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# ABSTRACT

## From Pink-Collar to Lab Coat: Cultural Persistence and Diffusion of Socialist Gender Norms*

The fall of the Iron Curtain in 1989 led to a massive migration wave from the Former Soviet Union (FSU) to Israel. We document the persistence and transmission of the Soviet unconventional gender norms, both vertically across generations of immigrants, and horizontally through neighborhood and school peer effects. Tracking the educational and occupational choices of a cohort of young Israeli women, we identify the persistence of two important features of the Soviet culture: the prioritization of science and technology, and the strong female attachment to paid-work. Women born in the FSU, who immigrated in infancy, are significantly more likely than natives and other immigrants to major in STEM in high school. In tertiary education, they remain over-represented in STEM, but also differ significantly from other women by their specific avoidance of study fields leading to "pink collar" jobs, such as education and social work. They also display a specific choice of work-life balance reflecting a greater commitment to paid-work. Finally, the choice patterns of native women shift towards STEM and away from traditional female study fields as the share of FSU immigrants in their lower-secondary school increases.

**JEL Classification:** Z1, I21, J16, J24, P30

**Keywords:** culture, gender norms, education, STEM, occupational choice, immigration, Soviet Union, Israel

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# 1 Introduction

In spite of "the Great Gender Convergence", women are still under-represented in high-paying and competitive occupations, even in economically and socially advanced countries (Goldin, 2014; Cortes and Pan, 2018). Part of the explanation certainly lies with cultural gender norms and identity. Cultural economics has established that the beliefs, preferences and attitudes of a group could persist over time and be transmitted across generations, even after the grounds on which they formed in the first place, such as institutions, regulations, or markets, have disappeared.[1] In this paper we identify the persistence of Soviet culture under which traditional gender norms have been partly undone. We study the natural experiment created by the sudden Jewish immigration from the Former Soviet Union (FSU) to Israel in the early 1990's. Analyzing the educational and occupational choices of young Israeli women depending on their origin, we document the vertical persistence and horizontal diffusion of Soviet culture in two main dimensions: the valorization of Science, Technology, Engineering and Mathematics (STEM) and female attachment to paid-work.

For 45 to 70 years, in the socialist bloc, the priority given to science and engineering within education and research paralleled that of the military-industrial sector within the economy: both were instrumental in the economic competition and arms race with the Western capitalist world, in particular the United States (Graham, 1993). These countries also developed institutions aimed at promoting full employment (and fertility) of both men and women, harnessed to the objective of rapid industrial growth. Since 1970 onward, women constantly made up half of the Soviet labor force (51%), and about 60% of skilled workers with an average or higher level of education (Goskomstat USSR, 1989, 1990). As underlined in the 1989 Soviet statistical yearbook, even physically difficult occupations comprised as much as 20% of female workers— 25% in the construction sector for example. This involvement in the labor market, in turn, influenced the work values of women, and, more generally, modified the conception of gender roles and identity

[1]The vertical durability of culturally inherited attitudes has been illustrated, inter alia, in the domain of violence (Grosjean, 2014), political attitudes (Alesina and Fuchs-Schündeln, 2007), time preference and trust (Algan and Cahuc, 2010; Alesina *et al.*, 2013), development (Ashraf and Galor, 2013; Spolaore and Wacziarg, 2013), and gender norms (Giuliano, 2007; Fernández and Fogli, 2009; Lippmann *et al.*, 2020).

(Buckley, 1981; Wolchik, 1981, 2019; Haan, 2012). The persisting legacy of these attitudes and their consequences in terms of labor market participation, school performance, and family arrangements, has been documented in several studies, particularly with respect to the episode of division and reunification of Germany (Cooke, 2007; Bauernschuster and Rainer, 2012; Görges and Beblo, 2015; Campa and Serafinelli, 2018; Lippmann and Senik, 2018; Lippmann *et al.*, 2020). In the same vein, this paper exploits the natural experiment of cultural mix formed by the massive migration from the FSU to Israel in the early 1990's.

The fall of the Iron Curtain in 1989 triggered an unprecedented migration of Jews from the FSU to Israel, sustained by the long-awaited freedom to emigrate, the collapse of the socialist economic system, and the Law of Return, by which Israel grants Jewish immigrants free access, immediate citizenship and benefits.[2] Within the span of 5 years, over 800,000 immigrants arrived in Israel, whose population at the time was around 4.5 million. This addition of nearly 20% to the country's population, came with substantial variations in the concentration of FSU immigrants across municipalities and schools in Israel. These features create the experimental conditions for identifying the cultural persistence and diffusion of Soviet-type gender norms.

We use rich longitudinal administrative data—tracking students' educational achievement and choices from middle school through tertiary education—to follow a synthetic cohort of female students born in 1988 and 1989, of which nearly 15% were born in the FSU and 4% were born in other countries.[3] These FSU immigrants, while born abroad, arrived in Israel as infants or young children, and were exposed to the same institutional setting as natives and other immigrants throughout the educational pipeline and in the labor market. We use standardized tests scores taken by the entire population of this cohort in eight grade in order to capture any early differences in

[2]The Law of Return considers as Jewish any person with one Jewish grandparent or who is married to a Jew. Under similar criteria and for varying periods of time, Jews from the FSU were also allowed access to the United States and Germany. Cohen *et al.* (2011) compare Jewish immigrants across these three destinations and find indications that there was positive selection of migrants to the USA, and no discernible differences among migrants to either Israel or Germany.

[3]In appendix, Table A1 shows that of the immigrants from former Communist countries, only 1.4% were born in formerly socialist Central European countries outside of the Soviet Union. For brevity, we hereafter refer to the whole group as FSU immigrants.

skills, family and social environment across students.[4] These tests predate any track or study field choices and therefore serve as an anchor that allows isolating the influence of culture on students' subsequent choices.

It turns out that FSU immigrant girls show a particularly marked preference for STEM subjects in high school compared both to natives and other immigrants. This holds, notwithstanding their early achievement as measured in eight grade, their parents' education or their family income. In tertiary education, they remain over-represented in STEM but also move into other fields, such as economics, business and management. But most strikingly, they do not follow the general overwhelming female self-selection into study fields leading to "pink-collar" occupations, such as education and social work. We complement these findings using the National Income and the Labor Force Surveys to describe the allocation of female natives and immigrants into occupations, working hours and wage levels. It appears that FSU immigrant women exhibit stronger labor force attachment, as shown by their selection into occupations characterized by longer working hours and higher wages, especially within skilled occupations. Their choices thus seem to be made in view of the labor market, rather than their role as a mother or a wife, to a greater extent than other women in Israel.[5] In doing so, they continue to express the Soviet gender norms regarding STEM and labor market attachment.

In addition to this vertical persistence we find evidence of horizontal diffusion of these norms to native women. The propensity of native-born young women to choose tertiary STEM (resp. pink-collar) study fields increases (resp. decreases) as the concentrations of FSU immigrants in their lower-secondary school increases. This convergence takes place in spite of the lower socio-economic background of pupils who attend such schools, which, as a rule, is detrimental to demanding educational investments such as mathematics and STEM.

Our findings contribute to three current lines of research. First, they shed light on gender segregation in education and in paid-work, especially concerning women with higher education. In

[4] Israel's Growth and Effectiveness Measures for Schools (GEMS) include four tests in Hebrew, mathematics, science and technology, and English.

[5] see Chiappori *et al.* (2017, 2018) for a discussion of labor market returns versus marriage market returns to female education.

many industrialized countries, these choice patterns are characterized by two main stylized facts: female under-representation in high income, hours-intensive occupations, such as STEM fields, and over-representation in lower-wage, less time-intensive occupations, such as teaching.[6] Recent literature has focused on estimating gender differences in preferences vis-à-vis the content matter of occupations and job characteristics. Cortes and Pan (2018), in a review of the literature on gender occupational segregation, highlight the importance of preferences for characteristics, such as family-friendliness or "work with people rather than things".[7] Our paper highlights the fact that these "female" preferences are themselves culturally conditioned, as suggested by Akerlof and Kranton (2000). Moreover, the relationship between the concentration of FSU immigrants and the choice patterns of natives indicates that these preferences, while persistent, are not fully fixed, but can be influenced by the social context.

We also contribute to cultural economics, by providing empirical evidence of both vertical and horizontal diffusion of norms, such as proposed by Bisin and Verdier (2011), and illustrated by epidemiological studies, which study individuals from different cultural backgrounds functioning within the same institutional setting (Fernández and Fogli, 2009; Fernández, 2011; Nollenberger *et al.*, 2016). Our findings agree with the recent stream of research that identifies the persistence of social norms inculcated during the Socialist era in Eastern Europe, years after the institutions which enforced these norms have been long gone. We expand this literature by showing evidence not only of the persistence of such norms among descendants of those who experienced these regimes, but also of diffusion among other groups with whom they come in contact. Close to our work, a recent article by Jarotschkin and Zhuravskaya (2019) illustrates how the initial gender norms of Germans and Chechens, who were deported from the Western parts of the USSR to Central Asia and Siberia, have been durably modified by the exposure to that of local populations. Another recent paper by Schmitz and Weinhardt (2019) documents how the migration of East Germans to Western regions

[6]Women's under-representation in STEM occupation, particularly engineering and information technology (Blau and Kahn, 2017) is anticipated in secondary and tertiary education by their under-representation in mathematically intensive study fields, such as physics and computer science (Turner and Bowen, 1999; Riegle-Crumb *et al.*, 2012; Buser *et al.*, 2014; Friedman-Sokuler and Justman, 2016; Justman and Méndez, 2018; Rapoport and Thibout, 2018).

[7]Several studies point to marriage market concerns and family responsibilities (Chiappori *et al.*, 2018; Kleven *et al.*, 2019)

after 1989 has modified the behavior of West German couples, in particular as concerns the labor market participation of women. However, while there is a large body of literature documenting the persistence of culturally conditioned gender norms on female labor force participation and fertility choices, we are the first to examine the persistence with respect to educational and occupational choices.

Finally, our findings relate to a growing literature on the impact of immigration on educational outcomes of natives. Within the large literature dedicated to peer effects in the classroom, several studies have focused on acculturation effects across ethnic groups at school (Cutler and Glaeser, 1997; Hoxby, 2000; Card and Rothstein, 2007). Our work complements that of Gould *et al.* (2009) who illustrate how the concentration of immigrants in primary school negatively affects the retention and matriculation rates of native Israeli children, especially those from lower SES. While our results confirm these findings, they also reveal another type of cultural diffusion, whereby increased exposure to a culturally distinct group, early in the educational pipeline, is associated with the relaxation of traditional gender norms regarding educational and occupational choices. Admittedly, this potential for cultural diffusion may be limited to early exposure: Orrenius and Zavodny (2015) and Anelli *et al.* (2017) identify a crowding-out effect of foreign students on US natives in STEM majors.

The paper proceeds as follows: section 2 describes the data and empirical strategy; section 3 analyzes the achievement and choice patterns of native, FSU immigrants, and other immigrant young women, throughout the educational pipeline to the labor market; section 4 analyzes the effect of FSU immigrants' concentration on natives; and section 5 concludes.

# 2 Data and Empirical Strategy

We use administrative data to follow two cohorts of students enrolled in eighth grade in Israel in 2002 and 2003, throughout their secondary and tertiary education.[8] Within these cohorts, born

[8]The sources of data for our analysis are several administrative data sets merged for our study by Israel's Central Bureau of Statistics using national Identity Numbers: the Population Registry; Ministry of Education's registry of

in 1988-1989, most FSU immigrants arrived before the age of six, which is the school starting age in Israel, hence were exposed to the same institutional setting as natives and other immigrants throughout the educational pipeline and in the labor market.[9] Our longitudinal dataset contains individual level data on: family socio-economic characteristics; municipality of residence; middle and high school characteristics; eighth grade achievement; twelfth grade attainment measures; matriculation study fields and scores; and tertiary education application preferences and entrance scores, study field, and degree completion. We identify immigrant students by their country of birth as recorded in the Population Registry.

## 2.1 Educational data and descriptive statistics

For the purpose of this analysis, our synthetic cohort is comprised only of female students attending Hebrew-language schools, the vast majority of whom were born in 1987 to 1989.[10] Our measure of individual eighth-grade achievement is taken from Israel's Growth and Effectiveness Measures for Schools (GEMS, "meitzav" in Hebrew), a set of four standardized tests in Hebrew language, mathematics, science and technology, and English. In 2002 and 2003 all schools in Israel with an eighth grade, except most ultra-orthodox schools, were split into two balanced samples of equal size, with half the schools participating in GEMS tests in 2002 and the other half in 2003. Our synthetic cohort is a composite of these two half-cohorts of eighth grade students, which is representative of the full population of schools. We limit our study sample to students who have at least two of the four GEMS scores, and information on at least one of the parents' education.[11] This leaves us with a study sample of 30,795 students, of whom 18.4% are immigrants.

students enrolled in 8th-grade in two consecutive school years, 2001/2 and 2002/3 (we refer to them in what follows as 2002 and 2003); the Ministry of Education's matriculation records of students enrolled in 12th grade in 2005/6 and 2006/7; Israeli Central Bureau for Statistic's registry of higher education; National Institute for Testing and Evaluation Psychometric database; and Tax Authority database.

[9] We perform the same analyses limiting our immigrant sample to those who immigrated prior to 1995 and results remain qualitatively unchanged.

[10] We do not include students in Arabic language schools, as the immigrants did not generally enter into these school.

[11] When we use the GEMS scores as explanatory variables we impute missing GEMS scores by regressing each GEMS score on the other scores and on all available background characteristics for students with all scores, and use the regression to predict missing scores. For a detailed discussion of attrition patterns see Friedman-Sokuler and Justman (2016)

The top panel ot Table 1 presents the demographic and socio-economic status characteristics of the three groups in eighth grade. As expected, the average income level of immigrant families is lower than that of natives.[12] With respect to parents' education, fathers' years of education are slightly higher on average among immigrants compared to natives. However, the two immigrant groups diverge with respect to maternal education— mothers of FSU immigrants are more educated compared both to natives and other immigrants, reflecting the higher level of female education in the FSU. The bottom panel of Table 1 shows that in eighth grade, FSU immigrants outperform all other groups in math, and are the lowest performers in Hebrew. All differences in achievement across groups are statistically significant at the 1% level, except the differences in English.

In our estimation strategy, eighth grade scores serve to capture differences in abilities and early investment, which may affect later study field choice. Figure 1 plots the density function of achievement in each of the eighth grade standardized tests, by origin. These figures reveal that overall, the achievement distributions do not differ dramatically by origin, except in Hebrew, where, as expected, natives scores higher and are distinct from immigrants. In the top two figures, we see that already in eighth grade, immigrants from the FSU are slightly over-represented at the top of the achievement distribution in mathematics and science.

Table 2 displays attainment and choice outcomes, which are the focus of our analysis. Young women who immigrated from the FSU are 4-8 percentage points less likely to reach twelfth grade and 2-9 percentage points less likely to obtain a full matriculation certificate ("Bagrut", in Hebrew). To gain access to higher education, students in Israel must obtain a matriculation certificate which includes both mandatory and elective study fields.[13] In high school, students may choose any

[12]FSU immigrant are concentrated in the 2nd and 3rd income quintiles, while other immigrants, which make up a more diverse group as can be seen in Appendix Table A1, are found in the bottom two quintiles as well as in the top.

[13]Full matriculation entails achieving a passing score in seven basic-level mandatory subjects as well as a passing score in at least one advanced-level elective, but students can and often do take two or more electives. Levels of difficulty are represented as numbers of units studied in a subject, generally between one and five. Basic-level mandatory subjects are: 3 units mathematics, 3 units English, 2 units language arts (Hebrew), 2 units history, 2 units Bible studies, 2 units literature and 2 units civics. Any of these subjects can be taken as an advanced elective at the 5 unit level. There are over 50 potential elective subjects available to students; the most popular are: biological and physical sciences, computer science (CS), social sciences, languages (mainly Arabic and French), geography and art.

Table 1: Descriptive statistics- family SES measures and scores in eighth grade

| | **FSU immigrant** | | **Native** | | **Other immigrant** | |
|---|---|---|---|---|---|---|
| | mean | s.d. | mean | s.d. | mean | s.d. |
| | | | Demographics | | | |
| Born 1987-89 | 0.99 | 0.10 | 1.00 | 0.05 | 0.98 | 0.13 |
| Emigrated prior to 1996 | 0.69 | 0.46 | — | — | 0.41 | 0.12 |
| Father's years of schooling | 13.13 | 2.84 | 13.01 | 3.03 | 13.19 | 4.99 |
| Mother's years of schooling | 13.35 | 2.69 | 13.12 | 2.78 | 12.82 | 4.55 |
| *Parents' maximal years of schooling* | | | | | | |
| <12 | 0.19 | 0.40 | 0.12 | 0.33 | 0.23 | 0.42 |
| 12 | 0.20 | 0.40 | 0.41 | 0.49 | 0.21 | 0.41 |
| 13-15 | 0.34 | 0.47 | 0.21 | 0.40 | 0.17 | 0.38 |
| 15< | 0.26 | 0.44 | 0.27 | 0.44 | 0.39 | 0.49 |
| *Family income quintiles* | | | | | | |
| Lowest | 0.14 | 0.34 | 0.11 | 0.31 | 0.27 | 0.44 |
| Second | 0.28 | 0.45 | 0.15 | 0.36 | 0.21 | 0.41 |
| Third | 0.30 | 0.46 | 0.20 | 0.40 | 0.16 | 0.37 |
| Fourth | 0.21 | 0.41 | 0.25 | 0.43 | 0.13 | 0.34 |
| Highest | 0.07 | 0.25 | 0.29 | 0.45 | 0.22 | 0.42 |
| | | | Eighth grade achievement | | | |
| Mathematics | 54.87 | 23.60 | 53.44 | 23.06 | 49.66 | 23.61 |
| Science | 63.70 | 19.81 | 65.05 | 17.30 | 62.03 | 18.83 |
| Hebrew | 62.99 | 21.71 | 69.34 | 16.73 | 63.95 | 20.42 |
| English | 81.62 | 19.08 | 81.04 | 18.97 | 82.65 | 19.49 |
| N | 4,458 | | 25,054 | | 1,283 | |
| Share | 0.14 | | 0.81 | | 0.04 | |

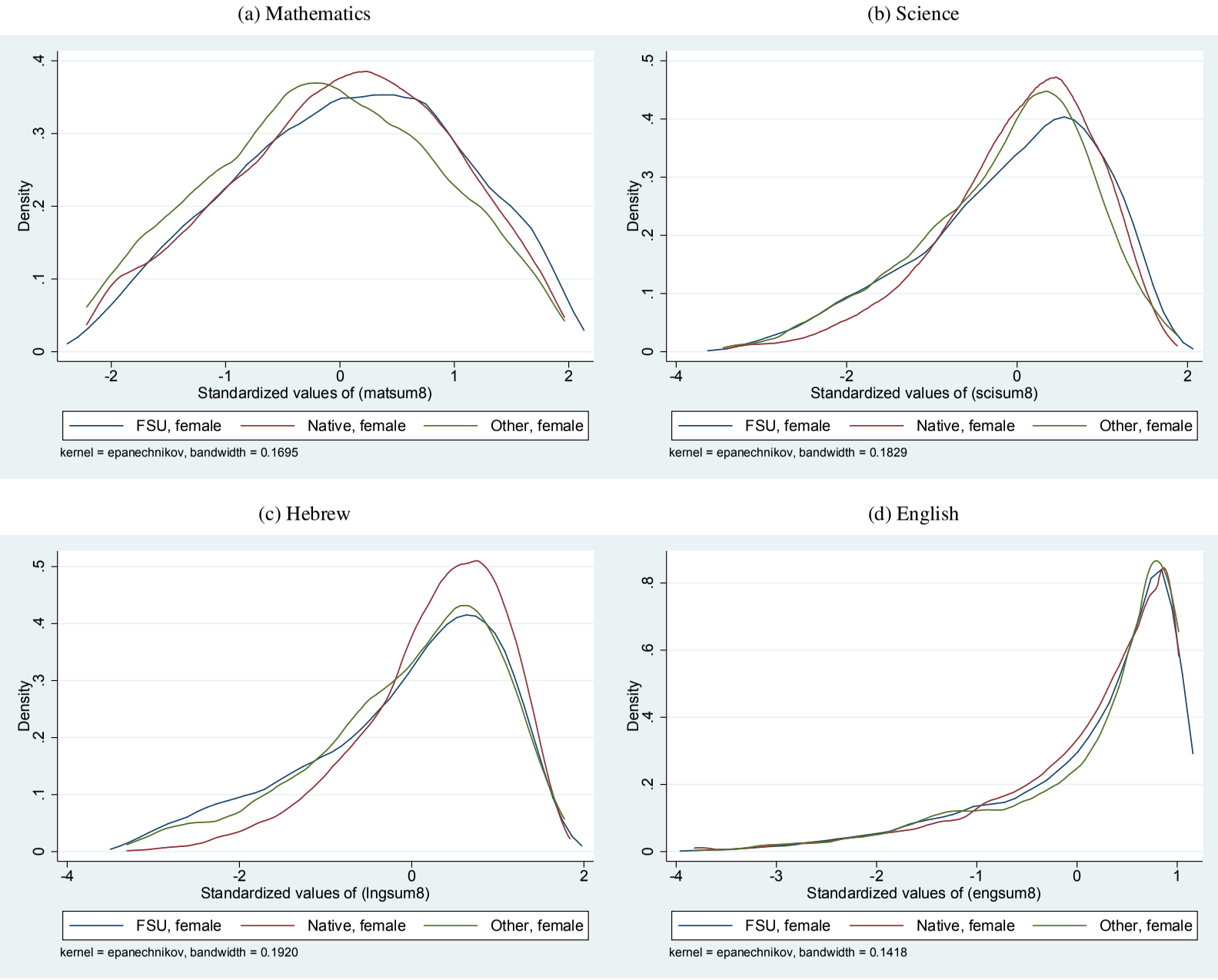
number of electives; they usually take between 1 and 3 subjects, and generally face no constraint on the combination thereof.[14] While FSU immigrants are less likely overall to matriculate, they are significantly more likely than natives and other immigrants to take advanced mathematics and STEM matriculation electives, and less likely than natives to take social sciences matriculation electives.

The second prerequisite for admission into most tertiary programs is the psychometric test (similar to the SAT in the United States).[15] The psychometric test is most commonly taken in the

[14]Some schools offer set programs with specific combinations such as physics and computer science or dance and theater, but these combination vary widely across schools.

[15]The test, including the language skills section, can be taken in a wide variety of languages, including Russian.

Figure 1: Distribution of students over eighth grade achievement (standardized), by origin group and subject




Notes: Density functions estimated using kernel-density of standardized GEMS scores.

year when individuals apply to tertiary education, around the age of 22.[16] While FSU immigrants take this exam at a similar rate as natives, and more than other immigrants, their propensity to actually enter tertiary education is significantly lower than other groups. This may be related to their relatively lower average scores in both matriculation and psychometric exams (shown in the bottom panel of Table 2), as well as to their higher propensity to go study abroad.

In tertiary education, students apply to subject-specific programs, with subject combinations usually occurring within field, e.g. political science and psychology, which both belong in social sciences. The relationship between occupational choice and field of study is strong at the tertiary level and less so in the secondary level. For example, taking STEM matriculation electives may increase the likelihood of admission into some tertiary STEM programs, but is not usually a prerequisite for admission. On the other hand, the content of many bachelor degrees, such as nursing, engineering and teaching, is strongly related to specific occupations and often include occupational accreditation or preparation, in addition to the academic degree (Central Bureau of Statistics, 2009).

In our analysis we distinguish four groups of study fields: STEM, "pink collar", economics and business, and social sciences. The first categories are closely related to labor market occupations. STEM mainly comprises engineering degrees as well as traditional sciences. Pink collar includes study fields that are directly related to traditionally female-dominated occupations, especially within the care sector—teaching, nursing and social work (Weinberg, 2000). Economics and business includes fields such as accounting and management.[17] Finally, within social sciences, the largest category overall, most fields do not directly link to occupations at the undergraduate level.[18]

The bottom panel of Table 2 shows that, in line with our cultural hypothesis, FSU immigrants are at least 30% more likely that other women to study in STEM fields, and 50% less likely to

[16]Entrance to tertiary education in Israel is delayed due to mandatory military service. In our sample, the average age of entering tertiary education is 23.2 for FSU immigrants, 23.5 for natives and 23.9 for other immigrants.

[17]For the list of subjects included in each category, see Table A2 in the appendix.

[18]Our classification slightly differs from that of the Israeli higher education system, where, for instance, both economics and social work belong in social sciences, whereas, in our context, they are sorted into other categories.

study in pink collar fields. FSU immigrants are also less likely to study a general degree in social sciences, and more likely to study economics and business.

Table 2: Descriptive statistics- attainment and choice outcomes

| | **FSU immigrant** | | **Native** | | **Other immigrant** | |
|---|---|---|---|---|---|---|
| | mean | s.d. | mean | s.d. | mean | s.d. |
| | | | Secondary education | | | |
| Retention, 12th grade | 0.89 | 0.31 | 0.97 | 0.17 | 0.93 | 0.26 |
| Full matriculation | 0.61 | 0.49 | 0.70 | 0.46 | 0.63 | 0.48 |
| *Matriculation electives* | | | | | | |
| Advanced mathematics | 0.18 | 0.39 | 0.14 | 0.35 | 0.12 | 0.32 |
| STEM | 0.33 | 0.47 | 0.26 | 0.44 | 0.24 | 0.43 |
| Social sciences | 0.28 | 0.45 | 0.34 | 0.47 | 0.27 | 0.44 |
| *Matriculation scores (weighted)* | | | | | | |
| Mathematics | 68.38 | 38.75 | 76.76 | 34.66 | 71.87 | 37.00 |
| Hebrew | 60.59 | 31.83 | 69.08 | 25.87 | 64.98 | 29.11 |
| English | 53.80 | 31.71 | 56.99 | 28.18 | 58.93 | 32.04 |
| | | | Tertiary education | | | |
| Took psychometric test | 0.55 | 0.50 | 0.56 | 0.50 | 0.53 | 0.50 |
| Entered tertiary education | 0.50 | 0.50 | 0.63 | 0.48 | 0.56 | 0.50 |
| *Psychometric scores* | | | | | | |
| Mathematics | 107.94 | 19.12 | 111.76 | 18.74 | 107.99 | 19.27 |
| Hebrew | 102.66 | 20.48 | 112.70 | 19.31 | 106.97 | 21.16 |
| English | 110.45 | 22.83 | 109.29 | 23.71 | 115.98 | 23.84 |
| *Study field* | | | | | | |
| STEM | 0.13 | 0.33 | 0.10 | 0.30 | 0.08 | 0.27 |
| Pink collar | 0.07 | 0.25 | 0.14 | 0.35 | 0.13 | 0.33 |
| Economics, business and management | 0.11 | 0.31 | 0.11 | 0.31 | 0.08 | 0.27 |
| social sciences | 0.10 | 0.30 | 0.16 | 0.37 | 0.16 | 0.36 |

## 2.2 Estimation

Our estimation strategy contrasts the educational and occupational choices of FSU female immigrants with those of native born Israelis as well as immigrants from other countries (hereafter 'other immigrants').[19] We condition all choices on measures of pupils' early achievement (in eight grade) in addition to observed family socio-economic status. We use early achievement, which

[19]Using other immigrants as a control group serves as a proxy for the effect of "immigration" per se, independently of the cultural background. The main effect of immigration we hypothesize is the poorer of language skills in Hebrew—a trait which is common to all immigrants. Another likely effect of immigration is the depreciation of human and social capital of the parents, which may affect the choices made by their children.

predates any track choice, to account for differences in unobserved early investment and household resources, such as parental human capital. Equation 1 describes the outcome $y$ of individual $i$ in origin group $j = FSU, Native, Other$ in school $s$ as a function of individual characteristics, prior achievement, and prior choice.

$$y_{ijst} = \alpha + \beta_{native} + \beta_{other} + X_i\theta_j + \sum_{a=0}^{t-1} A_{ia}\gamma_{ja} + y_{it-1}\delta_j + u_{ijs} \tag{1}$$
$$u_{ijs} = \omega_{j,2003} + \omega_{js} + \epsilon_{ijs}$$

Each outcome is observed at one of four periods $t = 1, 2, 3, 4$ corresponding to the four stages in the educational pipeline: eighth grade, end of high school, application to tertiary education and tertiary education. The coefficients of interest in Equation 1 are $\beta_{native}$ and $\beta_{other}$, i.e. the difference between FSU immigrants and other groups in terms of outcome, either achievement or choice propensity, conditional on: parental education and family income $X_i$, measures of achievement at prior stages $A_{ia}$;[20] and, when relevant, earlier choices $y_{it-1}$. All coefficients are indexed $j$ and in our most flexible specification are estimated separately by origin. The second line in Equation 1 decomposes the error term $u_{ijst}$ into three components: a cohort fixed-effect $\omega_{j,2003}$ capturing the potential difference in testing regimes across the two parts of our synthetic cohort; a school fixed-effect $\omega_{js}$ capturing potential school-specific environmental factors affecting students' achievement or choices, which we will investigate in section 4; and $\epsilon_{ijs}$, a random error clustered at the school level.

[20] Achievement measures are: a second degree orthogonalized polynomial of the four GEMS scores (mathematics, science, Hebrew and English); matriculation scores in three main mandatory subjects—mathematics, Hebrew and English—weighted by difficulty level; and psychometric exam scores in the same three domains.

# 3 The persistence of Soviet gender norms among immigrants

## 3.1 Matriculation electives choice in secondary education

We begin with a non-parametric analysis and examine the proportion of students choosing different matriculation electives as a function of their eighth grade mathematics achievement. Figure 2 reveals that the choice patterns of FSU students differ substantially from those of other young women. We know that FSU immigrants are more likely to take STEM matriculation electives and are over-represented in the higher deciles of mathematics achievement. But the figure shows that their marginal propensity to choose STEM electives is higher than that of natives and other immigrants, irrespective of their early math achievement. This reveals that the over-representation of FSU young women in STEM is not simply driven by the upper tail of the mathematics achievement distribution.

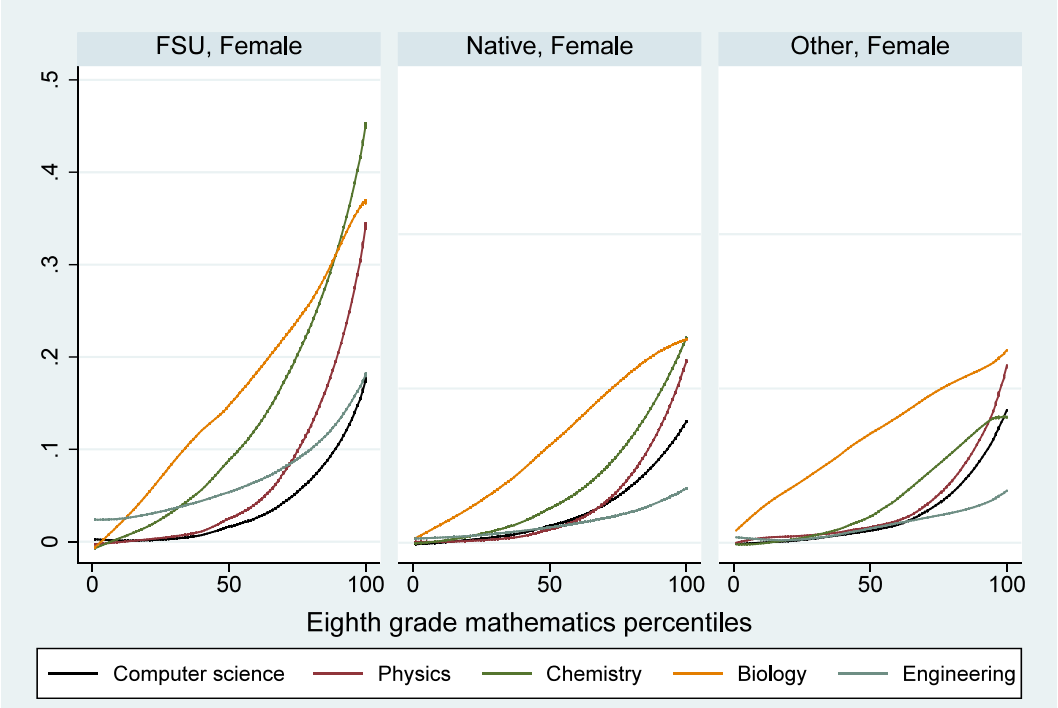
In Table 3 we estimate the difference among origin groups in the propensity to choose matriculation fields conditional on SES and prior achievement, using Equation 1. The top panel of the table reveals that young women born in the FSU are less likely than natives to matriculate and more likely than all other groups to choose the highest level of mathematics, notwithstanding their eighth grade achievement and socio-economic background. Their propensity to take STEM electives is nearly 10 percentage points higher than that of other groups. While prior achievement, in all domains, plays an important role with respect to choosing STEM electives, it accounts for less than a tenth of the gap in favor of FSU immigrants over native students. Conditional on prior achievement and family SES, all immigrants are less likely to study social sciences, and there is no difference between FSU and other immigrants.

## 3.2 Tertiary study field choice

As concerns entrance in tertiary education and choice of tertiary study field by young women from the FSU, we expect two countervailing forces at work: on the one hand, immigration and lower SES are negatively associated with attending tertiary education in general, and specifically

Figure 2: Share choosing matriculation electives over eighth grade mathematics achievement percentiles, by origin group

(a) STEM




(b) Non-STEM

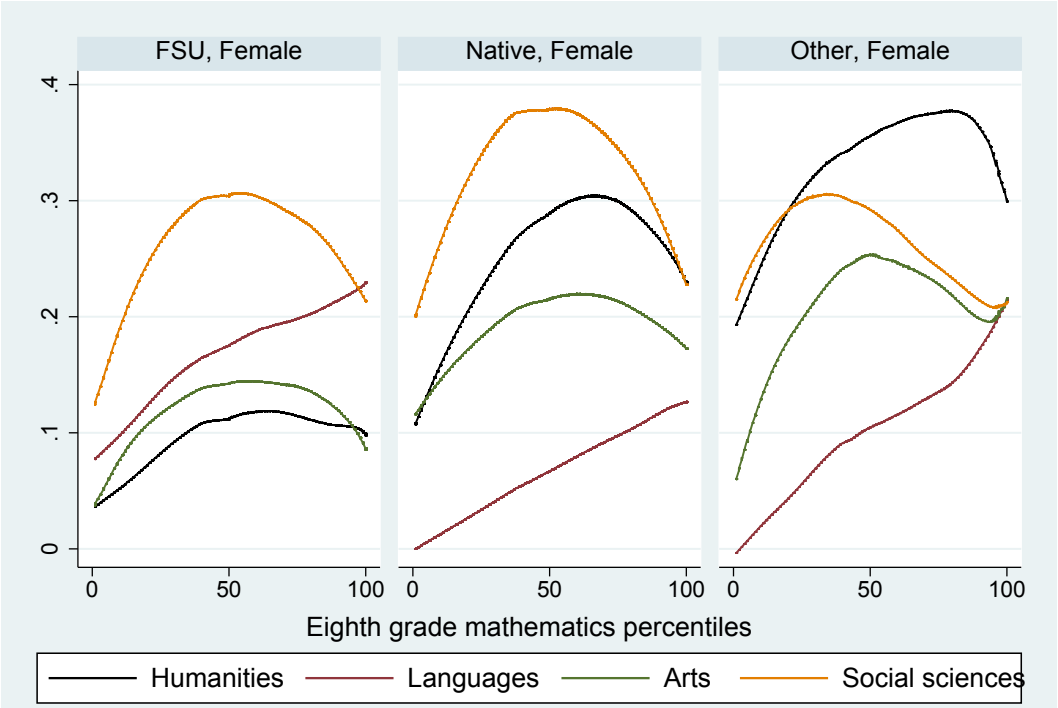


Table 3: Choice of matriculation electives in high school by origin, conditional on SES and prior achievement

| | (1) | (2) | (3) |
|---|---|---|---|
| | Full matriculation | | |
| Native | $0.047^{***}$ | $0.023^{*}$ | $0.025^{**}$ |
| | $(0.013)$ | $(0.012)$ | $(0.010)$ |
| Other immigrant | $0.002$ | $-0.003$ | $0.022$ |
| | $(0.021)$ | $(0.019)$ | $(0.016)$ |
| Constant | $0.678^{***}$ | $0.609^{***}$ | $0.615^{***}$ |
| | Advanced mathematics | | |
| Native | $-0.039^{***}$ | $-0.054^{***}$ | $-0.033^{***}$ |
| | $(0.010)$ | $(0.010)$ | $(0.008)$ |
| Other immigrant | $-0.064^{***}$ | $-0.081^{***}$ | $-0.041^{***}$ |
| | $(0.014)$ | $(0.013)$ | $(0.011)$ |
| Constant | $0.183^{***}$ | $0.118^{***}$ | $0.137^{***}$ |
| | STEM elective | | |
| Native | $-0.097^{***}$ | $-0.115^{***}$ | $-0.095^{***}$ |
| | $(0.014)$ | $(0.013)$ | $(0.011)$ |
| Other immigrant | $-0.106^{***}$ | $-0.118^{***}$ | $-0.076^{***}$ |
| | $(0.020)$ | $(0.018)$ | $(0.016)$ |
| Constant | $0.355^{***}$ | $0.288^{***}$ | $0.295^{***}$ |
| | Social science | | |
| Native | $0.050^{***}$ | $0.035^{***}$ | $0.023^{*}$ |
| | $(0.013)$ | $(0.013)$ | $(0.013)$ |
| Other immigrant | $-0.015$ | $-0.004$ | $-0.013$ |
| | $(0.018)$ | $(0.018)$ | $(0.018)$ |
| Constant | $0.294^{***}$ | $0.348^{***}$ | $0.341^{***}$ |
| *Controls* | | | |
| SES | | yes | yes |
| GEMS | | | yes |
| N | 30,795 | 30,795 | 30,795 |

Dependent variables vary by panel. Coefficients in column (1) are obtained from a LPM with school-level clustered standard errors and a dummy for cohort. In column (2) individual SES indicators are added and in column (3) GEMS scores are added. Omitted categories are parents with 12 years of schooling and third decile of family income. All GEMS scores are normalized to have a mean of 0 and standard deviation of 1, and are included as a second degree orthogonalized polynomial of the four GEMS scores (mathematics, science, reading and English) as well as an interaction term between language and mathematics achievement. Clustered standard errors at the school level in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

selective programs, while on the other hand, the influence of Soviet culture is prone to such investment, and specifically in selective fields such as STEM. Figure 3 shows that with respect to the choice of STEM study fields, the latter force dominates. The share of students choosing STEM tertiary programs is higher amongst the FSU group, within each eighth grade mathematics percentile. Specifically, young women born in the FSU disproportionately choose engineering and physical sciences, and refrain from choosing education and teacher training, as well as social sciences.

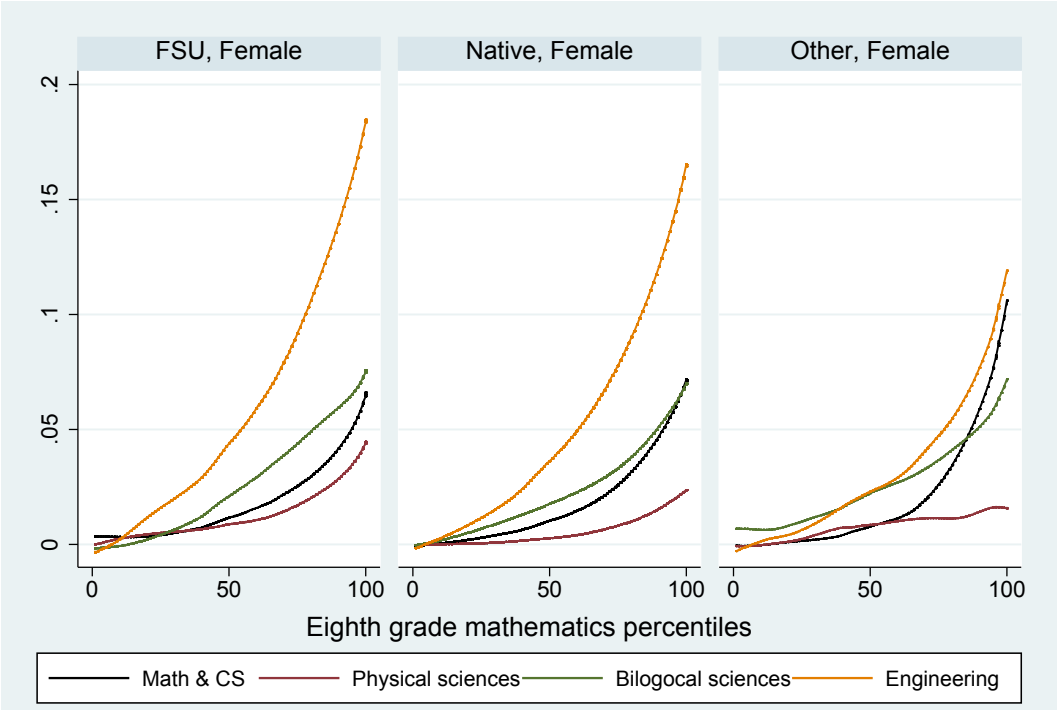
Table 4 displays the estimates of Equation 1 for tertiary outcomes.[21] The top panel of Table 4 shows that FSU immigrants are less likely to enter tertiary education than natives and other immigrants. Estimates in column (3) reveal that high school achievement and choices and psychometric tests explain almost half of this difference. In light of this, when estimating differences in study field choices, all estimations are performed on two samples: the full sample (columns (1)-(3)), and the sub-sample of individuals who took the psychometric test, i.e. those who actively consider entering tertiary education (columns (4)-(5)). The comparison of estimates from each sample enables the distinction between differences in choice driven by group specific selection patterns into higher education and those driven by preferences conditional on entering tertiary education.

The second panel of Table 4 illustrates the choice of STEM study fields. It shows that, even after controlling for eighth grade achievement and family SES, young women born in the FSU are more likely to choose these tracks, and that, as expected, this is particularly true of the tertiary-bound sample. Controlling for secondary school outcomes as well as psychometric test achievement renders the gaps across origin groups small and statistically insignificant, indicating that tertiary STEM choices largely follow secondary education STEM choices. The third panel illustrates the choice of social sciences. Natives' are much more likely to study social sciences than FSU immigrants. The propensity to study social sciences among natives and other immigrants is

[21] There are several criteria by which we can characterize the subset of individuals bound to tertiary education. We show here results for the narrowest subset—those who take the psychometric test. Alternative specification would be individuals taking matriculation exams or individuals with full matriculation upon high school graduation. Under these specifications estimates are closer to those of the full sample.

Figure 3: Share choosing tertiary study fields over eighth grade mathematics achievement percentiles, by origin

(a) STEM




(b) Non-STEM

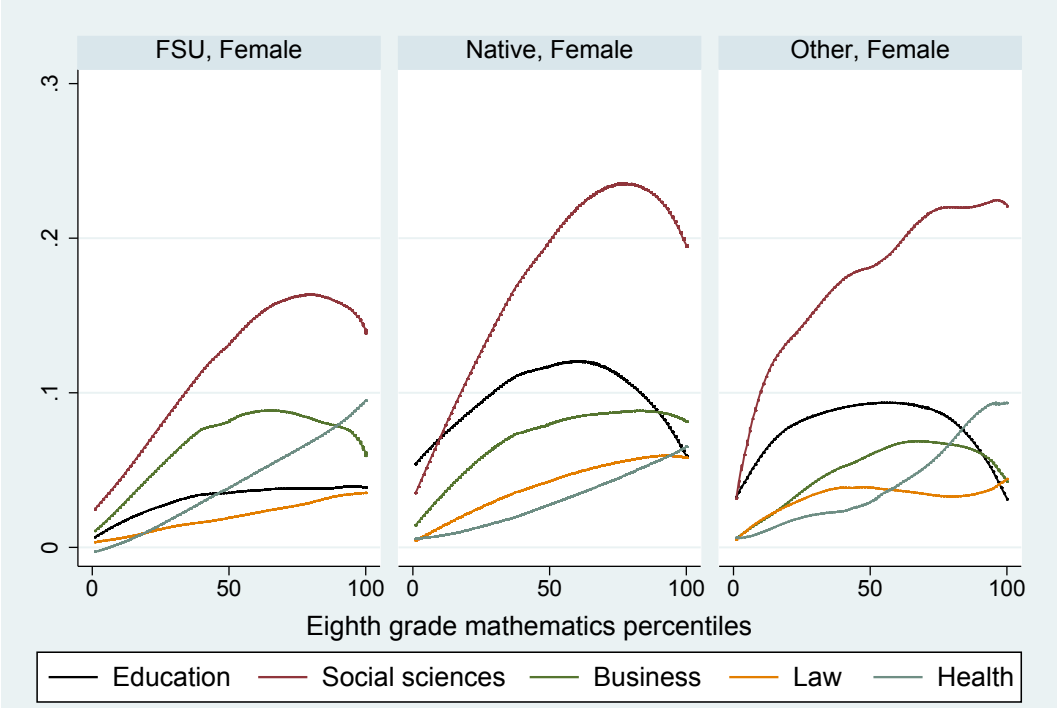


Table 4: Choice of tertiary study fields by origin, conditional on SES and prior achievement

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Studied in tertiary education | | | | |
| Native | $0.133^{***}$ | $0.087^{***}$ | $0.076^{***}$ | $0.108^{***}$ | $0.047^{***}$ |
| | (0.008) | (0.007) | (0.006) | (0.009) | (0.009) |
| Other immigrant | $0.060^{***}$ | $0.062^{***}$ | $0.042^{***}$ | $0.063^{***}$ | $0.041^{***}$ |
| | (0.016) | (0.014) | (0.012) | (0.017) | (0.015) |
| Constant | $0.486^{***}$ | $0.433^{***}$ | $0.231^{***}$ | $0.773^{***}$ | $0.680^{***}$ |
| | STEM study field | | | | |
| Native | $-0.028^{***}$ | $-0.029^{***}$ | 0.003 | $-0.050^{***}$ | $-0.012$ |
| | (0.005) | (0.005) | (0.005) | (0.009) | (0.009) |
| Other immigrant | $-0.050^{***}$ | $-0.040^{***}$ | $-0.005$ | $-0.074^{***}$ | $-0.012$ |
| | (0.009) | (0.009) | (0.009) | (0.016) | (0.016) |
| Constant | $0.128^{***}$ | $0.106^{***}$ | $0.012^{*}$ | $0.224^{***}$ | $0.145^{***}$ |
| | Social sciences[a] | | | | |
| Native | $0.063^{***}$ | $0.045^{***}$ | $0.030^{***}$ | $0.074^{***}$ | $0.030^{***}$ |
| | (0.005) | (0.005) | (0.005) | (0.008) | (0.009) |
| Other immigrant | $0.058^{***}$ | $0.047^{***}$ | $0.028^{***}$ | $0.079^{***}$ | $0.035^{**}$ |
| | (0.011) | (0.011) | (0.011) | (0.018) | (0.018) |
| Constant | $0.098^{***}$ | $0.077^{***}$ | $0.033^{***}$ | $0.153^{***}$ | $0.121^{***}$ |
| | Pink collar | | | | |
| Native | $0.077^{***}$ | $0.067^{***}$ | $0.041^{***}$ | $0.100^{***}$ | $0.020^{**}$ |
| | (0.005) | (0.005) | (0.005) | (0.008) | (0.009) |
| Other immigrant | $0.063^{***}$ | $0.062^{***}$ | $0.029^{***}$ | $0.107^{***}$ | $0.038^{**}$ |
| | (0.010) | (0.010) | (0.010) | (0.018) | (0.018) |
| Constant | $0.065^{***}$ | $0.039^{***}$ | $-0.002$ | $0.113^{***}$ | $0.136^{***}$ |
| | Economics, business and management | | | | |
| Native | $-0.000$ | $-0.011^{**}$ | $-0.011^{**}$ | $-0.021^{***}$ | $-0.007$ |
| | (0.005) | (0.005) | (0.005) | (0.008) | (0.009) |
| Other immigrant | $-0.029^{***}$ | $-0.019^{**}$ | $-0.015^{*}$ | $-0.046^{***}$ | $-0.005$ |
| | (0.009) | (0.009) | (0.009) | (0.014) | (0.015) |
| Constant | $0.111^{***}$ | $0.142^{***}$ | $0.125^{***}$ | $0.162^{***}$ | $0.185^{***}$ |
| SES | | yes | yes | | yes |
| GEMS scores | | yes | yes | | yes |
| Matriculation scores | | | yes | | yes |
| Prior choice | | | yes | | yes |
| Psychometric scores | | | | | yes |
| N | 30,795 | 30,795 | 30,795 | 17,092 | 17,092 |

[a]Social sciences do not include economics and social work which are included in EBM and Pink collar categories respectively.

Coefficients are obtained from a LPM with school-level clustered standard errors and a dummy for cohort. Omitted categories are parents with 12 years of schooling and third decile of family income. All GEMS scores are normalized to have a mean of 0 and standard deviation of 1. All regression include a second degree orthogonalized polynomial of the four GEMS scores (mathematics, science, reading and English) as well as an interaction term between language and mathematics achievement. Robust standard errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

50% higher than that of FSU immigrants among tertiary bound students, and remains 25% higher after controlling for earlier choices and achievement.

The two lower panels of Table 4 relate to study fields that are not usually offered in secondary education. It turns out that FSU immigrants exhibit a strong aversion for pink collar study fields, and are attracted to economics and business study fields[22] Natives and other immigrants are nearly twice as likely to enter pink collar study fields as FSU immigrants. This is true even in the tertiary bound sample, which shows that the low share of FSU immigrants in these fields is not driven by the fact that they do not enter tertiary education (extensive margin), but by their choice of other study fields (intensive margin). These differences are only partially explained by earlier choices and achievement, and remain statistically significant throughout.[23] Conversely, the only non-STEM fields that particularly attract FSU immigrant women are economics, business and management. This distinctive preference sets FSU immigrants apart from other immigrants.

## 3.3 Attachment to work

We now turn to the occupational choices of women. For this purpose, we use the most recent publicly available version of the Israeli Labor Force Survey (2016) and Income Survey (2010), for which detailed data on occupations is available.[24] In this analysis, our sample is not limited to the cohorts studied above, as the latter are slightly too young for their labor market outcomes to be fully informative. Our sample comprises women born 1972-1991, the age group among FSU immigrants that was not likely to be in the labor force prior to immigration.[25]

[22]Pink collar study fields refer to program that are a direct link to female-dominated occupations, mainly education and teacher training, social work and nursing.The full list of programs can be found in appendix Table A2.

[23]When estimating the various pink collar fields separately, the only female dominated occupation in which FSU women are over-represented is nursing and other health related occupations. However, this effect is small relative to their under-representation in education and other pink collar study fields.

[24]In 2011 the Income Survey was canceled and included in the Household Expenditure Survey and the publicly available data contains occupations only at the single digit level.

[25]As in the main analysis, we do not include the Arab population in the labor market analysis. The specific cutoff years were chosen as a function of the age variable in the 2016 LFS which is group as following: 15-17,18-24,25-29,30-34,35-44,44-54, etc. The Income Survey included exact years of birth.

Descriptive statistics from the Labor Force Survey, presented in Table 5, show that educational attainment and presence of children in the household are similar for FSU immigrants and natives and lower for other immigrants. Compared to natives, FSU immigrants are less likely to have a young child at home and to be the single provider in a household.[26] Labor force participation and full time employment rates are similar for FSU immigrants and natives, while lower among other immigrants. However, FSU immigrant women are more likely to work longer hours than a full time job, and less likely to work in part time jobs. Taken together, 61% of FSU women work full time or more, compared to 53% and 54% among natives and other immigrants, respectively.

Table 5: Demographic and labor force characteristics of women aged 25-44, by origin group

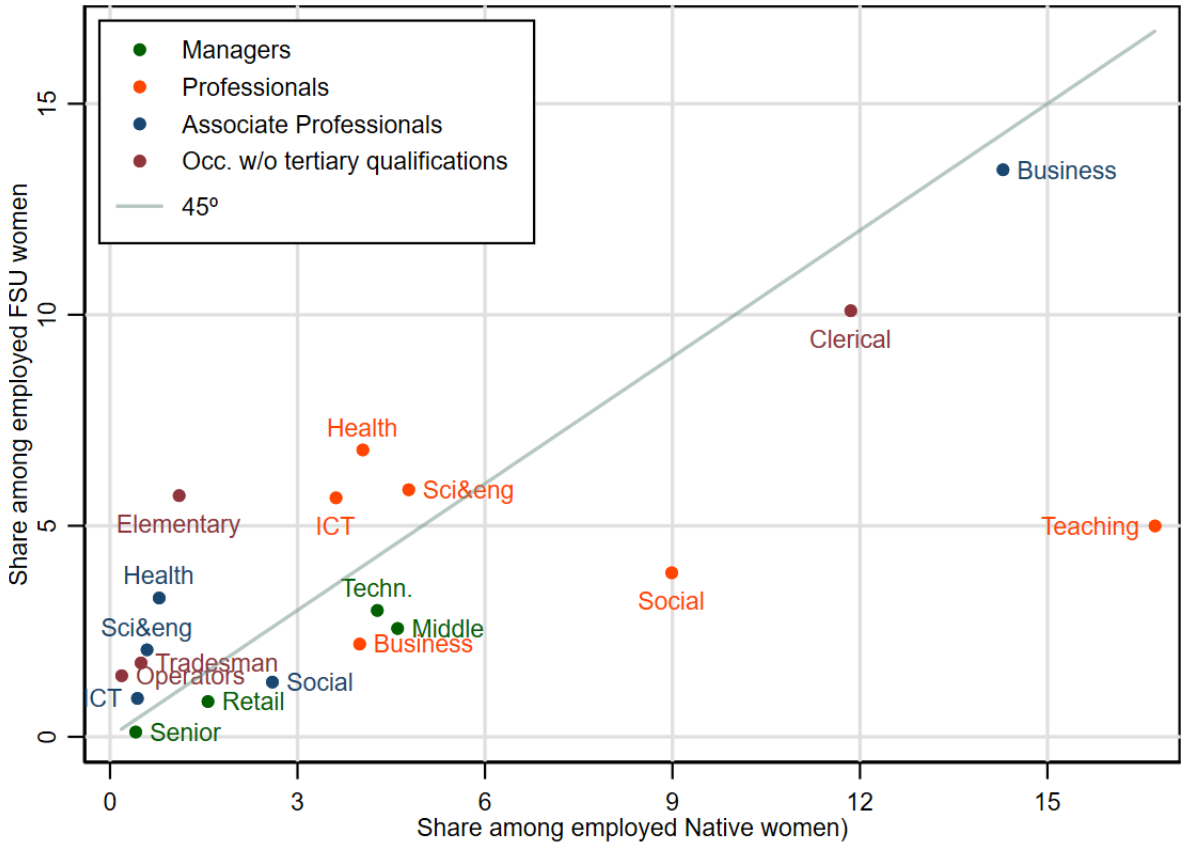
| | **FSU immigrant** | | **Native** | | **Other immigrant** | |
|---|---|---|---|---|---|---|
| | mean | s.d. | mean | s.d. | mean | s.d. |
| | | | Demographics | | | |
| Post-secondary education | 0.66 | 0.50 | 0.66 | 0.50 | 0.52 | 0.53 |
| At least one child | 0.71 | 0.49 | 0.73 | 0.48 | 0.63 | 0.52 |
| At least one child under 5 | 0.40 | 0.51 | 0.51 | 0.53 | 0.43 | 0.52 |
| Other workers in HH | 0.81 | 0.41 | 0.77 | 0.45 | 0.62 | 0.51 |
| | | | Labor force characteristics | | | |
| Does not work | 0.14 | 0.37 | 0.14 | 0.37 | 0.19 | 0.41 |
| *Weekly working hours* | | | | | | |
| Part time (<35) | 0.17 | 0.39 | 0.22 | 0.44 | 0.19 | 0.42 |
| Full time (35-45) | 0.33 | 0.50 | 0.32 | 0.49 | 0.23 | 0.45 |
| Over time (45<) | 0.28 | 0.47 | 0.21 | 0.43 | 0.31 | 0.49 |
| Share reporting hours | 0.78 | 0.44 | 0.75 | 0.46 | 0.73 | 0.47 |
| N | 5,809 | | 25,671 | | 3,747 | |

Source: Labor Force Survey, 2016, Central Bureau for Statistics. $N = 35,227$, sample comprises Jewish female survey respondents, aged 25-44 in 2016. Survey weights are used in calculations. Due to missing data on hours worked for some working individuals, share reporting hours is shown in table.

Figure 4 compares the share among FSU immigrant women in each occupation group, on the vertical axis, to the share among native women in each group, on the horizontal axis. All occupations are categorized according to the ISCO-08 classification, at the 1-digit level. We are especially interested in analyzing occupations associated with human capital investment choices,

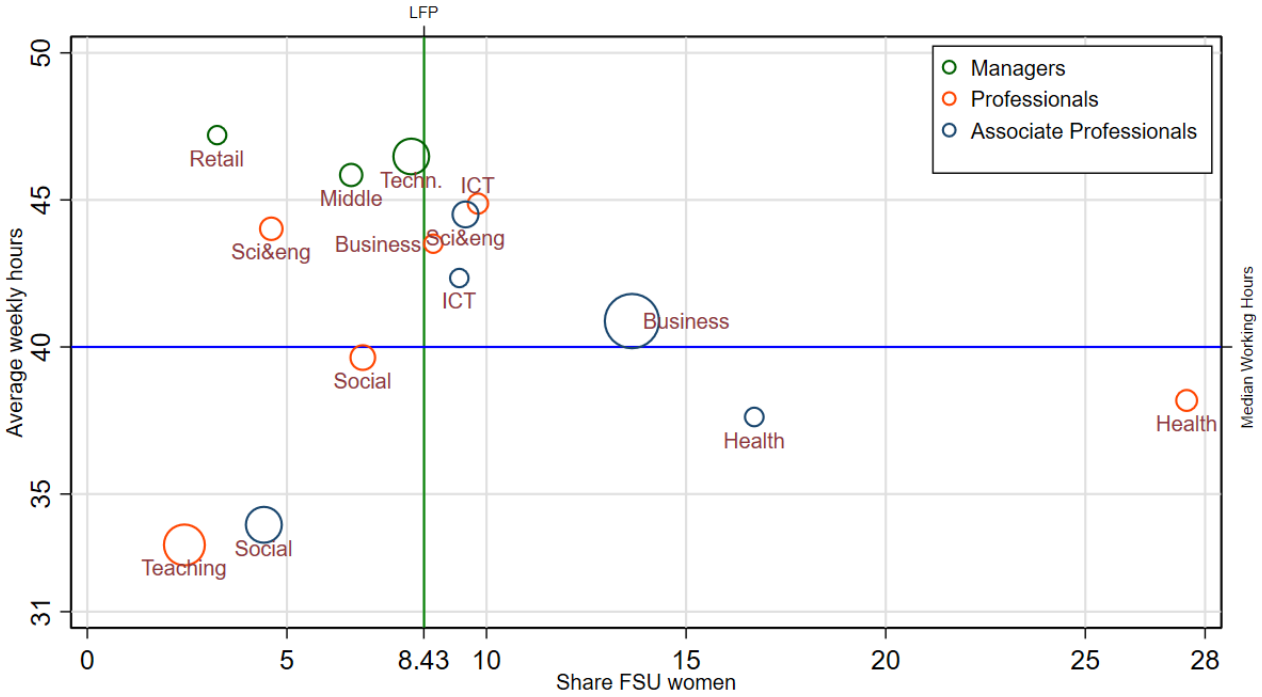
[26]The difference in the presence of young children is driven mainly by the fact that native women are more likely to have three children, while FSU women only two.

Figure 4: Share of Native and FSU immigrants in occupations




*Notes: Authors' calculations using 2016 Labor Force Survey of the Central Bureau for Statistic, Israel. Sample refers to employed female aged between 18 and 45 in 2016. Occupations are defined using ISCO-08 classification, at the 2 digit level for major groups 1,2 and 3; and at the 1 digit level for all other groups.*

Figure 5: Average weekly working hours and share of FSU immigrants by occupation




*Authors' calculations using 2016 Labor Force Survey of the Central Bureau for Statistic, Israel. Occupations are defined using ISCO-08 classification for major groups 1,2 and 3. Share FSU refers to the share of female FSU immigrants aged 18-45 in 2016. Size of circle represents the weight of the occupation in the full female population in survey. Average weekly hours are calculated using working hours of all workers in occupation category.*

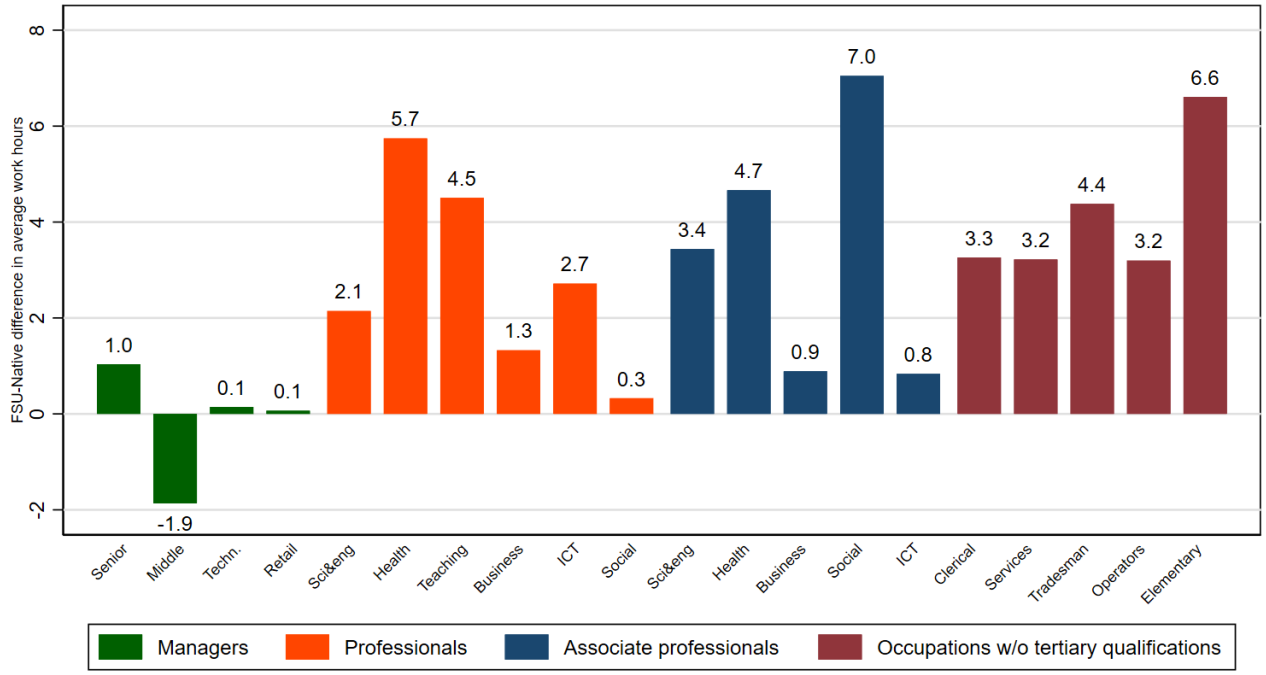
as discussed in the previous sections. Therefore, for skilled occupational categories (managers, professionals and associate professionals), we present occupation categories at the 2-digit level.[27]

Clearly, the structure of FSU female occupations differs from that of natives, as few occupation categories lie on the 45-degree line. In line with the aforementioned study fields choices, only about 5% of women born in the FSU work in teaching occupations, against nearly 17% for Israeli natives. Likewise, much fewer FSU women are found in social work occupations: 4% against 9% among natives. By contrast, they are over-represented in the health sector (often para-medical professions, such as medical laboratory workers), as well as in ICT, and science and engineering.[28]

[27] We include in the analysis only 2-digit level occupations for which we have at least 100 observations in the sample.

[28] In line with the general expected differences between immigrants and natives, native women are more likely to be in managerial occupations while FSU women are more likely to be in unskilled occupations.

Figure 6: Difference in average weekly working hours between native and FSU immigrant women, by occupation

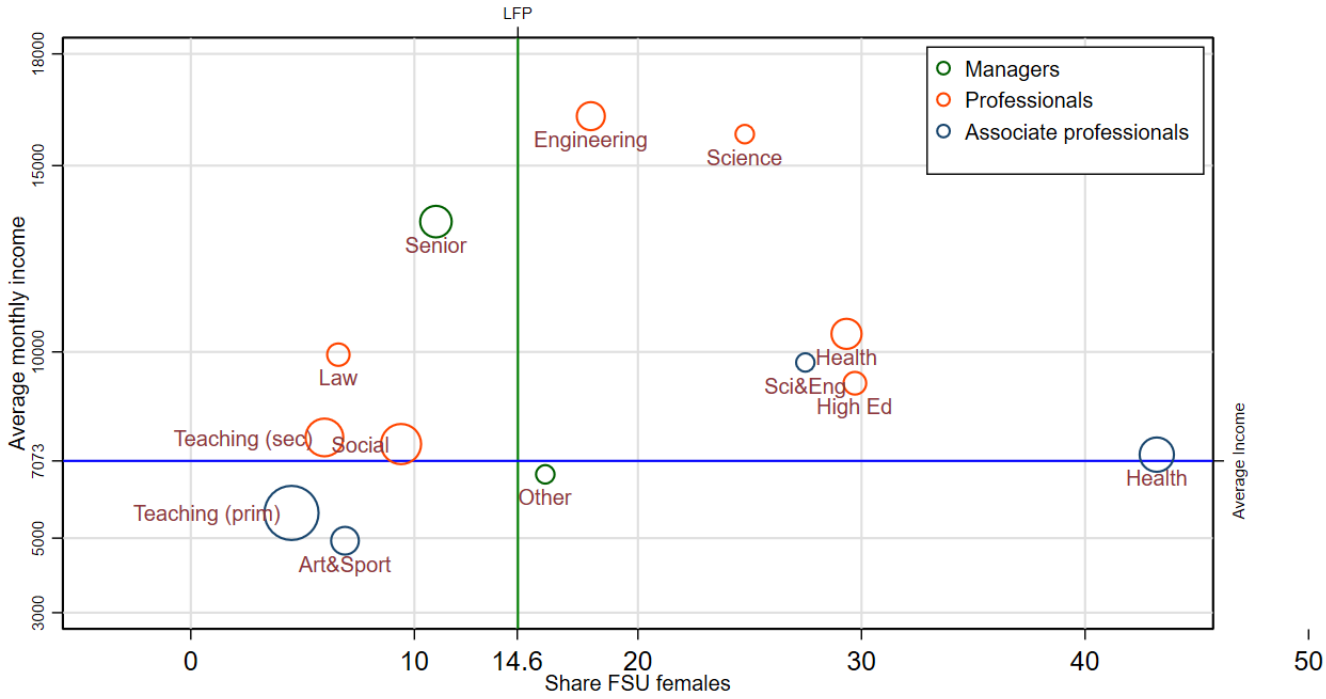



*Notes: Authors' calculations using 2016 Labor Force Survey of the Central Bureau for Statistic, Israel. Occupations are defined using ISCO-08 classification, at the 2 digit level for major groups 1,2 and 3; and at the 1 digit level for all other groups.*

With respect to working hours, Table 5 shows that FSU women exhibit stronger commitment to paid-work than native women. Figure 5 displays the share of FSU female immigrants in skilled occupation categories against the average working hours within the occupation, with circles representing the weight of the occupation in the total female population. The vertical bar represents the share of FSU women in the labor force in our sample. Naturally, most of the action takes place on the left side of the graph, where the dots are aligned along a clear upward trend: the higher the share of FSU immigrant females in an occupation, the higher the average hours worked in that occupation. (Two relative outliers are the health occupation categories which are not large categories, but in which FSU women are over represented).

Figure 6 displays the difference in hours worked between FSU women and native women within occupation categories, and for skilled occupation at the 2-digit level categories. The gap

Figure 7: FSU share by occupation and average monthly income




*Notes: Authors' calculations using 2010 Income Survey of the Central Bureau for Statistic, Israel. Occupations are defined using The Standard Classification of Occupations (1994) for major groups 0,1 and 2. Share FSU refers to the share of female FSU immigrants born 1972-1991 in an occupation among women in the same age group in the occupation. Size of circle represents the weight of each occupation in the full female population in survey. Average monthly income is calculated using monthly income of all workers in occupation category.*

is predominantly positive, implying that even within occupations, FSU immigrant women work longer hours than natives. This gap is particularly large in health occupations. Finally, Figure 7 displays the average wage within an occupation against the share of FSU female immigrants in that occupation, with circles representing the weight of the occupation in the full female population.[29] It turns out that the two magnitudes are positively associated. To the right of the vertical bar, where FSU women are over-represented, wage rates are higher than the general average wage (represented by the horizontal blue bar).[30]

# 4 Horizontal diffusion of Soviet gender norms

Thus far, we established the persistence of Soviet gender norms among young women who were born in the FSU, but experienced their full education within the Israeli education system. This persistence is certainly due to the vertical inter-generational transmission of preferences within families. We now turn to the horizontal channel, which operates through local social interactions between groups. We examine whether the concentration of these culturally distinct (FSU) immigrants in middle school, which represents natives's social environment prior to any field specialization, affects the choice behavior of natives, and discuss the possible mechanisms for such an effect.[31]

Horizontal cultural transmission in our setting may operate through several channels, endogenous or contextual Manski (1993). First, the "stereotype threat" associated with STEM could be reduced by the early exposure of natives to a high share of science-minded female peers. Second, an *endogenous* effect may appear if a high local concentration of FSU immigrants generates a demand for STEM related extra-curricular activities or exerts pressure on local schools

[29] In this survey the occupational categorization followed the Standard Classification of Occupations (1994).

[30] Shares of FSU women in occupation differ from those in the labor force survey for two main reasons. The first, different occupational categorization. The second, while the cohorts across both surveys are identical, in the Income survey the cohorts are 6 years younger and many have not yet entered the labor market, with FSU women entering tertiary education and the labor market earlier than their native counterparts.

[31] This channel may also affect other immigrants. However, given the small sample size and heterogeneity of this group in our context, we cannot reliably analyze this interaction.

to improve the level of STEM teaching, both of which may benefit native students as well.[32] Third, another contextual effect could stem from the local concentration of older immigrant women with STEM careers, serving as role models for young native women.

We construct a variable indicating the share of FSU immigrants among eighth grade pupils within a school.[33] Figure 8 shows that approximately 10% of native students attend schools with no FSU immigrants and half of the population attends schools with a share of FSU immigrants ranging between 5% and 23%. This variation creates the opportunity to test for social interactions stemming from early exposure to distinct cultural gender norms. This measure can be viewed as exogenous to students' preferences because in Israel, families generally do not choose primary and middle schools, but are allocated to them according to catchment areas defined by neighborhood of residence.[34] This implies that we cannot disentangle the effect of the neighborhood from the effect of the school, inasmuch as the concentration of FSU immigrants in a school also proxies the ethnic composition of the neighborhood.

One major challenge for our identification of horizontal transmission is to check that the concentration of FSU immigrants in a school is not driven by self-selection.[35] In our context, this could be the case if FSU immigrants were attracted to neighborhoods with a high share of relatives working in STEM occupations, or if they chose their location based on the quality of schools with respect to STEM education. We therefore begin our analysis by examining the characteristics of schools attended by FSU immigrants and their municipalities of residence.

It is well documented that the prevalence of STEM study fields is positively correlated with the SES of students (Friedman-Sokuler and Justman, 2016). In Israel, immigrants arriving in the 1990's (predominantly from the FSU) concentrated in municipalities and neighborhoods where the

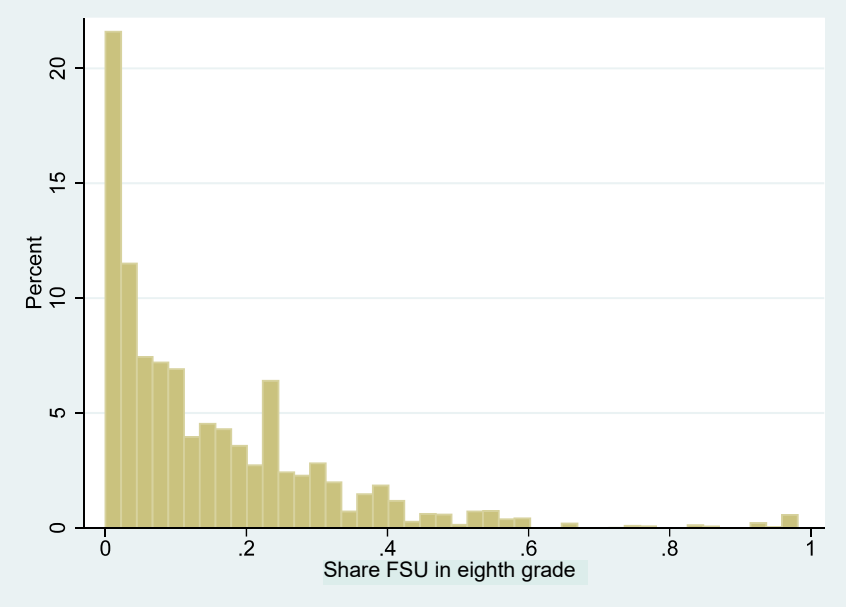
[32]While schools, especially in elementary and middle schools have little control over curriculum, they can affect small shifts at the margins- especially through the choice of supplementary programs, supplied by the non-governmental sector

[33]Grade (school) level variables are constructed using all students in the grade (school), irrespective of their inclusion in the study sample. For instance, the share of immigrants includes both male and female students, as well as students who have not taken any of the GEMS.

[34]There was no school choice in Israel prior to high school in the years we are considering.

[35]This is what Manski (1993) calls *correlated* effects.

Figure 8: Distribution of share of FSU immigrants in eight grade




*Notes:* $N = 29,349$. *Grade level characteristics are are calculated only for schools for which we observe at least 10 students at the grade level. Horizontal axis represents the share of FSU immigrant in the grade level of the individual in the year in which they attended eighth grade.*

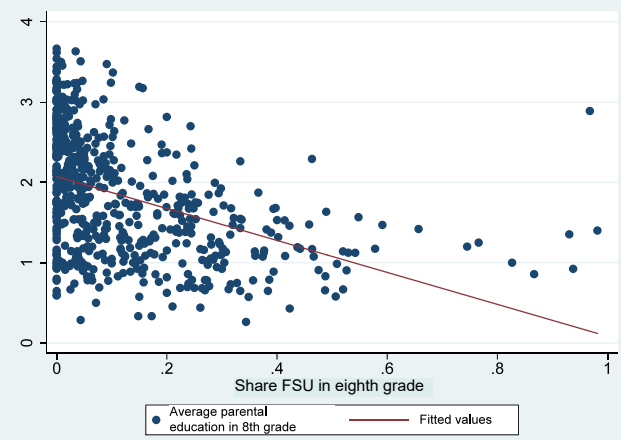
native population had lower socio-economic status (Gould *et al.*, 2009).[36] Plots (a) and (b) in the top panel of Figure 9 confirm this rule, and show that the share of FSU immigrants in a school is negatively correlated with the average education and income of native families in the school. The bottom two panels of Figure 9 use individual-level data and depict the relationship between the characteristics of municipalities of residence and the share of FSU immigrants in eighth grade.[37] Naturally, the share of FSU students in the eight grade of a school depends on the share of FSU immigrants in the local population as measured both in the 1995 and the 1983 census (prior to the mass immigration wave), as shown in plots (c) and (d). The plot (e) of Table 9 shows that the share of FSU immigrants in a school is negatively correlated with the municipality employment level. It

[36]The essential reason for this is lower housing prices, as well as government construction programs meant to meet the high housing demand after the wave of immigration from the FSU.

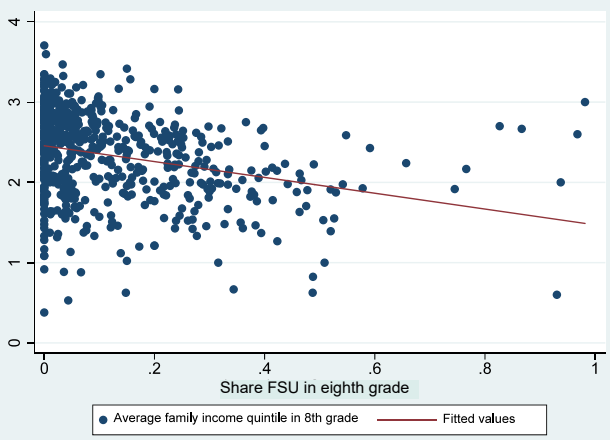
[37]For municipality data, we use the 1995 Population Census, which offers detailed data at the municipality level, irrespective of size. The census is supposed to happen once every 10 years, and 1995 census is the latest census to occur before our sample attended eight-grade in 2002-2003. The next census occurred in 2008.

Figure 9: Share of FSU immigrants in eight grade, and selected features of schools and municipalities of residence

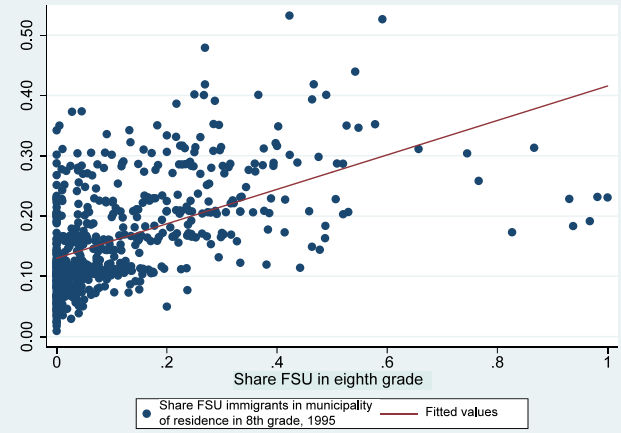
(a) School average parental education



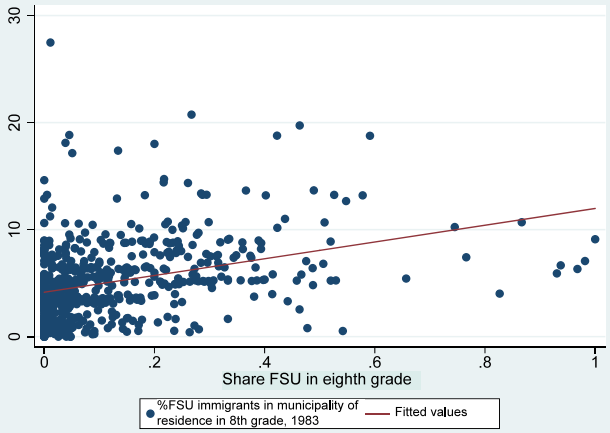

(b) School average family income quintile



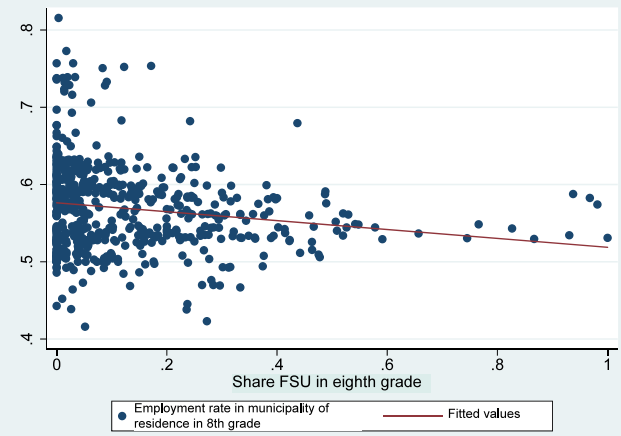

(c) Share FSU immigrants in municipality, 1995



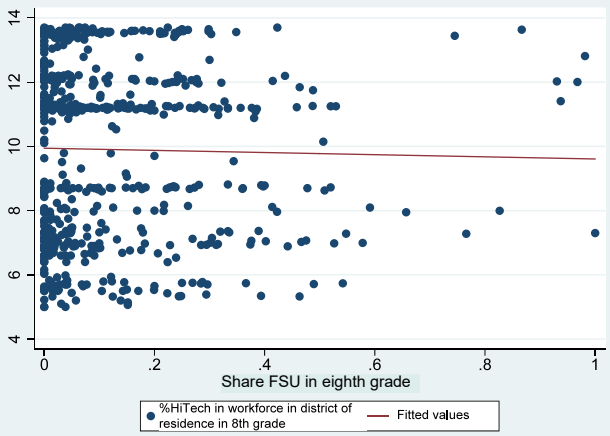

(d) Percent FSU immigrants in municipality, 1983




(e) Employment rate in municipality, 1995




(f) Percent in Hi-Tech occupations in district/sub-district




*Notes: In the top panel, each dot represents a school, $N = 553$, In the bottom two panels dot represent individual students.*

is also unrelated to the share of High-Tech employees in the district of residence (plot (f)) (Central Bureau of Statistics, 2017).[38]

Table 6: Impact of FSU immigrant concentration in eighth grade on natives

| | **(a) GEMS scores** | | | |
|---|---|---|---|---|
| | English | Hebrew | Mathematics | Science |
| Without SES controls | | | | |
| $\%\ FSU\ 8^{th}\ grade$ | -0.078*** | -0.124*** | -0.102*** | -0.031 |
| | (0.026) | (0.022) | (0.029) | (0.027) |
| $\%\ FSU\ 8^{th}\ grade^2$ | -0.010 | 0.032** | 0.013 | 0.013 |
| | (0.016) | (0.015) | (0.018) | (0.017) |
| With SES controls | | | | |
| $\%\ FSU\ 8^{th}\ grade$ | 0.079*** | -0.002 | -0.003 | 0.050* |
| | (0.023) | (0.023) | (0.032) | (0.030) |
| $\%\ FSU\ 8^{th}\ grade^2$ | -0.036*** | 0.008 | 0.002 | 0.003 |
| | (0.012) | (0.013) | (0.017) | (0.015) |
| $N$ | 22,596 | 23,409 | 22,146 | 21,899 |
| | **(b) Attainment and choice** | | | |
| | Full matriculation | STEM matriculation | STEM tertiary | Pink-collar tertiary |
| Without SES controls | | | | |
| $\%\ FSU\ 8^{th}\ grade$ | -0.325*** | -0.120** | -0.046 | -0.469*** |
| | (0.053) | (0.055) | (0.047) | (0.056) |
| $\%\ FSU\ 8^{th}\ grade^2$ | 0.079** | 0.015 | -0.032 | 0.166*** |
| | (0.033) | (0.031) | (0.036) | (0.028) |
| With SES controls | | | | |
| $\%\ FSU\ 8^{th}\ grade$ | -0.081 | -0.030 | 0.178*** | -0.248*** |
| | (0.053) | (0.063) | (0.050) | (0.053) |
| $\%\ FSU\ 8^{th}\ grade^2$ | 0.032 | 0.013 | -0.062* | 0.087*** |
| | (0.031) | (0.032) | (0.033) | (0.030) |
| $N$ | 24,184 | 24,184 | 24,184 | 24,184 |

Sample comprises native students only. Coefficients reported are logit regression estimates. Dependent variables vary by vertical panel. The variable 'Share FSU in 8th grade' is standardized with mean 0 and standard deviation of 1. Individual SES controls include family income quintiles and parents' highest level of education. School level controls include the means of income and education measures at the school level (including three cohorts). Robust standard errors, or clustered at school level in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 6 estimates equation 1 for native students only, adding $\lambda_j FSU8$ as an explanatory variable capturing the share of FSU immigrants in middle school. In order to analyze the marginal

[38]Table A3 in the appendix regresses $FSU8$ on various control variables and reveals the same pattern.

effect of a continuous variable (concentration of FSU immigrants) on binary choice outcomes, we estimate equation 1 using a logistic model. To account for the selection of immigrants into lower SES neighborhoods, we show the effect of turning on and off control variables, such as the average level of parental education and family income quintiles of natives in a school. In panel (a) of Table 6, the outcomes of interest are the four eighth grade scores. Without controls, all scores are negatively correlated with the share of FSU immigrants in eight grade. However, once we control for the individual characteristics and school average SES of natives, the coefficients are no longer negative and become positive and statistically significant in English and Science. Hence, as expected, selection into poorer neighborhoods biases these estimates downwards.

Panel (b) of Table 6 shows the correlation between the share of FSU immigrants in middle school and the choice of native young women in secondary and tertiary education. Without controls, the likelihood of obtaining full matriculation or choosing STEM is negatively associated with the share of FSU immigrants in eighth grade. But conditional on SES, these correlations shrink and become statistically insignificant. With respect to tertiary education choice, conditional on SES characteristics, native women who were exposed in early education to a large share of FSU students are significantly more likely to enroll into a STEM tertiary program, and much less likely to choose education and teacher training.

Figure 10 shows the predicted probabilities of various choice outcomes for natives and FSU immigrant females as a function of $\%\ FSU\ 8^{th}\ grade$, using the estimates from Table 6, conditional on SES characteristics. We omit the schools with more than 50% FSU immigrants because standard errors become extremely large, as this situation is relevant to less than 3% of native students in our cohort. With respect to choosing STEM in secondary and tertiary education, FSU immigrants are positively affected by the concentration of their peers. Natives appear to be slightly negatively affected in secondary school, and we found that this is driven be a decrease in the propensity to choose biology. However, in tertiary education, the probability that native young women choose STEM increases by nearly 30% (2.5 percentage points) as the share of FSU immigrants rises from 0 to 20%, a range which is representative of most of the sample. The

opposite pattern appears for pink collar tertiary study fields, where FSU immigrants are seemingly unaffected by the share of their own group, but natives dramatically reduce their propensity to choose pink collar occupations as their early exposure to FSU schoolmates increases.

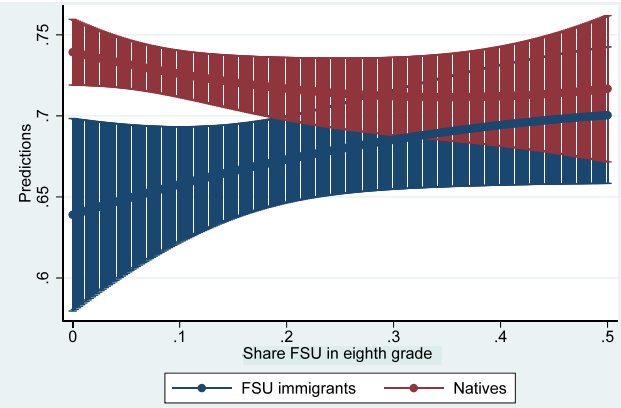
# 5 Conclusion

The sudden and massive Jewish immigration from the Former Soviet Union (FSU) to Israel in the early 1990's creates the opportunity to illustrate the vertical persistence and horizontal diffusion of cultural norms, in particular concerning gender identity. Here, we document the durable scientific culture inherited from Soviet times, as well as the special attachment to work of FSU women. The latter do not seem to choose their education tracks and occupations in view of prioritizing their work-life balance. They are more attracted to STEM, medical and business occupations, and avoid the appeal of the female-dominated teaching sector. De facto, once in the labor market, they work for longer hours, more often in full-time jobs, and for higher wages, than native or other immigrant women. We interpret these features as a legacy of the socialist episode, where full labor market participation was the norm for women (as well as men). As a lot of FSU immigrants have settled in specific areas, based on the presence of their compatriots and on the attraction of lower rents, we are able to document the influence of the concentration of FSU students in a school on the educational choices of native young women who attended the same school in eighth grade. We show that the orientation of native young women converges towards the patterns that are typical of FSU ones.

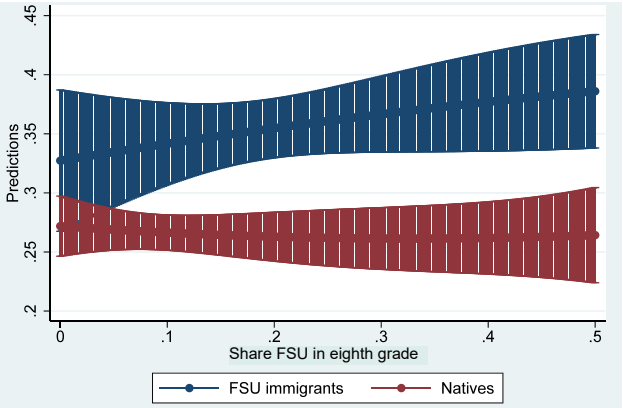
As a final remark, let us recall the decisive role of the *child penalty* in the divergence of men and women's careers. In socialist countries, institutions were designed in order to make full-time female employment compatible with maternity. Once in Israel, FSU immigrants have developed a network of private kindergarten (the Association of Immigrant Teachers - IGUM) that welcome children from 2 to 5 years old, from 7 am until 7 pm, in contrast with standard Israeli public and private kindergarten, which close around 13:30 and 16:30, respectively. The majority of children

Figure 10: Predicted probabilities for native and FSU immigrants as a function of share FSU immigrants in grade eight.

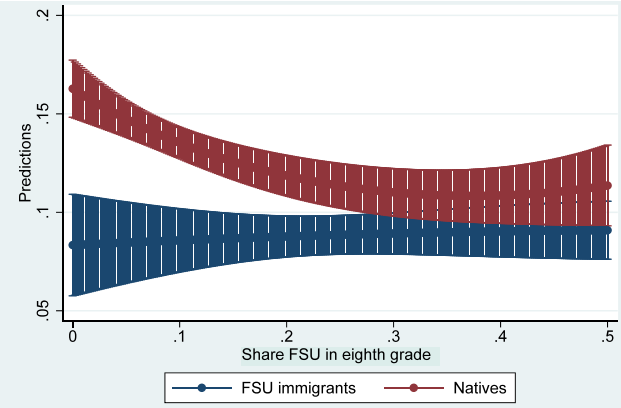
(a) Predictive margin of full matriculation



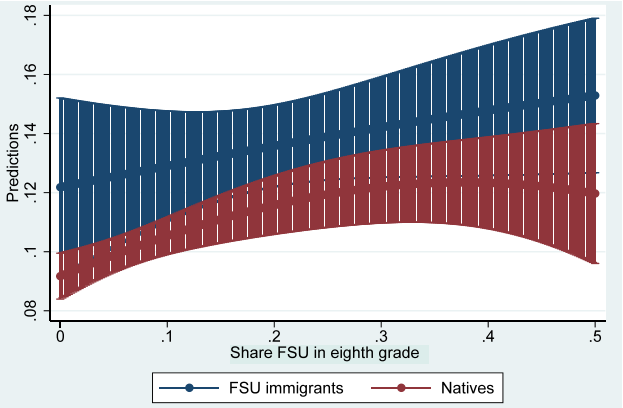

(b) Predictive margin of STEM elective (HS)




(c) Predictive margin of pink collar study field (tertiary)




(d) Predictive margin of STEM study field (tertiary)




*Notes: Predicted probabilities and 95% confidence intervals are calculated from separate logistic regressions for each origin group. All estimates are conditional on individual family income quintile and parents' highest level of schooling, as well as a polynomial of the share of FSU immigrants in eight grade and school level averages of natives' income quintile and parental education.*

who attend these kindergartens are born in Israel to at least one parent from the former Soviet Union, and Hebrew and Russian are jointly the official language.[39] This is revealing of the general attitudes of FSU families concerning the respective place of paid-work and motherhood in their time and investment. In a way, FSU women have managed to reproduce some (private) institutions that allow them to reach the same work-family balance as they (or their mothers) had in Soviet times. This is a powerful illustration of the persistence of culture, but also of the reciprocal influence of culture on institutions.

[39]Haaretz, December 27, 2018.

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# Appendix tables

Table A1: Immigrants by country of origin, full population (including male students)

| | N | % of immigrants | % of population |
|---|---|---|---|
| **FSU immigrants** | | | |
| Former Soviet Union Countries | 9,219 | 73.10 | 14.15 |
| Former European Communist countries | 120 | 0.95 | 0.18 |
| **Other immigrants** | | | |
| Ethiopia | 1,140 | 9.04 | 1.75 |
| United States and Canada | 912 | 7.23 | 1.40 |
| France | 217 | 1.72 | 0.33 |
| Argentina | 192 | 1.52 | 0.29 |
| Other European countries | 145 | 1.15 | 0.22 |
| Other Latin America Countries | 143 | 1.13 | 0.22 |
| MENA countries | 141 | 1.12 | 0.22 |
| Brazil | 111 | 0.88 | 0.17 |
| United Kindom | 107 | 0.85 | 0.16 |
| Other Africa | 86 | 0.68 | 0.13 |
| East Asia | 28 | 0.22 | 0.04 |
| Australia | 26 | 0.21 | 0.04 |
| Scandinavian countries | 25 | 0.20 | 0.04 |
| **Total immigrants** | 12,612 | | 0.19 |
| **Native Israeli** | 52,561 | | 0.81 |
| **Total** | 65,173 | | |

Countries with less than 20 immigrants are reported as part of broader categories due to data restrictions on individual level data.

Table A2: Definitions of tertiary study fields categories

| Category | General study field (CBS categorization) | Specific study fields |
|---|---|---|
| STEM | Mathematics, statistics & computer science | |
| STEM | Physical sciences | |
| STEM | Biological sciences | |
| STEM | Agricultural sciences | |
| STEM | Engineering and architecture | |
| Social sciences | Social sciences | Behavioral sciences |
| social sciences | social sciences | Communication |
| social sciences | social sciences | Criminology |
| social sciences | social sciences | BA social sciences |
| social sciences | social sciences | Sustainability |
| social sciences | social sciences | Geography |
| social sciences | social sciences | Cognitive Science |
| social sciences | social sciences | Psychology |
| social sciences | social sciences | International Relations |
| social sciences | social sciences | Political Science |
| social sciences | social sciences | Women's and Gender Studies |
| social sciences | social sciences | Sociology and Anthropology |
| social sciences | social sciences | PPE |
| Pink collar | Education and teacher training | |
| Pink collar | social sciences | Social Work |
| Pink collar | social sciences | Human Services |
| Pink collar | Health care professions | Dietetics |
| Pink collar | Health care professions | Physiotherapy |
| Pink collar | Health care professions | Occupational Therapy |
| Pink collar | Health care professions | Emergency Medical Services |
| Pink collar | Health care professions | Nursing |
| Pink collar | Health care professions | Public Health |
| Pink collar | Health care professions | Speech-language Therapy |
| Pink collar | Library science | |
| Economics, business and management | | Environmental Economics |
| Economics, business and management | | Economics |
| Economics, business and management | Business and Management | |
| Other | Humanities | |
| Other | Language, literature and regional studies | |
| Other | Art & design | |
| Other | Law | |
| Other | Medicine | |
| Other | Health care professions | Optometry |
| Other | Health care professions | Pharmacy |

Note: Row without specific study field indicate that all specific fields within a main study field are included in the category. The Central Bureau for Statistics categorizes all specific study fields in all higher education institutions in Israel, 175 in total, into 15 general study fields.

Table A3: Share of FSU immigrants in eighth grade conditional on individual characteristics of natives and municipality characteristics

| | (1) | (2) | (3) |
|---|---|---|---|
| | Share of FSU immigrants in eighth grade | | |
| Parents' maximal level of education, omitted category: 13-15 years | | | |
| Less than 12 years | 0.015*** | 0.015*** | 0.011*** |
| | (0.003) | (0.003) | (0.003) |
| 12 years | 0.015*** | 0.015*** | 0.013*** |
| | (0.002) | (0.002) | (0.002) |
| More than 16 years | -0.014*** | -0.013*** | -0.012*** |
| | (0.002) | (0.002) | (0.002) |
| Family income quintile, omitted category: 3th quintile | | | |
| 1st | 0.005* | 0.004* | 0.005 |
| | (0.003) | (0.003) | (0.003) |
| 2nd | 0.000 | 0.000 | -0.001 |
| | (0.002) | (0.002) | (0.002) |
| 4th | 0.001 | 0.002 | 0.003 |
| | (0.002) | (0.002) | (0.002) |
| 5th | -0.003 | -0.002 | 0.001 |
| | (0.002) | (0.002) | (0.002) |
| Municipality characteristics | | | |
| Share FSU immigrant in municipality | 0.689*** | 0.672*** | 0.707*** |
| | (0.009) | (0.009) | (0.012) |
| Municipality population 1995 | | -0.000** | -0.000** |
| | | (0.000) | (0.000) |
| Municipality dependent ratio 1995 | | -0.000*** | -0.000*** |
| | | (0.000) | (0.000) |
| Share of Hi-Tech employees | | -0.002*** | |
| in district/region | | (0.000) | |
| Municipality employment level | | | -0.113*** |
| | | | (0.015) |
| Average year of schooling in municipality | | | 0.000 |
| | | | (0.002) |
| Constant | -0.001 | 0.049*** | 0.099*** |
| | (0.002) | (0.004) | (0.012) |
| N | 24,686 | 24,636 | 21,281 |
| R-squared | 0.341 | 0.346 | 0.344 |

Robust errors in parentheses. * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$