiness - obtain the better school results. Parenting emphasizing child autonomy - that children should learn independence and imagination - yields somewhat better school results. Finally, authoritarian child rearing is based on the belief that children should be obedient. Students with authoritarian parents obtain the weaker test scores. We find similar, but mostly smaller, effects with one native and one immigrant parent.

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. Education is compulsory for children aged 6-16. The school system is subjected 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.[4] 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 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)

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[4]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-innvandrere/nokkeltall/immigration-and-immigrants

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. 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 focus on beliefs and values that affect the way parents raise their children, and affect their motivation to perform in school (see for example, Polavieja 2015:169). For example, Inglehart (1997; 2008) builds on Maslow's theory of human needs ordering. Material values have higher priority under economic scarcity, while post-materialist goals are more important when the basic needs are satisfied.[5] The traditional cultures discourage individual ambitions in education and work. People yield to the family's preferences, and accept religious rules and traditional customs. 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. The post-materialistic culture 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. We would therefore expect a materialistic culture to stimulate larger investments in human capital, particularly through students schooling effort.[6]

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[5]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.*"

[6]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."

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Following Baumrind (1971), Doepke and Zillibotti (2015) offer an explicit model of "parenting styles". Parents are paternalistic, and try to influence the behavior of their children in different degrees. The parental choices are rational responses to the economic environment. They outline three types parenting styles, each corresponding to equilibria determined by degrees of occupational mobility and returns to human capital investments (c.f. Doepke and Zillibotti 2015, Figure 1).

First, an authoritarian style implies that parents constrain children's choices. This type dominates in economies where children benefit from choosing the same occupation as their parents. The decline in this form of parenting can be explained by the emergence of modern economies with a wide variety of occupations. The parents occupation is not necessarily the best choice for the children. Second, an authoritative style signifies that parents try to shape children's preferences. Parents seek to instill a high degree of future-orientation in their children, and induce them to invest in schooling. This is beneficial in economies with high mobility and high returns to human capital investments. Third, a permissive style allows children to make their own choices without authoritarian or authoritative influence. Permissive parenting works best in economies where mobility is high, but the returns to human capital investment are relatively low. For example, the Scandinavian countries offer relatively modest returns to schooling due to a compressed wage structure and high tax rates.[7]

The models of Inglehart (1997; 2008) and Doepke and Zillibotti (2015) offer somewhat different explanations as to why culture diverge. The first highlight levels of economic development, while the latter address economic incentives and returns to human capital investments. Inglehart's conceptualization are broader, while Doepke and Zillibotti (2015) focus on child-rearing practices. The models are also related. The "home" of authoritarian parenting style is the traditional culture, and the permissive parenting style fits nicely into the post-materialist society. The authoritative parenting style aim at economic success, and it is therefore associated with Inglehart's concept of a materialist culture. At the same time, authoritative parents seek to induce preferences on their children; not impose choices. This

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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.

[7]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. 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.

parenting style appears to belong in modern, high-income economies, which would be classified by Inglehart as post-materialist.

3.1 Hypotheses

The current paper employs a classification of child-rearing practices related to both Inglehart (1997) and Doepke and Zillibotti (2015). Parents with *authoritatrian values* want their children to be obedient, which is associated with strict discipline, religious upbringing and even corporal punishment. This parenting culture corresponds to Inglehart's traditional values and to Doepke and Zillibotti's authoritarian type of parenting. Parents with *aspiration values* want their children to limit consumption and leisure activities in order to develop their economic future. Parents want children to do better than themselves. Aspiration values are related to Inglehart's materialist culture, and to Doepke and Zillibotti's authoritative parenting style. The third cultural type emphasizes *autonomy values*. The parents are less paternalistic than the two other cultural types, and they seek to raise children as independent and responsible persons. This category is associated with Inglehart's post-materialist values as it values personal self-realization. Parents would therefore be happy to see children seeking economic success and career ambitions, but they would regard other life-projects as equally valuable. Autonomy relates to permissive parenting since developing autonomy requires that children are allowed to discover their individual interests and talents.

The key hypothesis is that parents coming from aspiration cultures foster children with better school performance. We expect students with parents from authoritative cultures to display relatively weak school performance. Parents tend to regard family traditions and religious norms as more important than investments in human capital and future economic gain. Cultures emphasizing autonomous individuals may see school performance as an important precondition for self-realization, but students may also regard educational performance as less important. It remains unsettled how these students perform relative to those who have parents with explicit career ambitions.

3.2 Cultural indicators in the World Value Survey

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[8]. 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.
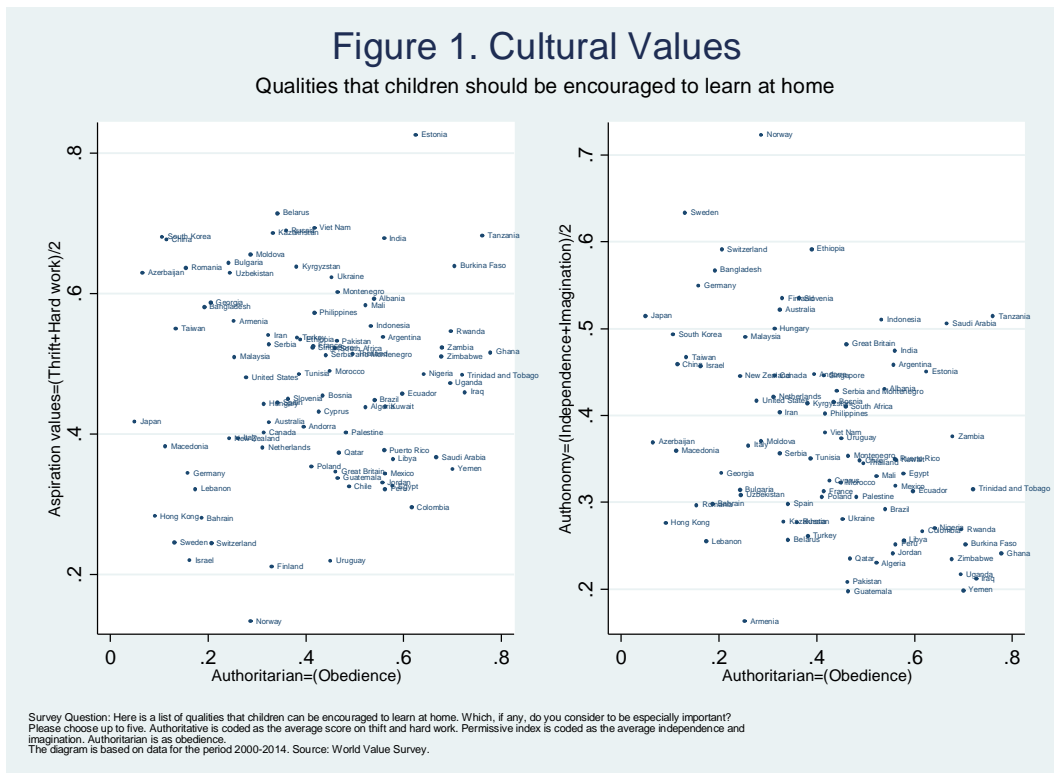
We use five of these indicators to define three "parenting values".[9] Aspirational values are defined by the average of hard work and thrift. It captures parents desire to induce their children invest in the future. The second indicator is labeled autonomy, and captures that parents prefer their children to be independent and make their own choices. This dimension is measured by independence and imagination. The authoritarian culture is measured by obedience. The three factors indicate whether the country-populations ascribe to the different parenting values, and they are estimated as country averages for all respondents in the surveys conducted after 1999.

In Figure 1, we display these country-level data. The Scandinavian countries have low scores on authoritarian values as measured by obedience, quite low on aspiration values (measured by hard work and thriftiness), and high values of autonomy values (measured by imagination and independence). 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 aspiration values, and low on authoritative and autonomy values. Several countries in Africa and the Middle East have high scores on authoritarian values.

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[8]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). Aggregate File Producer: JDSystems, Madrid SPAIN. Version history:
 - v2015-04-18: Current official release

[9]Appendix A displays results from a factor analysis using ten of the eleven indicators. Selvexpression is not included as it comprises a limited number of countries. One diagram shows rotated factor loadings based on the entire sample of individuals. One cluster of indicators comprise unselfishness, imagination, independence, responsibility and tolerance. Thrift and hard work are also grouped together, and so are obedience and religious faith. The other diagram are based on country-level data. Again we see the same set of indicators being clustered together.

Figure 1. Cultural Values

Qualities that children should be encouraged to learn at home

Survey Question: 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. Authoritative is coded as the average score on thift and hard work. Permissive index is coded as the average independence and
imagination. Authoritarian is as obedience.
The diagram is based on data for the period 2000-2014. Source: World Value Survey.

4   Research strategy

The effects of parenting style on childrens' cognitive development have been a major research topic in psychology and sociology. Most papers use observational data, and rely on survey responses of children or parents, and correlated these with various indicators of student performance. As have been acknowledged by most authors, it is hard to draw causal inferences from such studies.

The "epidemiological approach" offers one method to identify such effects based on analysis of first and second generation immigrants. First, we consider first-generation immigrants as parents. Cultural characteristics are quite persistent, and it is therefore assumed that parents influence their children based on the prevalent parenting style in the country of origin. We must therefore assume a delayed response to economic incentives. Second, we analyze the school performance of second generation immigrants, i.e. children who are born in Norway by one or two immigrant parents. These children are brought up differently depending on parents' cultural backgrounds. At the same time, these students face similar economic, institutional and educational conditions in a common homeland. This means that we can isolate the impact of parenting styles on educational outcomes.

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In the current context, occupational mobility and returns to human capital in the country of origin may explain why parents prefer an alternative parenting styles. In the new homeland, parents from different parts of the world remain faithful to the parenting style in the mother country, while facing the same schooling system and labor market. This implies that the economic and institutional environment of the country of origin can *only* influence their childrens' schooling motivation through parents' cultural values.

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 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. It is therefore critical to separate the effects of parents human capital from cultural influences. Let Y_{ikc} be the students test score in mathematics, i denotes student, k school, and c is the country of origin. We assume that students' test scores depend on the culture in the country of origin and parents' cognitive skills (H_{ic}). The model comprises municipality fixed effects (θ_k), and in additional specifications we include school fixed effects.[10] **X** represent a vector of additional individual-specific controls (student gender, number of siblings, and parity). As a starting point we estimate a model with country of origin fixed effects. The model is estimated using the native students as reference category (λ_0), which means that we estimate differences relative to these students (λ_c):

$$Y_{ikc} = \lambda_0 + \lambda_c + \mathbf{X}_{ikc}\phi + \delta H_{ic} + \theta_k + \varepsilon_{ikc}$$

In the key analysis, we estimate models where we replace the country of origin effects with the three cultural indicators. Data on native students are not included in this analysis:

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[10]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.

$$Y_{ikc} = \beta_0 + \beta_1 AspirationValues_c + \beta_2 AutonomyValues_c + \beta_3 AuthoritarianValues_c + \mathbf{X}_{ikc}\varphi + \gamma H_{ic} + \psi_k + \xi_{ikc}$$

These models are estimated separately for students with one immigrant and one native parent, and for students with two immigrant parents having the same country of origin.

4.1   The baseline model

Register data allows us to control for the standard human capital indicator, parents' education levels. As a starting point, we simply use education level as indicator for parental human capital. Years of education is an imperfect indicator of human capital since immigrants come from countries with very different educational systems. We would expect parents coming from better school systems to do better in the Norwegian labor market (Fernandez & Fogli 2009). Following Hanushek and Woessmann (2012:288), an augmented Mincer wage equation can be formulated as: $\ln w_{ic} = \alpha_0 + \alpha_1 S_{ic} + \alpha_2 E_{ic} + \lambda H_{ic} + \epsilon_{ic}$ where E denotes potential years of work experience, and S represents years of schooling. Substitution into the school performance regression leads to the following model specification:

$$Y_{ikc} = \beta_0 + \beta_1 AspirationValues_c + \beta_2 autonomyValues_c + \beta_3 AuthoritarianValues_c + \mathbf{X}_{ikc}\phi + \frac{\delta}{\lambda}[\ln w_{ic} - \alpha_0 - \alpha_1 S_{ic} - \alpha_2 E_{ic} - \epsilon_{ic}] + \theta_k + \varepsilon_{ikc}$$

Adding parents' wage income is one way of accounting for differences in country of origin schooling quality. The main strength of this approach is that we use individual-level data on parents wage income and labour force participation.

An additional concern 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]. A related worry is due to immigrants' and/or natives choice of residence. Ambitious parents may opt out of municipalities or school catchment areas with low-quality schools, and settle in areas where published tests scores are higher [Black 1999] [Fiva and Kirkebøen 2011]. Teacher quality and peer effects could therefore account for correlations between students' cultural background and school performance. The models including school fixed effects are likely to capture many of these components of human capital.

5 Empirical results

We present two sets of empirical analyses. We first display regression estimates using parental country-of-origin fixed effects, and thereafter the influence of the parenting cultures as measured by the WVS indicators.

Table 1. Descriptive statistics

	One immigrant parent			Both immigrant parents		
	N	Mean	SD	N	Mean	SD
Individual-level variables:						
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
School-level variables:						
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
Country-of-origin level variables:						
School quality in country of origin	47,725	0.086	0.028	27,553	0.054	0.026
Percent with low birth weight in country of origin	48,240	8.0	4.84	25,025	13.8	7.02
Percent of English speaking in country of origin	44,827	64.75	31.40	19,362	31.67	22.86
GDP per capita 2000 (PPP)	49,497	20,574	11,793	26,256	6,105	6,802
Response variables:						
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 dataset includes second-generation immigrants from 192 countries. The mathematics test scores are standardized with a zero mean and standard deviations of one, separately for each grade level and each year.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). School quality in the country of origin is based on Schoellman (2012: Table A1).Share of births with low birthweight (less than 2500 grams) is from World Health Organization (WHO) and UN (UNICEF).

We have rescaled 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.

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 Gross Domestic Product (GDP) per capita, schools of high quality, where few children are born with low birthweight, and large English-speaking populations.

5.1 The impact of parents' country-of-origin

We start out with an analysis where we estimate differences in test scores by parental country fixed effects, controlling for the relevant covariates, municipality and year fixed effects. 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.

In Figure 2, we display estimates for country fixed effects. The diagram presents estimates for countries with high numbers of second-generation immigrant students (>500). The pattern is similar for the 5th and 8th grade levels. The diagram displays average effects for students at both levels with one and two immigrant parents. Comparing this pattern with mean scores of the PISA 2012 mathematics performance indicates a considerable correspondence.[11]

Note that students who have parents Siri Lanka and Somalia have dark skin, but obtain very different test scores. Parents from Vietnam are mostly refugees, while parents from Japan and China have arrived to seek work. Both groups obtain

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[11]The bivariate correlation between the country scores in Figure 2 and the PISA mathematics test results are r=0.77.

very high mathematics scores. Moreover, the country effects tend to go in the same direction for students with one versus two immigrant parents. Preconceived attitudes related to students skin color or parents' immigrant status seem unlikely explanations for the patterns in Figure 2. The country estimates 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, both when performance deviations are positive (Vietnam, Japan and China) and when they are negative (Philippines, Somalia and Chile).

Finally, Figure 2 shows that students with similar cultural background get comparable test scores. The North-European countries obtain scores that are very close to those obtained by Norwegian students. Finnish students tend to do well on international tests. The estimates in Figure 2 are (based on nearly 1500 Finnish students) suggests they perform on par with the natives. Similar to other studies, the students with East-Asian origin do exceptionally well. These students achieve test scores that are about half a standard deviation better than native students. Those with parents from Central Asia, the Middle East, Africa and the former Yugoslavia and Soviet-Union score lower than the Norwegian students. This could indicate that parents cultural influence is important for the childrens' school performance.

Figure 2. Immigrants' school performance

Note. The diagram displays country-level effects based on data on second-generation immigrant students in the 5th and 8th levels. Norwegian students are used as reference category. The diagram presents estimates for countries with the higher number of immigrant students. The regression models include school and year fixed effects, parents' levels of wage incomes and education and family characteristics. The countries sorted by the estimates derived from regression models with two immigrant parents.

Suppose the estimates displayed in Figure 2 (and corresponding for more countries) indicate how parents' cultural background influence the childrens' school performance. In that case, we can employ these estimates to assess the impact of culture on cross-national variations in students' mathematics performance. In Figure 3, we present a scatterplot measuring the country-level estimates (i.e. Figure 2-type estimates) on the horizontal axis. The vertical axis measures the mathematics test scores obtained in the TIMSS 2011 and the PISA 2012 studies.[12] The bubble sizes are proportional to the square root of number of immigrant students used to estimate the baseline regression model.

The plot indicates positive relationship between the international test scores and the estimates obtained on the Norwegian national tests. A regression with PISA- and TIMSS-scores as response variables indicate a R-square statistic of 0.35 and 0.22 respectively, suggesting that cultural factors account for a substantial share of cross-national performance variations.

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[12]The data sources are: a) TIMSS 2011, International results in mathematics (the 4th grade) (Chapter 1), TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College. b) PISA 2012 Results in Focus: What 15-year-olds know and what they can do with what they know, OECD 2014. Figure 3 employs the mean scores for individual countries. The bivariate correlation between the PISA- and TIMSS-indicators of mathematics performance is 0.874.

Figure 3. The mathematics performance in PISA and TIMSS

Cultural estimates and cross-national performance measured in PISA 2012 and TIMSS 2011

Note. The horizontal axis displays country-level estimates based on second-generation immigrants to Norway using the baseline regression. The vertical axis shows the mathematics performance as measured by the PISA 2012 and TIMSS 2011 country-level test scores. The bubble sizes are proportional to the square root of the student immigrant populations used in the baseline analysis. Norwegian students are not included in the diagram.

5.2   The impact of parents' culture

In Table 2, we present corresponding models for mathematics test results for students in the the 5th and 8th grade, using the three cultural indicators from WVS. Students with two native (Norwegian) parents are not included in these analyses. Note that the original test scores varied from 0 to 51 on the tests in the 5. grade, and from 0 to 76 on the 8.grad. These variables have been standardized separately for each grad level and separetely for each of years (2007, 2008,2009,2010 and 2011). In Appendix B, we present the complete estimation results.

Table 2. The impact of culture on school performance

	Both parents immigrants			One immigrant parent		
	(1)	(2)	(3)	(4)	(5)	(6)
Aspiration values	1.317***	1.312***	1.287***	0.171	0.191	0.220
[$\frac{1}{2}$(Hard work+Thrift)]	(0.346)	(0.348)	(0.302)	(0.137)	(0.136)	(0.145)
Autonomy values	0.495*	0.497**	0.348	0.448***	0.403**	0.382**
[$\frac{1}{2}$(Independence+Imagination)]	(0.249)	(0.250)	(0.294)	(0.165)	(0.14)	(0.153)
Authoritarian values	-0.602***	-0.588***	-0.883***	-0.275***	-0.268***	-0.312***
[(Obedience)]	(0.218)	(0.255)	(0.248)	(0.084)	(0.082)	(0.076)
R-squared	0.249	0.249	0.315	0.238	0.242	0.266
Observations	20.502	20.297	9.481	38.132	37.783	25.716
Number of countries	82	82	73	87	87	86
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes
Parents' wage income	No	Yes	Yes	No	Yes	Yes
Parents' employment/experience	Yes	Yes	Yes	Yes	Yes	Yes
Student characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Missing values included	Yes	Yes	No	Yes	Yes	No

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

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

Notes. The response variable is the mathematics test score in the 5. and 8. grade (see documentation in Table 1). The models include a dummy variables for grade level. The models comprise both mothers' and fathers' levels of education, work experience and wage levels (columns (1)-(3)). Parents' education level has been measured on an eight point scale as defined by the International Standard Classification of Education; ISCED. Parents wage income has been measured on a log scale. Parents' work experience has been measured as age less years of education less six years. In columns (1), (2), (5) and (6), we have included misssing values as a separate education category. All observations with missing values are excluded in columns (3) and (6). All models include controls for family characteristics, i.e. number of siblings, parity and students' gender.

A key observation from Table 3 is the large and significant effects of the cultural variables. When immigrant parents want children to work hard and save for the future, the students perform better at school. The effects of emphasizing autonomy are smaller, yet significant in most specifications. An authoritarian parenting style leads to weaker student performance. Similar to the pattern displayed in Figure 2, the cultural indicators have weaker effects with one immigrant parent for aspirational and authoritarian parent values. A parenting style that values autonomy yields comparable effects for both types of families.

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These cultural effects are substantial, which is evident in the case of two immigrant parents. Increasing each of the three cultural indicators with one standard deviation (measured at the country level) suggests effects of 0,18 standard deviations for aspiration values, 0,06 for autonomy values and -0,11 for authoritarian values. Alternatively, we could compare Norway and South-Korea. The aspiration indicator has the lowest score in Norway, while South-Korea display a very high score. Autonomy values are highly valued in Norway, and somewhat less so in South-Korea. Neither populations report that authoritarian values are very important. Had Norwegian parents adopted the Korean parenting values, we would expect to observe an increase in mathematics performance of 0.72 standard deviations.

The Norwegian value surveys allow us to estimate the value indicators for 1990, 1996 and 2008.[13] The aspirational values have declined form 0.138 to 0.106, autonomy values have remained at a stable level of about 0.58, while the value of child obedience have declined from 0.309 to 0.194. The drop in authoritarian values suggests a modest positive on school performance, while the decline in aspirational values has an opposite effects. Overall, this means that cultural changes over the recent decades have little bearing on Norwegian students school performance.

5.3 Robustness tests

The baseline analysis conceptualize parent resources as levels of education and cognitive skills, the latter captured indirectly through labour market performance in Norway. As an alternative, we relate to an emerging literature that challenge the common practice of equating the nation's human capital with average years of schooling. Hanushek and Zhang (2009) report that quality-adjusted years of schooling have a large, positive impact on wages. Hanushek and Woessmann (2009) and Schoellman (2008) use related methods to estimate cross-national differences in schooling quality, and show that educational quality is a major determinant of economic growth. Schoellmann (2008: 390) analyzes data on foreign-educated immigrants to the US and Canada, and estimates a augmented Mincer regression that allows the effects of years of schooling to vary by country of origin. These estimates of returns to schooling suggest that countries produce very different levels of human capital per year of schooling. These estimates can be interpreted

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[13]Norwegian survey data show that parenting values have changed considerable over the last generations. Consider the following statement: "Children should learn: Obedience and respect for guardians". In 1957, 78.9% said that they agreed completely, and 12.6% said they agreed partly. These number dropped to 37.3% and 37.8% in 1988, and to 40.6% and 30.3% in 1994.

as measures of school quality in parents' country of origin. We denote Q_c the quality of the education system in country c, and measured by the Schoellmann-estimates. We define quality-adjusted years of schooling as $Q_c \cdot S_{ic}$. [14] This leads to a model specification with quality adjusted years of schooling:[15]

$$Y_{ikc} = \beta_0 + \beta_1 AspirationValues_c + \beta_2 AutonomyValues_c + \beta_3 AuthoritarianValues_c + \mathbf{X}_{ikc}\phi + \delta Q_c S_{ic} + \rho_k + \varepsilon_{ikc}$$

A number of studies show that living conditions are important for developing cognitive skills [Black et. al 2007]. Infants with low birth weight (commonly defined as less than 2500 grams) tend to have weaker cognitive skills, school performance and labor market performance. The share of infants born with low birth weights are higher in many poor countries, mostly due to insufficient prenatal nutrition and other harmful environmental influences. Those immigrant parents who come from poor countries may benefit less from schooling, which may explain way they benefit less from schooling. Let W_c denote the share of children with a low birth weight. Moreover, some studies using the "empidemiological approach" have included GDP per capita in the country of origin as a control variable.[16] [Barro and McClearly 2003] [Inglehart 2008] [Doepke and Zilibotti 2008]. Following papers employing a similar research design [Alesina and Giuliano 2014] [Fernandez and Fogli 2009] [Fishman and Miguel 2007] [Gratano1996] [Zhan 2015], we also include GDP per capita (GDP_c) as a control variable. As an alternative model, we therefore suggest the following regression model:

$$Y_{ikc} = \beta_0 + \beta_1 AspirationValues_c + \beta_2 autonomyValues_c + \beta_3 AuthoritarianValues_c + \mathbf{X}_{ikc}\phi + \varphi S_{ic} + \nu W_c + \gamma GDP_c + \mu_k + \psi_{ikc}$$

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[14] Parents who come from countries with high-quality schools are likely to take additional years of education. Schoellmann (2012:402-403) suggests that quality-adjusted years of schooling should be measured as $h(Q_c, S_{ic}) = \exp(\frac{(Q_c, S_{ic})^\eta}{\eta}), 0 < \eta < 1$. This implies smaller quality differences when η is to 0. Schoellmann estimate of the elasticity of years of schooling with respect to education quality. These results indicate that $\eta \approx 0.5$. Estimating the model with the alternative indicator yields almost identical results for the cultural variables.

[15] The estimatation is based on data for the annual tests performed in 2007-2011. Note that subscript for years is supressed, and that the estimated models include year fixed effects.

[16] 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.

When variables capture the consequences of a natural experiment, they should not be included as controls ("bad controls"). Parents exert cultural influence as role models for their children. A daughter may emulate her mother's lifestyle by considering school work less important when her mother does not work. This means that parents' work participation and income levels is likely to be an effect of cultural background. Similarly, school choice could be an effect of parents' cultural background, possibly indicating that school fixed effects should not be controlled for. Robustness to omitted variable bias can also be assessed by observing changes in the estimates when we exclude all variables except municipality and year fixed effects (Altonji et. al 2005). As a final test, we present estimates where we exclude school fixed effects and whether parents' work participation.

Table 3. Robustness tests

	Both parents immigrants			One immigrant parent		
	(1)	(2)	(3)	(4)	(5)	(6)
Aspirational values	1.210***	1.804***	0.892**	0.247	0.381***	0.234
$[\frac{1}{2}$(Hard work+Thrift)]	(0.437)	(0.335)	(0.343)	(0.226)	(0.129)	(0.196)
Autonomy values	0.856**	0.342	1.613***	0.202	0.434***	0.769**
$[\frac{1}{2}$(Independence+Imagination)]	(0.371)	(0.257)	(0.346)	(0.273)	(0.147)	(0.307)
Authoritarian values	-0.370	-0.402**	-0.467	-0.222*	-0.133*	-0.335*
[(Obedience)]	(0.302)	(0.185)	(0.304)	(0.114)	(0.0724)	(0.183)
Quality-adjusted schooling years	0.294***			0.249***		
	(0.0619)			(0.043)		
Share with low birth weight		-0.00980**			-0.00646**	
[>2.500 grams]		(0.00384)			(0.00307)	
GDP per capita (log-scale)		8.96e-06*			3.15e-06*	
[PPP]		(5.01e-06)			(1.60e-06)	
R-squared	0.213	0.248	0.091	0.214	0.242	0.079
Observations	20,280	20,314	20,537	37,197	36,759	38,269
Number of countries	70	77	82	73	81	87
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	No	Yes	Yes	No
Municipality FE	No	No	Yes	No	No	Yes
Parents' wage income	No	Yes	No	No	Yes	No
Parents' employment/experience	Yes	Yes	No	Yes	Yes	No
Student characteristics	Yes	Yes	No	Yes	Yes	No

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

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

Notes. Quality-adjusted years of schooling is years of schooling times the Schoellmann-estimate of countries' school quality (Schollmann 2011, Table A1). In columns (1) and (4), parents' education level has been measured as years of education, estimated on basis of the eight point scale (ISCED, c.f. Table 1). In column (4), we include actual years of schooling for the native parent as an additional control. GDP per capita is measured at purchasing power parities (PPP), and data come from the World Bank. Share of births with low birthweight (< 2.500 grams), which are collected by the UN (WHO and UNICEF).

The robustness tests are displayed in Table 3. The estimates for the cultural variables are similar to the baseline specifications presented (Table 2). With two immigrant parents, an aspirational parenting style yields the better outcomes, parenting with emphasis on autonomy generates weaker positive test scores, while an

authoritarian style leads to worse results. The estimates for autonomy parenting vary somewhat between model specifications. The robustness tests for one immigrant parent yield estimates in line with those in Table 2. The estimates for aspirational and authoritarian values are smaller (in absolute values) for students with one immigrant parent, while the effects of autonomy is quite similar.[17]

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[17]Oster (2014) points out that the argument by Altonji et. al (2005) is only valid if the added controls are related to the omitted and unmeasured variable. This means that the excluded controls are informative only if we see a substantial decrease in R-square. We see that R-square in considerably lower in columns (3) and (6) than in the other coumns and in Table 2.

6   Conclusions

Parents' 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, after controls for parents human capital. The country differences correspond broadly to the patterns observed in international achievement tests as measured by PISA and TIMSS, suggesting that parenting cultures also explain a major part of cross-national performance differences.

We conceptualize types of parenting cultures as aspirational values, autonomy values and authoritarian values, and use the World Value Survey to measure the extent to which people in different countries believe these are important values.

We estimate cultural effects in regression models that include controls for parents human capital, family characteristics, and school fixed effects. Additional tests show that these results are robust to controls for school quality, share born with low birth weight and GDP per capita in the country of origin. In the case of two immigrant parents, the estimates indicate that aspirational parenting improves childrens' mathematics performance. A culture that values autonomy a weaker, yet positive effect, while an authoritarian parenting style impacts negatively on school performance. We estimate significantly smaller cultural effects in families with one immigrant parent.

7 Appendix

Appendix A. Rotated factor loadings
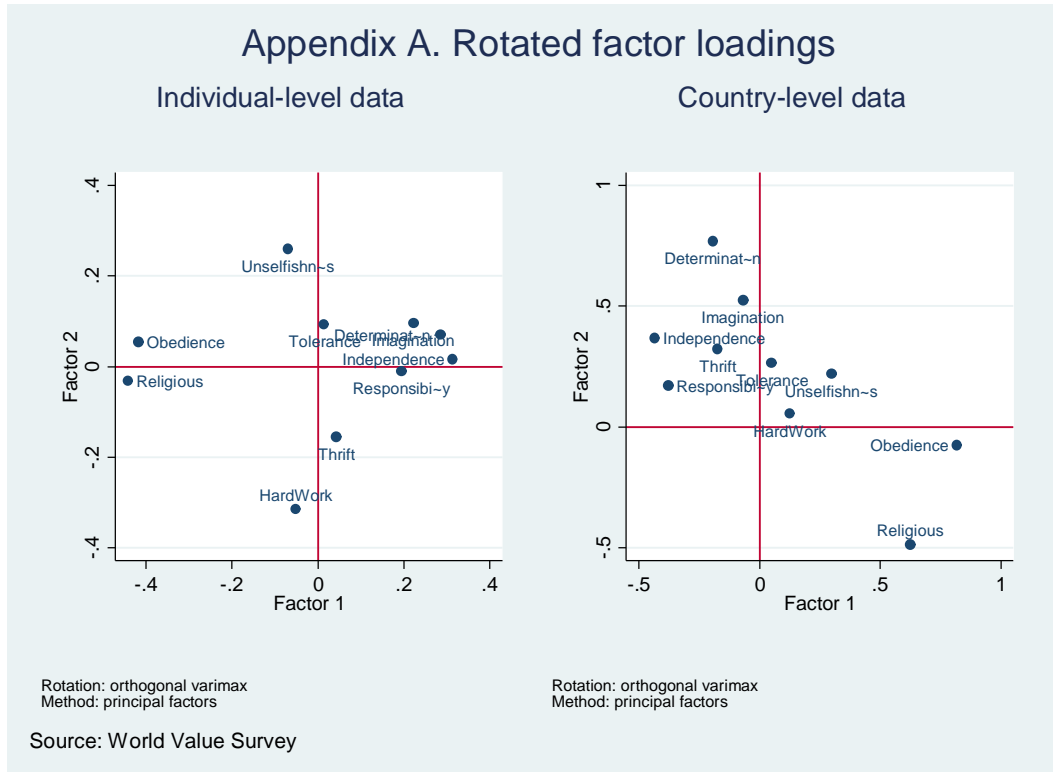
The diagram displays rotated factor loadings based on individual-level data from the World Value Survey.

Data includes all country-surveys starting in 1999 (N=208,467).

Appendix B. VARIABLES	(1) Two parent immigrants	(2) Two parent immigrants	(3) Two parent immigrants	(4) One imm. parent	(5) One imm. parent	(6) One imm. parent
Aspiration	1.317***	1.247***	1.278***	0.194	0.215	0.260*
values	(0.346)	(0.363)	(0.329)	(0.136)	(0.135)	(0.137)
autonomy	0.495*	0.629**	0.483	0.513***	0.467***	0.468***
values	(0.249)	(0.281)	(0.299)	(0.169)	(0.165)	(0.150)
Authoritarian	-0.602***	-0.574**	-0.886***	-0.287***	-0.277***	-0.327***
values	(0.218)	(0.251)	(0.274)	(0.0952)	(0.0912)	(0.0799)
Girl (=1)	-0.173***	-0.168***	-0.169***	-0.176***	-0.176***	-0.183***
	(0.0215)	(0.0202)	(0.0236)	(0.0105)	(0.0102)	(0.0102)
Mother's Ed. = 1	0.00332	0.00604		-0.339***	-0.341***	
	(0.0272)	(0.0301)		(0.0612)	(0.0653)	
Mother's Ed = 2	0.0868***	0.0921***	0.151***	-0.166***	-0.172***	0.0904
	(0.0189)	(0.0209)	(0.0376)	(0.0452)	(0.0441)	(0.101)
Mother's Ed = 3	0.192***	0.178***	0.287***	-0.0481	-0.0719**	0.190*
	(0.0304)	(0.0344)	(0.0480)	(0.0317)	(0.0329)	(0.106)
Mother's Ed = 4	0.240***	0.249***	0.308***	0.0217	-0.00926	0.255**
	(0.0407)	(0.0395)	(0.0461)	(0.0380)	(0.0388)	(0.107)
Mother's Ed = 5	0.240**	0.273***	0.594***	0.162***	0.126***	0.379***
	(0.0993)	(0.0783)	(0.124)	(0.0459)	(0.0463)	(0.0909)
Mother's Ed = 6	0.371***	0.395***	0.477***	0.227***	0.184***	0.446***
	(0.0553)	(0.0441)	(0.0695)	(0.0354)	(0.0371)	(0.112)
Mother's Ed = 7	0.573***	0.606***	0.707***	0.413***	0.364***	0.626***
	(0.0430)	(0.0485)	(0.0747)	(0.0364)	(0.0384)	(0.113)
Mother's Ed = 8	0.829***	0.788***	0.859***	0.515***	0.456***	0.722***
	(0.0946)	(0.112)	(0.120)	(0.0569)	(0.0576)	(0.116)
Father's Ed = 1	-0.00815	-0.0288		-0.156**	-0.198**	
	(0.0413)	(0.0493)		(0.0738)	(0.0773)	
Father's Ed = 2	0.0618**	0.0518	0.0670	-0.143***	-0.181***	0.0130
	(0.0255)	(0.0314)	(0.0517)	(0.0277)	(0.0253)	(0.0815)
Father's Ed = 3	0.0612**	0.0482	0.0172	-0.0447	-0.0974***	0.0942
	(0.0269)	(0.0337)	(0.0558)	(0.0347)	(0.0319)	(0.0860)
Father's Ed = 4	0.151***	0.134***	0.156**	0.0460	-0.0134	0.175**
	(0.0362)	(0.0426)	(0.0647)	(0.0324)	(0.0267)	(0.0854)
Father's Ed = 5	0.266*	0.223	0.163	0.0683*	0.0181	0.210**
	(0.142)	(0.145)	(0.140)	(0.0346)	(0.0363)	(0.0892)
Father's Ed = 6	0.287***	0.269***	0.301***	0.227***	0.164***	0.336***
	(0.0374)	(0.0401)	(0.0667)	(0.0378)	(0.0293)	(0.0861)
Father's Ed = 7	0.487***	0.474***	0.479***	0.354***	0.282***	0.462***
	(0.0537)	(0.0598)	(0.0920)	(0.0356)	(0.0312)	(0.0875)
Father's Ed = 8	0.608***	0.636***	0.543***	0.436***	0.358***	0.520***
	(0.101)	(0.0956)	(0.126)	(0.0415)	(0.0329)	(0.0876)

Appendix B cont.

VARIABLES	(1) Two parent immigrants	(2) Two parent immigrants	(3) Two parent immigrants	(4) One imm. parent	(5) One imm. parent	(6) One imm. parent
Father's inc. (log)		0.0192***	0.0417**		0.0280***	0.0374***
		(0.00718)	(0.0209)		(0.00712)	(0.00739)
Mother's inc. (log)		0.00324	0.0137**		0.0294***	0.0287***
		(0.00855)	(0.00612)		(0.00508)	(0.00846)
Divorced (=1)	-0.0169*	-0.0209	-0.0359**	-0.0240***	-0.0229***	-0.0263***
	(0.0101)	(0.0129)	(0.0173)	(0.00664)	(0.00656)	(0.00855)
Parity	-0.0305***	-0.0257***	-0.0523***	-0.0462***	-0.0442***	-0.0572***
	(0.00828)	(0.00808)	(0.0169)	(0.00677)	(0.00687)	(0.00856)
Mother's exp.	0.00256***	0.00256***	0.0140***	0.000160*	0.000152*	0.00613***
	(0.000537)	(0.000971)	(0.00240)	(8.07e-05)	(8.03e-05)	(0.00179)
Father's exp.	3.34e-05	2.37e-05	-0.00159	3.08e-05	5.01e-05*	0.000461
	(3.89e-05)	(3.30e-05)	(0.00295)	(2.40e-05)	(2.70e-05)	(0.00158)
Fifth Grade	-0.128***	-0.0246	-0.0158	-0.0259***	-0.0286***	-0.0209
	(0.0260)	(0.0173)	(0.0214)	(0.00893)	(0.00914)	(0.0128)
Observations	20,502	20,297	9,481	38,132	37,783	25,716
R-squared	0.249	0.167	0.194	0.170	0.174	0.182
Municipality FE	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes
Missing incl.	Yes	Yes	No	Yes	Yes	No

Robust standard errors in parentheses

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

Note to Appendix B. 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, under-graduate level; 7: First stage of tertiary education, graduate level; 8: Second stage of tertiary education (postgraduate education) Year fixed effects not included. Missing included refers to missing values on education level and income level.

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