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Good for girls or bad for boys? Schooling, social inequality and intrahousehold allocation in early twentieth century Finland

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Abstract Apart from the commonly emphasized historical or cultural explanations, was there an economics behind the early, extensive schooling of girls in Europe's Nordic periphery? This article analyses factors behind the emerging female majority in secondary schooling in early twentieth century Finland through resource allocation within households. We argue that a significant part of the female educational advantage can be explained with a classic unitary Beckerian schooling investment model. We apply an Engel specification widely used in development economics to a household budget dataset from the 1920s to estimate the effect of the age and gender of children on schooling investment across social groups. We find a pro-girl bias among households of low socio-economic status, explained primarily by the sizable penalty to boys caused by opportunity costs and expected returns. Worker boys could generate significant income from an early age, making their education initially expensive for cash-constrained families. Contrary to previous claims, the dropout rates of boys were also higher than those of girls. Together with a propensity to leave home earlier, this lowered the expected net returns to schooling. Meanwhile, the expansion of modern services created attractive job opportunities for secondary educated girls. We find no evidence of intrahousehold bargaining. The findings resemble certain cases in development economics and the economic history of advanced countries including the USA. Rather than matching with patterns of anti-girl discrimination in many developing countries, our results highlight the prehistory of the currently emerging pattern of female educational advantage—and male disadvantage—in OECD countries.

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1 Introduction

Together with other Nordic countries, Finland is often cited as a global leader in two areas considered critical to economic and social development: education and gender equality (e.g. Tamkin 2014; Zahidi 2013; Taylor 2012). References to the historical background of this success typically offer highly particularistic or deep-structural explanations, ranging from early Lutheran egalitarianism through national liberation struggles to the rise of Nordic Social Democracy (e.g. Parramore 2013; Anderson 2011). Instead, this paper presents a reinterpretation of a significant part of the female educational advantage in early twentieth century Finland based on historical economics. In this way, it connects the Finnish experience with that of other currently advanced countries as well as certain developing countries.

Educating girls in poor countries is considered a high-value investment. Besides equity issues, empirical results suggest significant positive externalities from children nurtured by empowered mothers, including more spending on health and schooling (e.g. Schultz 2002, pp. 211–215; Summers 1992). Economic returns to schooling also often appear higher for girls than boys, especially with initially low female levels of education (Schultz 2002, pp. 208–211; Duraisamy 2001; Himaz 2010; Gormly and Swinnerton 2004). For policy makers, schooling girls holds the promise of higher quality and quantity labour supply to drive future growth (Lagarde 2013). In economic history, Unified Growth Theory has explained the demographic transition in Western countries through technology-induced increases in demand for human capital (Galor 2011). A gendered elaboration suggests that this mechanism worked specifically through the escape of women from a strictly reproductive role, driven by ever-growing demand for educated labour and the improved female bargaining position that followed (Diebolt and Perrin 2013).

In absence of effective compulsion, critical decisions to invest in human capital take place within households, based on perceived benefits (cf. Lucas 2002, pp. 15–18). Rooted in the "missing women"—dilemma (cf. Coale 1991), the focus of empirical research on intrahousehold resource allocation has been on gender discrimination in nutrition and health. This has been widely analysed as a function of gendered opportunity sets—mainly labour market structures—faced by households in different historical contexts. Bargaining models, rather than collective utility functions or the black box of culture, have become the tool of choice in empirical analysis (e.g. Horrell and Oxley 2013; Horrell et al. 2009; Sen 1984, pp. 371–377). In addition to the resources of mothers, the income generation potential of children themselves, combined with their propensity to share with the family on the short, medium or long run, have in such analysis determined the treatment of boys and girls within households (e.g. Ginsberg and Swedlund 1986; Klasen 1998; Horrell and Oxley 1999; Logan 2007). The main implication of the

literature has been that enhanced employment opportunities for women are the key to overcoming detrimental early-life discrimination (Burgess and Zhuang 2000; Qian 2008).

In schooling decisions, however, the bias discovered has not always been against girls. With relatively superior returns to education, both historical and contemporary developing country contexts have given rise to pro-girl patterns in investment into formal schooling by households (e.g. Goldin and Katz 2008, pp. 229–230; Himaz 2010). Paradoxically, such outcomes can be seen as a function of an initial handicap on the labour market, as the low-skill alternatives have been worse for girls, or higher human capital is required for women to be employed at all. Social groups and informal institutions can play a role, sometimes with seemingly less advantageous initial positions creating inadvertent opportunities for female success, whereas perceived immediate male advantages turn out to be traps. In particular, the higher short run income generation potential of boys may work to their detriment in schooling in poor households (e.g. Kingdon and Theopold 2008; Munshi and Rosenzweig 2006). We argue this was, in fact, a significant cause of the female educational advantage in secondary schooling in early twentieth century Finland as well.

Exceptionalism has dominated previous Finnish research on the history of gender and education. The fact that secondary schools had a female majority already in the early years of the twentieth century has repeatedly been suggested as unusual (Buchardt et al. 2013, pp. 7–8, 15–16; Kaarninen 1995, p. 150, 2011, p. 419). Explanation has been sought in an inclusive educational system rooted in emergent nation-building and local elite strategies to undermine Russian rule in the nineteenth century. In this narrative, links between nationalism, egalitarianism and education boosted the position of the nation's daughters (Albisetti et al. 2010, p. 5; Kaarninen 1995, pp. 151–153). On the other hand, a particular appreciation of education, penetrating the population all the way down to the nascent working class, is often presented as a given cultural trait of the Nordic region, setting it apart from the rest of Europe (Kaarninen 1995, pp. 148–149; Kokkinen 2012, p. 103). More extensive schooling driven by "non-economic factors" has been argued as a cause behind the Nordic catch-up with the advanced industrial economies since the nineteenth century in economic history as well, albeit the statistical evidence holds only for Scandinavia (O'Rourke and Williamson 1997, pp. 162–168).

Literature on Finnish economic development has rarely taken a rigorous quantitative approach to education. Despite of recent posturing as a knowledge economy with high educational standards, it has been pointed out that the average level of education in Finland was very low compared to Scandinavia or the West until the post-WWII decades, with 64 % of the adult population having completed only the mandatory 4–6 year common school, and 27 % even less, in 1950 (Hjerppe 1988, p. 92; see below, Table 2). Higher technical education was lagging behind Scandinavia and domestic industrial needs at least until WWII (Fellman 2001). The Finnish catch-up with Nordic neighbours and what became the EU15 mostly occurred from the 1960s to the 1980s, with the growth of labour productivity in the service sector playing an important role alongside industrialization (Kokkinen et al. 2007). Arto Kokkinen has shown in a pioneering study on human capital and Finnish GDP convergence over the twentieth century that with the pre-WWII period

included, the statistical link between GDP and human capital was unidirectional, growth determining educational investment but not vice versa. Only in the post-WWII decades, a cointegration analysis indicates that the amount of human capital available also became a binding constraint for the appropriation of technology, physical capital accumulation and economic growth (Kokkinen 2012).

This suggests factors constraining educational investment in the early phases of industrialization should be of interest to economic historians. However, the history of the supply and demand of education, including female educational advantage, has mainly been approached from a social, cultural or political perspective (cf. Heikkinen and Leino-Kaukiainen (eds.) 2011; Tuomaala 2004; Kaarninen 1995).[1] Contrary to this, we argue that the Finnish case was largely explainable by mainstream economics. Lower opportunity costs and increasing expected returns to households made schooling girls more attractive than schooling boys among families of low socio-economic status. Many of the findings bear striking resemblance to those of Claudia Goldin et al. (e.g. Goldin and Katz 2008; Goldin et al. 2006; Goldin 1998) on the USA, a case far removed from north-east European varieties of nationalism or enlightenment. At the same time, they resonate well with some cases in development economics.

The rest of the paper is organized as follows. Section 2 provides an overview of trends in economic development, employment and secondary education for young women in interwar Finland, with new data to qualify the claims that the Finnish female majority in secondary education was exceptional and the position of girls in secondary schools was tenuous. Section 3 presents the core household budget dataset. Section 4 discusses theory, formulates a unitary model for household schooling decisions and elaborates the econometric estimation strategy. Section 5 presents the empirical results. Section 6 combines the results with enrolment data to advance a consistent view of the dynamics of schooling girls in interwar Finland. Section 7 discusses the findings in the context of theory and comparative economic history, and their link with the discussion on the recently emerging "new gender gap" in educational attainment favouring women.

2 Women, employment and education

2.1 The emergence of modern services

In terms of GDP per capita, interwar Finland was closer to the southern and eastern peripheries of Europe than Scandinavia (Prados de la Escosura 2000, pp. 26–28). Agriculture remained dominant beyond WWII. However, employment in non-agrarian sectors increased from 30 to 40 % between 1920 and 1940 (Kaukiainen 1981, p. 40), as the entire population climbed from about 3.1 to 3.7 million. Female share of all non-agrarian employment was steady at about 40 %, but the internal composition changed in ways pertinent to the demand for education (Table 1).

[1] Exceptions include Rahikainen's work (e.g., 1996) linking schooling and child labour markets in the early twentieth century, and the studies by Pekkarinen (2008), Pekkarinen et al. (2009) on the econometrics of the comprehensive school reform of the 1970s.

Table 1 Non-agrarian employment of women in selected sectors in Finland, 1910–1940

Year	1910		1920		1930		1940	
	n (%)	Of emp	*n* (%)	Of emp	*n* (%)	Of emp	*n* (%)	Of emp
Modern services	49,300	0.127	86,800	0.193	127,500	0.218	178,100	0.220
Of which women	18,400 (37.3)	0.127	35,900 (41.4)	0.198	57,000 (44.7)	0.246	86,300 (48.5)	0.256
In commerce	8,800 (39.1)	0.061	15,500 (39.4)	0.085	25,400 (43.5)	0.110	39,600 (49.0)	0.117
In education	5,100 (58.0)	0.035	7,200 (60.0)	0.040	10,900 (64.9)	0.047	14,100 (65.0)	0.042
In health care	3,300 (66.0)	0.023	6,200 (72.9)	0.034	9,800 (76.6)	0.042	15,500 (79.1)	0.046
In finance, ins.	580 (44.6)	0.004	2,400 (55.8)	0.013	3,800 (54.3)	0.016	5,000 (56.8)	0.015
In public admin	380 (3.9)	0.003	2,800 (15.4)	0.015	3,600 (14.9)	0.016	8,500 (22.4)	0.025
In liberal profs	240 (12.6)	0.002	1,800 (40.0)	0.010	3,500 (41.2)	0.015	3,600 (38.7)	0.011
Industry	112,400	0.290	158,400	0.353	198,100	0.339	281,600	0.347
Of which women	34,300 (30.5)	0.238	50,600 (31.9)	0.279	63,100 (31.9)	0.272	103,200 (36.6)	0.306
Others[a]	226,100	0.583	203,700	0.454	258,300	0.442	351,700	0.434
Of which women	91,800 (40.6)	0.636	95,000 (46.6)	0.524	111,700 (43.2)	0.482	147,900 (42.1)	0.438
In service	26,400 (93.3)	0.183	28,800 (95.4)	0.159	37,400 (96.6)	0.161	39,900 (99.0)	0.118
In misc labour	33,300 (38.0)	0.231	26,200 (42.3)	0.144	35,500 (37.1)	0.153	39,500 (37.7)	0.117
In unknown	26,900 (37.2)	0.186	28,300 (58.5)	0.156	19,500 (64.6)	0.084	15,700 (36.1)	0.047
Women in total employment	144,400 (37.2)		181,400 (40.4)		231,900 (39.7)		337,300 (41.6)	

All numbers for non-agrarian employment only. Percentages in brackets indicate share of women in occupational sector. Shares of employment are out of women's employment for all rows on women, and total employment including men for rows on Modern services, Industry and Others. *Source:* computations from Vattula (1981, pp. 74–75)

[a] Includes also transport, construction, cafés and restaurants, and cleaning and sanitation (1940 only)

Modern services—commerce, finance and insurance, education, health care, public administration, liberal professions—increased their share, while sectors like domestic service and miscellaneous labour were declining in relative, if not yet absolute, terms. From 1910 to 1930, the absolute increase in female employment in these fields was nearly three times larger than in industry, congruent with a global model proposed by Claudia Goldin suggesting a particular link between female secondary education, "respectable" white-collar work and the entry of women into the workforce during modern economic growth (Goldin 1994). However, after the Great Depression, the relative growth of employment in modern services slowed down, while female employment in industry picked up notably, in part because male industrial employment suffered more than female industrial employment during the crisis, in part because of increasing employer preference for readily available and cheaper female labour (Suoranta 2001). Nevertheless, while the overall share of modern services stagnated, their proportion of female employment kept growing, as these types of jobs were increasingly feminized. The pull of the office continued, and the crisis of the 1930s did not terminate the expansion of female white-collar opportunities.

The overall development of the Finnish service sector was unimpressive in international comparison, with services employing 14.4 % of the working population by 1930, compared with 31.5 % in Sweden or 47.7 % in the UK, close to Poland (15.2 %) or Bulgaria and Romania (c. 10 % each) (Buyst and Franaszek 2010, p. 210). While the numbers in poor and agrarian Finland were modest—in 1930, the share of what we denote *modern* services out of all employment, including agriculture, was around 7.5 %—they still indicated a small, growing pool of "clean indoor jobs" for appropriately schooled girls. This globally familiar trend was related to technological change and a new division of labour in business administration (Goldin 1990, pp. 106–107; Fellman 1999), but also growth in services and the public sector. The share of commerce, with plenty of largely manual type positions, was high. For those from worker families, however, besides advantages in pay, the benefits over alternatives in industry, traditional services or home-based forms of employment like sewing included higher social status, a more pleasant working environment and a greater degree of autonomy. In contemporary literature, the wretched character of the "factory girl" was succeeded by the modern "office girl"—an independent, up-and-coming figure. Particularly, the lightness of new office work was a source of wonder in autobiographical novels (Kaarninen 1995, pp. 194–205). Curiously, these literary trends had an identical counterpart in the USA as well (Wilson 1992).

2.2 The supply of secondary schooling

More than elementary education was required for taking advantage of the new opportunities. From the early 1920s, schooling in Finland normally started at age seven with the free and compulsory "common school" (*kansakoulu*[2]). Following a Central European "elitist" model (cf. Goldin and Katz 2008, pp. 22–28), selection to secondary

[2] *Kansa* means the (common) people in the Finnish language, while *koulu* means school.

schools took place already at age 10–11, based on performance and entry exams. Secondary schools consisted of middle school classes I–V until age 15, followed by upper secondary classes VI–VIII until age 18, after which it was possible to qualify for university through a matriculation exam (*ylioppilastutkinto)*. An overwhelming majority remained in common school, where two more classes were supposed to be taken, although this was not always adhered to (Kivinen 1988). Only 9.2 % of 11-year-olds entered secondary schools in 1920, and 15.2 % by 1930 (Kaarninen 2011, p. 409).

Socio-economically, the take-up of secondary education was strongly skewed towards the middle and upper strata of society and the urban population. Direct costs, but more importantly opportunity costs through lost income from children, as well as distances, made secondary education a remote issue for most of the population. Table 11 in Appendix provides an overview of secondary school student background over the period. The agrarian majority of the population was grossly underrepresented, and civil servants and small and large business owners grossly overrepresented. The high share of small business owners may have reflected the perceived importance of the skills provided by secondary education for family businesses in the growing sector of commerce, a key source of employment for secondary educated women. The stratum of workers stood, in fact, somewhere in between in terms of representation. While a share of 12–13 % may seem small, various estimates of the share of people employed in non-agrarian manual occupations in general or industry in particular in Finland at the time are not dramatically higher.[3] Workers were among the less affluent groups that slowly but steadily increased their share over the 1920s.

A middle school certificate was widely perceived as a "sufficient" achievement for women. It opened up a number of white-collar occupations either directly or through training, including nursing, clerical work and teaching. From 1914, it became always possible to leave school with a certificate after class V. In 1915, an act delineated a separate "girl school" (*tyttökoulu*) system, where 6 years were required to complete the equivalent of middle school on the basis that the pressure of the normal course was considered too much for girls. While clear and growing majority of girls attended coeducational institutions, this legitimized a parallel but inferior track for females, where more time was spent and further education blocked. The likelihood of higher academic attainment differed dramatically by sex. While roughly 10 % of working-class girls starting secondary school matriculated, almost a quarter of boys did. Irrespective of class, continuing to university was much less likely for women than for men. This reflected a "glass ceiling" making entry to higher public or private positions very unlikely for women at this time (Strömberg 2011, pp. 137–138; Kaarninen 1995, pp. 162, 183–184, 197–198, 218–220).

In addition to the girl schools, also middle schools offered lower secondary education only, while the coeducational or single-sex *lyseo* schools had grades up to the matriculation exam. Besides state schools, a few were municipal, but a growing number were private. Growth was rapid particularly in the 1920s, with 64 state and

[3] An estimate based on the occupations of "heads of households" has 11.8 % of the population classified as industrial in 1920 and 12.8 % in 1930; with construction and miscellaneous labour added, the figures are 17.2 and 20.3 %, respectively (Pitkänen 1982, p. 200; Computations from Tilastokeskus 1979, pp. 5–10). Both rates of growth are clearly below that for pupils from worker families in secondary schools in this period.

100 private or municipal schools in 1920–1921, and 75 state and 140 non-state schools in 1927–1928. In the 1930s, only 14 state schools were added (Suomen Virallinen Tilasto (SVT) IX Oppikoulut 47–64). The private schools, however, actually ran on state license and grants. Tuition fees were lower in state institutions, but private schools were heavily subsidized, and the difference in direct costs was small (see Sect. 4.2 below). Private schools were often started in smaller localities as community initiatives. The preferred school type was a coeducational middle school, creating an opportunity to attain a certificate without migration and a stepping stone for a more distant *lyseo* after. One may see remote parallels with the demand-driven expansion of secondary schooling in the USA through the "high school movement" in the same period (Goldin and Katz 2008, pp. 195–246). There were direct influences in promoting coeducation, as several Finnish educators had taken study tours across the Atlantic and published writings advocating an American-style, universal system (Strömberg 2011, pp. 131–136). Fundamentally, though, in small towns and rural localities, the idea of setting up separate schools or excluding half the clientele on the basis of sex was economically unviable.

The share of state schools still remained steady at around half of all students during the period, as the more urban institutions tended to be larger. Nearly 60 % of girls studied in private schools, but the slight shift occurring during the period was towards the state, not the private sector.[4] A clear change was the decline of all-girl institutions from about 40 % of female students in the mid-1920s to about 32 % by 1937–1938 (computations from SVT IX Oppikoulut 47–64, combined tables on the number of secondary schools, teachers and students).

2.3 Enrolment and dropping out

Girls reached majority in secondary schools in 1910–1911, when Finland was still an autonomous Grand Duchy under Russian rule. After independence and civil war in 1917–1918, the share of girls surged to 54 % and continued to grow incrementally over the 1920s. The Great Depression was followed by a visible drop of about two percentage points, with recovery towards the end of the 1930s. Female majority was never lost (Kaarninen 1995, p. 150). However, these aggregate figures reveal little about the underlying schooling patterns.

Figure 1 charts the paths of six cohorts of students through secondary school in the interwar years. Certain things are pertinent. Firstly, girls dominated lower secondary school, while boys usually assumed a narrow majority in upper secondary school. While it is true girls obtained qualifications for academic studies more rarely than boys, the female domination of middle schooling is noteworthy. In general, Finnish girls received a secondary education much more often than boys. Secondly, middle school was an end in itself to a significant number of both male and female students, as the tilt in the graphs after class V demonstrates. In the school year 1927–1928, there were 2,765 (65 %) middle or girl school graduates who left school, and 1,519 (35 %) who completed upper secondary school (SVT IX Oppikoulut 55, table IV). Estimates based

[4] State share of female students was 41 % in 1920–1921, slightly over 43 % in 1927–1928 and 44 % in 1937–1938.

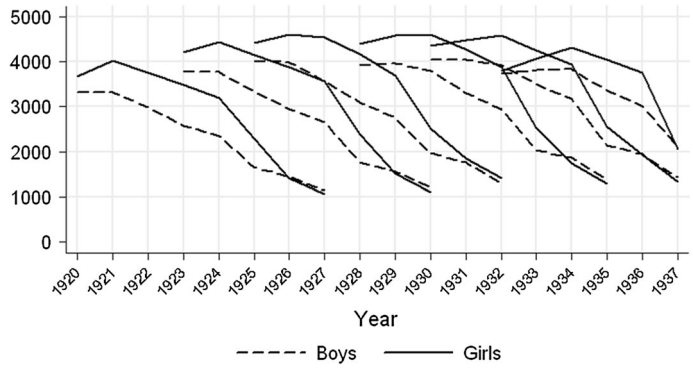

Fig. 1 Six cohorts of secondary school students through classes I–VIII by sex, 1920–1937. *Note*: Cohort of 1932 truncated to class VI. *Source*: Computations from SVT IX Oppikoulut 47–64, combined tables on the number of secondary schools, teachers and students

on retention from lower to upper secondary school suggest that more than twice as many girls as boys did not continue studies after middle school in the 1920s and 1930s. This, however, was not the same as dropping out, as a middle school certificate was a valuable asset on the job market (Kaarninen 1995, pp. 183, 196–200). The figures also reflect the female majority in lower secondary schooling. Finally, both sexes had high dropout rates as well, with a constant slide in the number of students from the first classes to the last, not only at junctures where leaving with a certificate was possible. Girls often entered secondary school at the second grade, which caused the number of female students peak at class II rather than class I. From the onset of the Great Depression, starting was often postponed till class III.

Previous literature has emphasized the precarious position of females in secondary schooling, suggesting that despite their majority, girls were more likely to not to finish school. But did girls really drop out more often than boys, as has been repeatedly claimed? (Kaarninen 1995, p. 184, 2011, p. 420). It would be an academic anachronism to consider graduation from middle school a failure to complete education. One local small sample analysis has suggested female disadvantage in actual quitting only among students with worker background, a phenomenon analysed further below (Kaarninen 1995, pp. 184–185). To gauge the general precariousness of educational careers by sex, better measures are required.

It is possible to observe student retention rate until class V, by which time it was not possible to leave school with a certificate. For comparability between sexes, retention should be measured against class II in the 1920s, as this is when female student numbers peaked, and if development over the 1930s is included, against class III. The figures in Table 12 in Appendix clearly show that in fact, boys tended to leave school without even a middle school certificate more often than girls. During the 1920s, the retention rate from class II to class V was steady at around 80 % for girls and 70 % for boys. Figure 2, depicting retention from class III to class V over the whole period, shows male disadvantage persisted over the Great Depression.

Statistics also exist on the number of students over all classes quitting without attaining any certificate. Unfortunately, these are not segregated by sex. It is

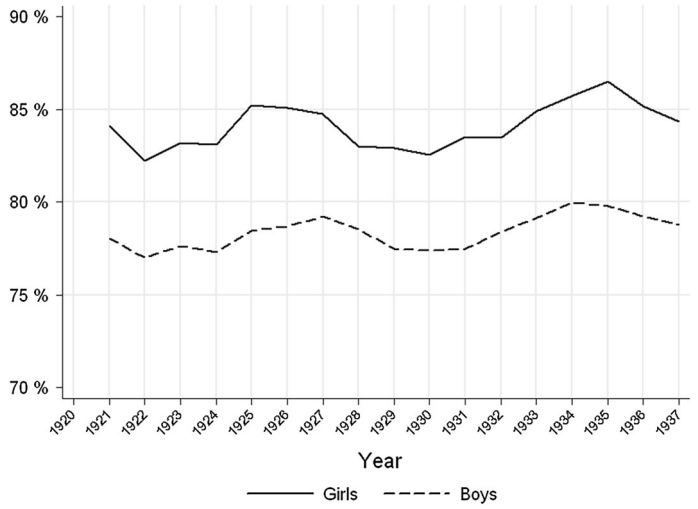

Fig. 2 Retention rates from class III to class V by sex, 1921–1937. Three-year moving averages. *Source*: computations from SVT IX Oppikoulut 47–64, combined tables on the number of secondary schools, teachers and students

possible to compare the dropout rates of all-girl institutions against the general dropout rates. This risk bias, as the location, selection and internal dynamics of all-girl institutions were likely to differ from the rest and changed as the student population shrank. The benefit is that the data cover all classes and distinguish directly cases where students really quit. Together with the retention rates for lower secondary school, the figures in Table 12 in Appendix confirm that it was, indeed, boys rather than girls who were more prone to drop out. The crisis of the 1930s did not overturn this difference, although all dropout indicators momentarily moved closer to each other.

Instead of standing out as a country with an exceptional but precarious female majority in secondary schooling, at closer scrutiny Finland actually seems to have had a lot in common with several advanced countries. In terms of enrolment, while the female majority in the US high schools of the early twentieth century is well documented (e.g. Goldin 1998, pp. 361–363), also Sweden, another latter-day Nordic gender equity leader, displayed similar patterns. While institutions were less inclusive, schooling less coeducational and the position of female education unresolved for longer than in Finland (Kaarninen 1995, pp. 152–153), Swedish historical statistics reveal a girl majority in lower secondary education already in 1920. In all secondary education, including classes leading to academic maturity, the balance tilted in favour of females by 1930 (Computations from SCB 1977, pp. 174–175).

Table 2 builds on the global Educational Attainment Dataset assembled by Barro and Lee (2013).[5] It reports adult[6] population shares that had received any secondary education by sex in selected countries in 1950. The data are limited to over 25-year-

[5] Available at http://www.barrolee.com/.

[6] Over 15 years.

Table 2 Share of population over 25 that ever received secondary or tertiary education and average years in school by sex in selected countries, 1950

Country	Finland		Sweden		Germany		Ireland		UK		Canada		USA	
Sex	F	M	F	M	F	M	F	M	F	M	F	M	F	M
% Secondary schooling	8.5	7.1	21.0	21.3	17.9	22.5	25.4	19.5	24.4	17.0	48.8	41.4	53.9	49.6
% Tertiary education	2.5	3.6	2.8	4.9	1.5	4.6	2.7	4.1	1.3	2.0	8.5	9.2	12.8	14.3
Av years in school	3.84	3.79	6.36	6.50	6.59	6.90	6.22	5.95	6.33	5.85	7.65	7.16	8.23	8.05

% Secondary schooling is share that ever received any secondary schooling, including those who dropped out and those who continued to tertiary education. It has been computed by adding those with complete or incomplete secondary schooling as highest attainment to those with complete or incomplete tertiary education as highest attainment, assuming that the latter had also completed secondary education. *Source*: computations from Barro–Lee (2013) educational attainment dataset

olds, so that only cohorts that received their secondary education before WWII are included. As the concept of "completion" can be misleading, shares of those who received any tertiary education and average years of schooling are reported to gauge the distribution of total educational attainment.

Firstly, it can be observed that Finnish attainment in these cohorts was indeed very low compared to major Western countries up to WWII.[7] In this regard, Finland stood out among the Nordic countries. Secondly, there was nothing unique about girls attending secondary school more often than boys; this had happened in several other countries. Thirdly, even in those countries with clear female majorities in exposure to secondary education, including Finland, males still had continued to tertiary education more often. This implies that the distribution of attainment was more inequal among males, with overrepresentation both at the top and at the bottom tails.[8]

The demonstrated higher likelihood of males to quit also resonates with results on modern reference populations in OECD countries, including Sweden and the USA. In these countries, boys typically and consistently have higher dropout rates[9] from secondary education (Pekkarinen 2012, pp. 173–174). All this supports the conclusion that the position of Finnish girls in secondary education in the early twentieth century was actually neither exceptional nor particularly weak.

3 The household budget data

Our core data consist of the primary material of a 1928 government Cost-of-Living Study (hereafter CLS). It contains 954 household budgets collected from 29 localities, including 14 cities and 15 smaller population centres, mainly rural industrial communities. The survey targeted the non-agrarian population, building on the European tradition of worker surveys from Le Play, Halbwachs and the *Verein für Sozialpolitik*, which by the twentieth century had increasingly been taken over and codified by government statisticians coordinating their methods internationally. Finland was fully engaged in international cooperation, and an appeal for new studies to members in an ILO conference on social statistics in 1925 was one stated motivation for the CLS (Saaritsa 2008a, pp. 194–208; SVT XXXII 1936: 14, p. 1). The resulting data were very similar to others in different countries in the same period.

Some 18.5 % of the approximately 3.5 million Finns lived in cities in the year 1930, while the share of population, including dependents, making a living from outside agriculture was estimated at 39 % (Koskinen et al. (eds.) 2007, p. 323;

[7] Compared with the cases in the "advanced countries" group of the Barro–Lee data, both men and women had less average years of schooling only in Portugal and Turkey. Finnish women were on average better educated than women in Greece, Italy and Spain, but Finnish men fared worse than their counterparts in these countries.

[8] Male dominance at the top was particularly clear looking at *completed* tertiary education, where the ratio of male to female percentages ranged from 1.34 (USA) to 4.75 (Germany). In Finland, the ratio was 2.6.

[9] Measured including all those who never started secondary education.

Kaukiainen 1981, p. 40). Out of the 637,000 inhabitants of the 38 cities in Finland in 1928, 432,000 or 68 % resided in the 14 cities included in the survey. One in four survey households was from the capital Helsinki (pop. 227,000 in 1928), followed by the south-eastern and south-western coastal hubs of Viipuri (8 % of CLS households, pop. 54,120) and Turku (7 %, pop. 63,918). The selection of cities depended on cooperation from local authorities, and regrettably, the major industrial city of Tampere (pop. 54,000) was not included (SVT XXXII: 14, p. 4; Tilastollinen päätoimisto 1930, p. 11).

At least half of the Finnish industrial workforce lived outside urban areas in the 1920s (Alapuro 1985, p. 64; Tilastollinen päätoimisto 1930, p. 105). Most of the remaining 15 surveyed localities were towns and villages in rural municipalities dominated by a single or a few industrial employers—typically wood-processing industry, which positioned itself near waterways for transport and energy, creating an archipelago of rural factory communities across the country. Spatially, the study therefore represented well the two main types of habitat of nascent industrial Finland, while excluding the farming majority (see online appendix for a map). The omission of the agrarian population, the origin of around 17 % of secondary school students at the time, cannot be helped, but enrolment data and previous literature provide basis for discussing the applicability of the results in Sect. 6 below.

In terms of sampling the actual households, the data exhibit biases characteristic of similar historical social surveys everywhere. Regardless of the expressed aim of "representativity", random sampling did not become internationally recommended best practice until towards the late 1930s (Desrosières 1991; Kruskal and Mosteller 1980). In larger cities, the process of selection was delegated to local authorities. In the instructions, the study was defined as focussing on "workers proper", but was also to include lower and higher officialdom and families "belonging to the so-called middle class". It was instructed that "typical occupations" of each locality should be covered (SVT XXXII: 14, pp. 3–4). The data had an "intact" male breadwinner family bias, consisting almost solely of households with two parents and children. For an analysis on investing in children, the damage of the family bias is limited, although single-parent families are regrettably excluded. For Helsinki, contributing a quarter of the data, it has previously been shown that the average family size conformed to that in the city, but parents of underage children tended to be older than average adults, while fewer of them were elderly (Saaritsa 2008b, pp. 318–320).

The internationally favoured diary method used (e.g. Halbwachs 1913, pp. 29–32) was based on the households themselves keeping accounts on their income and expenses for a period of 1 year, regularly prompted and cross-checked by a "bookkeeping advisor". This excluded those without will or capacity to do so, even for the modest fee offered. The result was deemed to represent "the cost of living of a certain kind of an elite". It has been shown that the worker household heads of the CLS had median incomes comparable to the adult male population of Helsinki as per municipal taxation. However, the data also contained workers with irregular occupations and low and insecure income, including a small number of current or past recipients of poor relief, a sign of major hardship in the 1920s. Several families suffered serious income shocks during the year (Saaritsa 2011,

pp. 105, 127). Therefore, the data are not limited to a "labour aristocracy". All in all, the representativity issues are standard for similar datasets widely used in economic history.[10]

The households were classified into three social groups. Workers (*työläiset*), who were the focus, included people with or without vocational training working for wages. White-collar workers (*toimenhaltijat*) consisted primarily of low-ranking government and municipal officials, and of private sector employees who "on the basis of their income and standard of living" were considered akin to this social group. The elite (*virkamiehet*)[11] included high-ranking government officials, professionals and "comparable" cases (SVT XXXII: 14, pp. 9–11). In terms of detail and number of dimensions, the data are exceptionally rich. The quarterly summary cards in the archives of Statistics Finland (Tilastokeskus, Tilastoarkisto, K09e Kulutustutkimukset 1928, unpublished) cover, *inter alia*, household composition (age, sex, breadwinner's occupation), earnings (income of the male breadwinner, his wife and lumped contributions from children) and a large number of expenditures (education, health care, insurances, food and different types of goods).

Table 3 provides key descriptives for the data by social group. Between-group differences as per family size, income and schooling expenditure are predictable. Workers earned less, had larger families and spent considerably less on education. In addition to a lower level of earnings, the incomes of main earners in this group also fluctuated more. The mean deviation from annual average of a quarterly household head income was 14 % for workers and 8 % for the other groups (cf. Saaritsa 2008a, pp. 258–260). Notably, the striking difference in the frequency of children's financial contribution in worker versus other families implies a very different role for offspring at the bottom of the socio-economic hierarchy.

4 Theory and method

4.1 A unitary schooling investment model

Analysis of the gendered schooling decisions of families requires considering both human capital and intrahousehold resource allocation theory (cf. Deolalikar 1993). Classic human capital models analyse costs and benefits of education over the life course, and the expected net outcomes that determine investment behaviour at critical periods (cf. Becker 1964). Empirical analysis of human capital investment by sex has identified factors affecting the costs and returns of education differently

[10] Examples of similar data used in research literature include, e.g., a survey conducted by the US Bureau of Labour in various countries in 1889–1890 (Horrell and Oxley 1999, pp. 497–498, 2000, pp. 38–39), a cost of living survey by the US Bureau of Labor Statistics 1917–1919 (Moehling 2001, pp. 932–933; Emery 2010, p. 76) and the New Survey of London Life and Labour conducted in 1929–1930 (Baines and Johnson 1999a, pp. 950–952; b, pp. 696–697).

[11] The term, translated as "elite", in fact literally means "civil servant", but as this group included top-earner private sector employees as well, that translation would not be appropriate.

Table 3 Descriptives for CLS households by social group

	Mean (SD)	Median	*n* (Zero obs.)
Household size	4.77 (1.75)	4	954 (0)
For workers	4.93 (1.84)	5	581 (0)
For white collar	4.62 (1.72)	4	242 (0)
For elite	4.33 (1.22)	4	131 (0)
Household income	35,077 (15,686)	31,746	954 (0)
For workers	28,983 (8,921)	28,169	581 (0)
For white collar	37,099 (12,854)	34,657	242 (0)
For elite	58,369 (20,548)	56,373	131 (0)
Children 11–15	1.53 (0.70)	1	393 (561)
For workers	1.56 (0.71)	1	264 (317)
For white collar	1.43 (0.69)	1	89 (153)
For elite	1.60 (0.67)	1.5	40 (91)
Children 16–18	1.25 (0.45)	1	220 (734)
For workers	1.23 (0.44)	1	145 (436)
For white collar	1.33 (0.51)	1	58 (184)
For elite	1.12 (0.33)	1	17 (114)
Schooling expenditure	500 (1,180)	187	488 (466)
For workers	250 (480)	82	271 (310)
For white collar	638 (1,172)	400	103 (139)
For elite	1,121 (2,212)	693	78 (53)
Wife's income	3,983 (6,043)	1,400	395 (559)
For workers	2,614 (3,342)	1,053	268 (313)
For white collar	3,702 (6,254)	1,068	66 (176)
For elite	10,301 (9,934)	6,415	61 (70)
Children's contribution	5,275 (4,736)	4,400	269 (685)
For workers	5,324 (4,721)	4,354	193 (388)
For white collar	5,326 (5,111)	4,415	58 (184)
For elite	4,592 (3,690)	4,375	18 (113)

Statistics for nonzero observations only. Currency: Finnish *markka* (FIM). *Source*: CLS data

for men and women over time and in different contexts (cf. Goldin et al. 2006, pp. 15–17; Kingdon and Theopold 2008; Pekkarinen 2012). In standard models, an agent is implicitly assumed to be taking the investment decisions herself. In the case at hand, critical decisions were taken at age 10–11, making them a family matter.

In intrahousehold resource allocation theory, unitary models assume families are maximizing an essentially singular utility function. Sen (1984, pp. 371–377) has mapped a number of subtypes of this approach. In addition to the "glued-together" family with indistinguishable members, these include the Beckerian "super-trader" family, where members specialize and exchange resources internally on an implicit market (cf. Becker 1985), and the "despotic" family, where a head unilaterally dictates resource allocation with varying degrees of consideration for the needs and wishes of other members. The more popular bargaining models assume a

"cooperative conflict", where members with different preferences bargain over pooled resources using their personal resources, particularly income, as assets in negotiations, and making implicit or explicit threats to withdraw to a non-cooperative fallback position outside the household (Horrell and Oxley 2013, pp. 149–153; Sen 1984, pp. 374–376; Moehling 2005). The "threat points" are largely determined by age and gender, with women and children usually having inferior outside options (Agarwal 1999, pp. 218–288).

Empirically, different models lead to different predictions in terms of relevant variables and expected outcomes. For instance, Horrell and Oxley (2013), Horrell et al. (2009) have highlighted the case of the "impoverished unitary" family, where economic constraints force preferential allocation of resources to breadwinners to maintain work capacity, thus reflecting the inequalities of outside labour market positions, but only out of necessity. Escaping poverty would result in more equitable allocation. This elaboration enables testing the applicability of the two types of models by moving along the income distribution. Under bargaining, also variation in individually generated income by members would be expected to change household allocations to better reflect the preferences of those with more power. If mothers are assumed to have more altruistic preferences towards children than fathers, an improvement in maternal economic position would be expected to increase allocations towards offspring. If parents would have preferences towards children of the same sex as themselves, girls would gain more from an empowered mother than boys (cf. Horrell and Oxley 2013, p. 158; Klasen 1998, pp. 455–456; Guha-Khasnobis and Hazarika 2006; Roushdy 2004; Quisumbing and de la Brière 2000).

Our analysis starts from a unitary sex-differentiated family schooling investment model with a singular decision maker and moves on to test empirically for elements of bargaining. It will be argued that the unitary model conforms more consistently to the findings than bargaining models. In this model, the present values of children's current and expected monetary contributions to the family are decisive for the derived demand for schooling, rather than the long-term utility of schooling to themselves or their parents' immediate bargaining positions. However, the present values are crucially affected by the strength of the time preference for current against future incomes, which in turn is a function of poverty.

In the model, the utility of schooling boys and girls to a family is determined by its effect on the net present value of household incomes:

$$U = U\left(\partial w_t^g + p^g \frac{\partial w_{t+1}^g}{1+r} - \partial c\right) + \left(\partial w_t^b + p^b \frac{\partial w_{t+1}^b}{1+r} - \partial c\right)$$

where w is the sex-differentiated earnings on period t for girls and boys, p is the sex-differentiated probability of future returns to the family, r is the discount rate, and c represents the direct cost of education. P captures factors like likelihood of completing secondary education, likelihood of staying home after secondary education, likelihood of sharing personal income at this stage and likelihood of remitting after moving from home. The discount rate r is affected by household income, with lower and more uncertain income leading to stricter time preference.

Schooling will reduce earnings on period t with ∂w_t as the opportunity cost, incur positive direct costs and increase earnings on period $t + 1$. All w^g are supposed to be lower than all w^b, which generally implies higher opportunity costs for boys. It can also be assumed that for girls, p is higher with than without schooling due to the likely effects of education on fertility and marital age (e.g. Becker et al. 2012).[12]

In this framework, higher immediate opportunity cost of schooling through lost earnings, smaller difference between present and expected earnings, lower probability of future returns to the family and a higher discount rate work against a child getting educated, along with higher direct costs of education. In a family making choices over educating children of different sex, a combination of these factors may tip the balance in favour of girls, even if female earnings are consistently lower than male earnings conditional on education. We argue that there is evidence such circumstances existed for worker families in early twentieth century Finland. In particular, high opportunity costs of schooling combined with relatively more uncertain future returns worked against boys in households of low socio-economic status.

4.2 The Working-Leser Engel specification

Empirically, intrahousehold resource allocation reflecting the derived demand for education by sex is analysed with the Working-Leser specification widely applied in development economics (Deaton 2000; Burgess and Zhuang 2000; Himaz 2010). It operates through modelling linear Engel curves for the consumption of goods and adding household demographics on the age, sex and number of household members to identify gendered differences in allocation patterns.

In the standard model:

$$w_i = \alpha_i + \beta_i \ln(x/n) + \eta_i \ln n + \sum_{j=1}^{J-1} \gamma_{ij}(n_j/n) + \delta_i z - \mu_i$$

w_i is the share of commodity $\square_i$—in this case, education—of total household expenditure, x is total household expenditure, n is household size, n_j is the number of household members in the age–sex group $\square_j$, while z stands for the vector of other relevant household characteristics and μ_i is the error term. The impact of the sex of children is tested through comparing the parameter estimate γ_{ij} for relevant female and male age groups. We apply the model presented by Deaton (2000, pp. 231–234) with log household expenditure expressed as per capita. While statistics on student age by class indicate some deviation from the norm on all grades, applying standard age categories for secondary school yields sufficiently clear results.

The source does not contain direct information on school enrolment. The key dependent variable is the budget share of children's schooling expenditure (*lasten koulumaksut*). At face value, this could be considered a generic continuous variable

[12] This is essentially similar to the simple two-period model of returns to education presented by Becker (1964, pp. 59–61), with the addition of the parameters p.

on schooling investment by households, but in effect we largely treat it as a proxy for secondary schooling. We argue that this interpretation is justified by three types of evidence.

Firstly, the original source indicates that the expenditure recorded in this category consisted of the sum spent on school materials and school fees. We use age groups specific to secondary schooling in Finland in the period and obtain significant estimates in line with our hypotheses. Secondary schooling carried fees, while alternative education available to children of the same age either involved modest costs and was infrequently attended (continuation classes of the common school) or was not likely to be attended by working-class girls (vocational training). This makes secondary schooling clearly the most plausible explanation for our results.

Secondly, as discussed below, we replicate our key results with a parallel model using a dummy dependent variable constructed on the basis of the ratio of household schooling expenditure to local secondary school fees, on which we have independent data. When the likelihood of exceeding this threshold is estimated with a probit model using the covariates of the Engel model, our results remain substantively the same.

Finally, and importantly, we will show that our microeconometric results are consistent with patterns in macro-level enrolment data by sex and socio-economic status over the 1920s and 1930s (see Sect. 6). We are therefore confident that variation in schooling expenditure conditional on age and sex captures the variation in the probability of secondary schooling sufficiently well for this analysis. However, even if schooling expenditure would be considered just an unspecified indicator for human capital investment, our conclusions on the gendered variation of educational investment by social group and its causes would be largely identical.

While in the original accounting framework, schooling expenditure was broken down to tuition fees and school materials, the source only reports the combined sum. Tuition fees only applied to secondary schools. Nationally, the average fee in 1928–1929 was FIM 435, which represented 1.7 % of the average annual total expenditure of a surveyed worker household. In private *lyseo*s, the mean was FIM 697 (2.7 %) and state *lyseo*s FIM 255 (1 %); in middle schools and girls schools, the fees were lower (Kaihovaara 2011, p. 45). Table 4 presents estimates on the lowest tuition fees of secondary schools in or near the survey localities. Data are missing for 81 households, where nearest secondary school was not identified. This variation in direct costs is controlled for in the analysis, but the results are robust to the inclusion of the missing cases and running the models without the fees variables.

Obviously, the cost of secondary education comprised primarily of the foregone earnings of working children. The average lowest tuition fee was approximately 6 % of the average positive contribution of children in all survey households and in worker households. In Table 3, the average positive contribution of children to the household was approximately ten times higher than the average schooling expenditure.

"School materials" referred to expenditure on paper, pens, etc. Such expenditure applied to common schools as well and occurred in households with no children in age for secondary school. As we focus on fee-carrying secondary education, complementary spending becomes a potential source of noise and spurious

Table 4 Estimated secondary school fees for the CLS households

Group (*n*)	Girl schools excluded			Girl schools included		
	Mean FIM (SD)	Mean exp. share (SD)	Exp. share (min–max)	Mean FIM (SD)	Mean exp. share (SD)	Exp. share (min–max)
All (873)	316.43 (240.12)	0.012 (0.011)	0.002–0.096	288.91 (252.50)	0.011 (0.012)	0.001–0.096
Workers (517)	333.11 (253.25)	0.014 (0.012)	0.004–0.096	308.10 (266.62)	0.013 (0.013)	0.003–0.096
White collar (230)	292.97 (222.65)	0.009 (0.008)	0.003–0.075	263.31 (232.25)	0.009 (0.008)	0.002–0.075
Elite (126)	290.84 (209.35)	0.007 (0.007)	0.002–0.055	256.95 (220.75)	0.006 (0.007)	0.001–0.055

Data unavailable for 81 cases. Fees have been estimated from published statistics by dividing the sum of "payments by students" with student headcount. Figures include possible effects of discounts and scholarships. "Exp. share" is the ratio of lowest fee estimate in locality to total household expenditure. *Sources*: computations from SVT IX Oppikoulut 1928–1929; CLS 1928 data

correlation. It has been suggested that the Engel specification might fail to detect discrimination if lower enrolment rates are hidden by higher but potentially spurious gender-specific expenditure (e.g. clothing) on the enrolled girls, as the model presupposes positive covariance between enrolling and spending (Kingdon 2005).[13] In general, spurious gender-specific expenditure (e.g. on drawing materials) could contaminate the results, even though the original control procedures during data collection aimed at strict separation of spending categories and no substantial evidence of leakage can be found.[14] On the other hand, as Table 3 indicates, there is also piling to zero in educational expenditure among households, possibly compromising OLS regressions.

While using OLS is still arguably not detrimental with appropriate caveats (Angrist and Pischke 2009, pp. 94–102), both of these concerns are simultaneously addressed by checking for robustness with an alternative specification. Dummy dependent variables have been constructed on whether schooling expenditure was equal to or above the lowest local secondary school fee, both per household and per child in the age group 11–18.[15] The shares of applicable households likely having children in secondary school predicted by these variables would be 15–22 % for workers and 56–72 % for the higher socio-economic groups. This seems on the high side particularly for workers. As the investigators recognized, the data did have a degree of elite bias, even within groups of lower socio-economic status. However, for the purposes of our analysis, the exercise resembles constructing a propensity score rather than exact measurement. In addition to eliminating any possible spurious variation below or above the threshold, the procedure also eliminates the risk of the estimates being driven simply by families placing daughters to the more expensive private institutions.[16] Applying a probit specification instead of OLS, these dependent variables yield results essentially identical to those with the original Engel model.

[13] The same concern applies to a Tobit specification. The application of models separating enrolment and expenditure decisions, such as hurdle or Heckman, is precluded by the lack of separate information on enrolment in the source.

[14] The summary cards passed through analysts correcting errors in classification in the original weekly account books. Leakage between schooling expenditure and general expenditures on food, clothing and books has been explored econometrically. None of these variables reaches significance when entered on the right hand side of the schooling expenditure regressions, with the exception of writing equipment—a class of goods nearly identical to those consumed as school materials—where there is some evidence of correlation.

[15] The variables have been defined both allowing a state girl school to define the lowest fee and restricting the identification of lowest fee to the most inexpensive coeducational or all-male institution due to a sometimes notable difference. The findings are robust to this. Observation of Epanechnikov kernel density graphs for the underlying variables seems to indicate a break in the densities close to value 1, suggesting the cut-off for the dummies is appropriate. This was also done relating the expenditure per lowest fee separately to the number of boys or girls of relevant age in the households. While the densities by gender were predictably different, there appeared to be no difference in the position of the break, suggesting the results are not driven by, e.g., scholarships disproportionately targeting worker boys. The break appeared further below 1 for the group of workers than for the data as a whole for the per capita-based variables, indicating a higher possibility of errors of exclusion.

[16] In case of families with low socioeconomic status, this source of bias might have existed within localities where the most inexpensive institution was not open for girls. However, the cheapest option was typically a girl school.

Table 5 Education Engel estimates and social group interactions: OLS regressions

	All	Workers	White collar and elite
ln (household size)	0.446 (0.708)	−1.861 (1.445)	0.927 (1.128)
ln (hh exp per capita)	−0.694 (0.295)**	−0.262 (0.6)	−0.586 (0.448)
Share of females 0–6	−3.300 (1.032)***	0.459 (2.11)	−2.741 (1.674)
Share of males 0–6	−3.616 (1.026)***	0.813 (2.101)	−3.176 (1.666)*
Share of females 7–10	−2.635 (1.138)**	0.587 (2.321)	−1.975 (1.839)
Share of males 7–10	−3.483 (1.189)***	0.786 (2.416)	−2.957 (1.902)
Share of females 11–15	−1.048 (1.134)	0.762 (2.315)	−0.538 (1.832)
Share of males 11–15	0.355 (1.144)	−5.710 (2.334)**	4.525 (1.841)**
Share of females 16–18	1.112 (1.314)	0.972 (2.702)	1.049 (2.173)
Share of males 16–18	1.132 (1.297)	−2.072 (2.596)	2.398 (2.016)
Share of females 19–22	0.385 (0.936)	−3.196 (1.972)	2.655 (1.633)
Share of males 19–22	2.127 (1.402)	−6.900 (2.787)**	5.364 (1.983)***
Share of females 23–29	−0.824 (0.651)	0.918 (1.294)	−1.275 (1.006)
Share of males 23–29	3.777 (1.797)**	−1.338 (3.662)	4.257 (2.739)
Share of males 30–54	3.394 (1.872)	−0.514 (3.802)	3.357 (2.841)
Share of females over 55	−1.695 (1.13)	−0.528 (2.387)	−1.267 (1.944)
Share of males over 55	2.223 (2.013)	1.348 (3.96)	0.953 (2.87)
Lowest school fee/hh exp	−9.370 (5.335)*	−9.776 (13.274)	5.380 (11.848)
Children's income/hh exp	−4.313 (0.811)***	2.919 (1.905)	−4.077 (1.628)**
Mother's income/hh exp	−0.973 (0.611)	0.145 (1.193)	−0.495 (0.864)
Constant	2.314 (1.946)	1.024 (3.072)	1.024 (3.072)
F test gender diff 11–15	3.32*	17.88***	17.79***
F test gender diff 16–18	0.00	1.55	0.52
R^2	0.16	0.24	

Dependent variable: schooling expenditure as percentage of total expenditure. $n = 873$. Standard errors in parentheses. Estimates for social groups obtained from the pooled model fully interacted with a dummy variable for the category of workers. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. *Source*: CLS 1928 data

5 Results

5.1 Pro-girl workers, pro-boy elite

Table 5 presents estimation results for the Working-Leser Engel model, first without distinguishing socio-economic status and then with social group interactions for workers and remaining main effects for the two higher socio-economic groups. While the regression coefficients are tested for difference from zero as usual, the key indicator for gender difference in intrahousehold resource allocation in this specification is the F test on the significance of the difference of effect between boys and girls in the same age group (Deaton 2000, p. 234). Regardless of the significance of the coefficients themselves, the order of the point estimates indicates the direction of the difference. The focus is on children at the age for secondary school. The relevant age category 11–18 has been split in order to differentiate

effects for lower and upper secondary school ages, but the findings are robust to merging the categories.

The first column reports estimates for the whole data as such. The estimates in the second and the third column have been obtained from a model where all other variables have additionally been interacted with a dummy assuming value 1 in case of a worker household and value 0 otherwise. While the second column reports the change in estimates when conditioned with being a worker household, the third reports the remaining effects for the two higher groups. Differences between the second and the third column therefore reflect the difference that being or not being a worker makes for the estimates (e.g. Wooldridge 2003, pp. 232–235; Brambor et al. 2006).

The results suggest significant gender differences in the age category 11–15, but with starkly opposing patterns between social groups. The full, uninteracted data yield a moderately significant pro-boy bias. However, the effect of worker status has a highly significant pro-girl bias. The coefficients strongly suggest that this has primarily to do with the sizable penalty that having a worker background carried for males in age for secondary school. The remaining main effects for white-collar and elite households in the fully interacted model conversely show a clear pro-boy bias for the same age group.

Due to scarce degrees of freedom, a fully interacted model does not allow clustering standard errors by locality. This seems desirable due to many potential factors driving intracluster correlation, including locally uniform costs of education. A Chow test with default standard errors suggests a significant difference between the interacted and main estimates ($F = 4.42$), lending support to the application of separate regressions. At the same time, this is a more straightforward way of looking at the differences between boys and girls within different social groups.

Table 6 presents results for workers and nonworkers from separate regressions with two different specifications, OLS and probit, all with locally clustered standard errors. The previous findings are substantively replicated with more moderate levels of statistical significance across specifications, with the OLS indicating a pro-girl bias also for the age group 16–18 among workers. In the probit analysis, where the previously discussed dummy dependent variable based on fees has been used, the pro-boy gender bias in the upper socio-economic strata is only liminally significant, while the penalty on being a worker boy is statistically significant also against zero.[17] Specifications where only the relevant age–sex groups are interacted with social group also yield similar results.

All in all, the finding on pro-girl—or anti-boy—bias among workers seems robust and would be hard to explain with a spurious gender correlation, as this would need to be group specific. Our model suggests looking into the gender differences in the costs and returns of education by socio-economic group instead.

[17] Using specifications with dummies based on schooling expenditure per capita for the relevant age group further diminishes the sample, as only 415 households both had children in this age and resided in localities where school fee data could be constructed. With such specifications, the pro-boy difference would disappear, but the pro-girl difference among workers is always highly significant ($p < 0.001$).

Table 6 Education Engel estimates by social group: OLS and probit regressions with clustered standard errors

	OLS (dependent variable: school exp % hh exp)		Probit (dependent variable: dummy school exp > lowest school fee)	
	Workers ($n = 517$)	White collar and elite ($n = 356$)	Workers ($n = 517$)	White collar and elite ($n = 356$)
ln (household size)	−0.934 (0.373)***	0.927 (2.146)	0.135 (−0.1)	−0.677 (0.231)***
ln (hh exp per capita)	−0.848 (0.42)**	−0.586 (0.961)	−0.062 (0.065)	−0.353 (0.103)***
Share of females 0–6	−2.282 (0.727)***	−2.741 (2.48)	−0.597 (0.178)***	−1.509 (0.369)***
Share of males 0–6	−2.363 (0.739)***	−3.176 (2.31)	−0.616 (0.18)***	−1.659 (0.428)***
Share of females 7–10	−1.388 (0.711)*	−1.975 (2.948)	−0.430 (0.164)***	−0.590 (0.473)
Share of males 7–10	−2.171 (0.768)	−2.957 (2.622)	−0.535 (0.24)**	−1.151 (0.562)**
Share of females 11–15	0.224 (0.99)	−0.538 (2.668)	−0.187 (0.145)	0.247 (0.365)
Share of males 11–15	−1.184 (0.837)	4.525 (3.356)	−0.340 (0.147)**	0.936 (0.647)
Share of females 16–18	2.021 (1.251)	1.049 (3.144)	0.143 (0.169)	0.110 (0.383)
Share of males 16–18	0.326 (0.827)	2.398 (3.185)	−0.095 (0.174)	0.133 (0.667)
Share of females 19–22	−0.541 (0.574)	2.655 (2.223)	−0.211 (0.158)	−0.322 (0.499)
Share of males 19–22	−1.536 (1.54)	5.364 (4.167)	−0.371 (0.166)**	0.100 (0.375)
Share of females 23–29	−0.357 (0.548)	−1.275 (0.884)	−0.012 (0.12)	−0.487 (0.356)
Share of males 23–29	2.919 (4.429)	4.257 (7.556)	−0.215 (0.322)	−1.133 (0.374)***
Share of males 30–54	2.843 (3.935)	3.357 (6.52)	−0.066 (0.279)	−1.427 (0.41)***
Share of females over 55	−1.795 (0.732)**	−1.267 (2.368)	−0.348 (0.195)*	−1.053 (0.242)***
Share of males over 55	2.301 (3.673)	0.953 (5.165)	−0.132 (0.264)	−1.766 (0.527)***
Lowest school fee/hh exp	−4.396 (3.574)	5.380 (8.992)	−4.878 (1.641)**	−34.981 (9.093)***
Children's income/hh exp	−1.158 (0.845)	−4.077 (2.355)*	−0.255 (0.165)*	−1.039 (0.306)***
Mother's income/hh exp	−0.351 (0.261)	−0.495 (0.575)	0.012 (0.102)	−0.221 (0.281)
Constant	4.072 (1.098)***	1.024 (4.996)		
Test gender diff 11–15	$F = 5.00$**	$F = 3.53$*	$\chi^2 = 3.21$*	$\chi^2 = 2.64^{£}$

Table 6 continued

	OLS (dependent variable: school exp % hh exp)		Probit (dependent variable: dummy school exp > lowest school fee)	
	Workers ($n = 517$)	White collar and elite ($n = 356$)	Workers ($n = 517$)	White collar and elite ($n = 356$)
Test gender diff 16–18	$F = 2.95$*	$F = 0.10$	$\chi^2 = 1.99$	$\chi^2 = 0.00$
R^2	$R^2 = 0.17$	$R^2 = 0.24$	Pseudo $R^2 = 0.26$	Pseudo $R^2 = 0.43$

Clustered standard errors in parentheses. Results for separate regressions with clustered standard errors by locality. Marginal effects reported for probit. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$; £ $p = 0.104$. *Source*: CLS 1928 data

Table 7 Education Engel estimates for age 11–15 interacted with mother having earnings and with group interactions: OLS regressions

	All	Workers	White collar and elite
Share of females 11–15	−1.360 (1.228)	1.738 (2.486)	−1.352 (1.930)
Share of males 11–15	1.831 (1.226)	−6.937 (2.495)***	5.734 (1.920)***
Earning mother × share of females 11–15	0.970 (1.062)	−4.702 (2.287)**	4.404 (1.888)**
Earning mother × share of males 11–15	−3.146 (1.131)***	3.324 (2.427)	−3.277 (1.976)*
F test gender diff 11−15	9.57***	18.71***	25.37***
F test gender diff Earning mother × 11–15	7.14***	5.74**	7.76***

Dependent variable: schooling expenditure as percentage of total expenditure. $n = 873$. Standard errors in parentheses. Estimates obtained from models identical to Table 4. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. *Source*: CLS 1928 data

As for intrahousehold bargaining, notably, mothers' earnings are not statistically significant in any of the specifications.[18] There is therefore no immediate evidence of a positive effect of a mother's bargaining position, measured by generated income, on investment into the formal schooling of children. However, some empirical work has suggested that schooling is not necessarily among those goods where possible maternal altruism is reflected, and could be more sensitive to variation in male guardians' resources as well (Edmonds 2004; cf. Saaritsa 2008b, pp. 327–329 on a subset of this data, suggesting increased schooling expenditure was linked with informal cash transfers managed by men).

Some significant effects do emerge when mother having earnings is entered as dummy and interacted with the relevant age categories. Coefficients from a modified fully interacted model in Table 7 show that this basically subverts the estimated gender differences in group effects. Seemingly, a mother with independent earnings improved the position of girls *vis-a-vis* boys, but only among the higher socio-economic groups. The effect is *opposite* when conditioned on being a worker: in this case, boys would have appeared to benefit from a resourced mother more than girls.

Such switching gender preferences sit badly both with bargaining models and with literature on the impact of parental resources on schooling, which would normally anticipate either gender-neutral or same-sex effects (cf. Horrell and Oxley 2013, p. 147; Buchmann and DiPrete 2006, pp. 519–520). Further analysis will strongly suggest that these estimates are, in fact, an artefact of a substitutive relationship between mothers' and children's earnings in the households. Assuming a single marginal utility for all household income, mothers with earnings reduced the opportunity costs of educating boys among workers as the value of any extra income dropped, leading to a fall in the pro-girl bias in this group. Adding up the coefficients with and without the maternal income interaction suggests that maternal

[18] This is robust to entry as sum rather than income share; as a dummy, the variable acquires marginal ($p < 0.1$) but *negative* significance in some specifications.

income brought the effect of the age–sex groups closer together and diluted gender differences regardless of their direction. In separate clustered regressions, the results are alike, but remain mainly below statistical significance, suggesting the effect is not very robust.

Similarly, there is no sign that children were able to use their immediate earnings as bargaining chips to push for more schooling—assuming this was what they would have preferred (cf. Moehling 2005). Whenever children's contributions have statistical significance, the coefficient is negative, which is again more conducive to a household opportunity cost interpretation of the relationship between children's income generation and educational investment. However, in the context of human capital investment, implicit or explicit bargaining with future returns to the household also has to be considered (cf. Horrell and Oxley 1999, pp. 514–520).

5.2 Opportunity costs

The estimates suggest that in general, higher current income from children was associated with less investment into education. In what follows, we model the share of household expenditure financed by children's contributions in the same style as schooling expenditure above. Important differences by gender and social group emerge again. For the whole data, the estimates suggest male children generated more income for the common family pool. The group interactions show this clear gender difference was, in fact, pertinent to workers only. Out of the relevant age groups, the result is clearest in the 16–18 bracket (Table 8). In the separate clustered OLS regressions by group (Table 9), the gender difference in the 11–15 bracket is statistically significant as well, even if both coefficients are below zero.

In the younger age group, productivity and earnings were likely to be low, although early experience may have contributed to a higher income trajectory in the following years (cf. Fig. 5 below). There was plenty of time to work outside class hours and during breaks, and work and school were not mutually exclusive. School and labour regulations still limited possibilities to earn. Children who did not enter secondary school had a legal obligation to complete two more classes of common school by age 14. Finland was dragging its feet in adopting ILO norms on child labour, and enforcement was imperfect, but the minimum age for employment was limited to 13 in industry—by exception only, but allowing night shifts—and strictly to 14 in services. Agriculture was not regulated in any way (Rahikainen 1996). All in all, the findings strongly imply that among workers, boys bore the brunt of supplementing family income, and this was what cut their schooling short compared to girls.

This, of course, is not entirely surprising. Worker families needed supplementary income more badly, and manual work for untrained youth was more available and better paid for boys than for girls. The long-term consequences of foregoing secondary schooling also differed for worker boys and girls. Female employment in industry was limited to unskilled positions, badly paid relative to men, and heavy. For males, particularly skilled work was remunerated much better and involved opportunities for advancement (Heikkinen and Hannikainen 2006, pp. 168–170; Lähteenmäki 1995, p. 77; Suoranta 2009). The average pay gap between industrial and white-collar work actually shrank in the interwar years (Siipi 1967, p. 59). In

Table 8 Children's contribution Engel estimates and social group interactions: OLS regressions

	All	Workers	White collar and elite
ln (household size)	0.224 (0.027)***	0.102 (0.055)*	0.145 (0.045)***
ln (hh exp per capita)	0.010 (0.012)	−0.005 (0.024)	0.002 (0.018)
Share of females 0–6	−0.250 (0.041)***	−0.135 (0.081)*	−0.186 (0.065)***
Share of males 0–6	−0.269 (0.041) ***	−0.113 (0.081)	−0.220 (0.064)***
Share of females 7–10	−0.215 (0.046) ***	−0.071 (0.09)	−0.195 (0.071)***
Share of males 7–10	−0.235 (0.048) ***	−0.127 (0.093)	−0.191 (0.074)**
Share of females 11–15	−0.222 (0.046) ***	−0.113 (0.09)	−0.175 (0.071)**
Share of males 11–15	−0.147 (0.046) ***	−0.036 (0.091)	−0.154 (0.072)**
Share of females 16–18	−0.020 (0.054)	−0.144 (0.106)	0.052 (0.085)
Share of males 16–18	0.152 (0.053) ***	0.311 (0.102)***	−0.036 (0.081)
Share of females 19–22	0.025 (0.038)	0.076 (0.079)	−0.037 (0.066)
Share of males 19–22	0.145 (0.058)**	0.359 (0.11)***	−0.050 (0.08)
Share of females 23–29	0.037 (0.027)	0.010 (0.051)	0.020 (0.04)
Share of males 23–29	0.127 (0.074)*	0.124 (0.145)	0.095 (0.108)
Share of males 30–54	0.086 (0.078)	0.110 (0.151)	0.064 (0.112)
Share of females over 55	−0.101 (0.045)**	−0.038 (0.09)	−0.065 (0.07)
Share of males over 55	0.207 (0.084)**	0.103 (0.16)	0.141 (0.117)
Mother's income/hh exp	−0.013 (0.025)	−0.056 (0.048)	0.002 (0.035)
Constant	−0.246 (0.077)***	−0.135 (0.081)	
F test gender diff 11–15	5.61**	1.53	0.18
F test gender diff 16–18	11.98***	22.00***	1.33
R^2	0.45	0.53	

Dependent variable: children's earnings/total expenditure. $n = 954$. Standard errors in parentheses. Estimates for social groups obtained from the pooled model fully interacted with a dummy variable for the category of workers. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. *Source*: CLS 1928 data

the rural mill communities, finding work was facilitated by social networks like kinship, and generations sometimes followed each other to the factory (Saaritsa 2001). Induction and training were firm specific and took place through apprenticeships or informal practice, lacking the direct costs or comparable earnings loss of schooling. In tightly bound working-class communities, males pursuing education were potentially even frowned upon (Kaihovaara 2011, pp. 69–70, 79–82).

Industrial employment of children and youth below 18 years of age was already in decline in Finland the interwar years.[19] In the cities, children could find work in the formal and informal service sectors, running errands in offices, shops and the streets, carrying luggage, shining shoes, etc. The reluctance of particularly boys to attend the supplementary "civic school" classes after mandatory common school ended was a headache for authorities trying to clear the streets of "idle" youth. It was customary to go looking for opportunities to earn at 13–14. Notably, statistics on Helsinki from the

[19] Around 5 % of the industrial workers of Helsinki in mid-1920s were under 18 (Rahikainen 1996, p. 334).

Table 9 Children's contribution Engel estimates by social group: OLS regressions with clustered standard errors

	All ($n = 954$)	Workers ($n = 581$)	White collar and elite ($n = 373$)
ln (household size)	0.224 (0.039)***	0.247 (0.05)***	0.145 (0.05)***
ln (hh exp per capita)	0.010 (0.013)	−0.004 (0.02)	0.002 (0.018)
Share of females 0–6	−0.250 (0.039)***	−0.321 (0.061)***	−0.186 (0.042)***
Share of males 0–6	−0.269 (0.044)***	−0.333 (0.062)***	−0.220 (0.056)***
Share of females 7–10	−0.215 (0.045)***	−0.266 (0.062)***	−0.195 (0.064)***
Share of males 7–10	−0.235 (0.054)***	−0.317 (0.059)***	−0.191 (0.07)**
Share of females 11–15	−0.222 (0.047)***	−0.287 (0.069)***	−0.175 (0.053)***
Share of males 11–15	−0.147 (0.046)***	−0.190 (0.075)**	−0.154 (0.066)**
Share of females 16–18	−0.020 (0.054)	−0.092 (0.085)	0.052 (0.063)
Share of males 16–18	0.152 (0.077)*	0.275 (0.119)**	−0.036 (0.067)
Share of females 19–22	0.025 (0.022)	0.039 (0.025)	−0.037 (0.022)
Share of males 19–22	0.145 (0.065)**	0.309 (0.129)**	−0.050 (0.096)
Share of females 23–29	0.037 (0.012)***	0.030 (0.021)	0.020 (0.02)
Share of males 23–29	0.127 (0.11)	0.219 (0.225)	0.095 (0.064)
Share of males 30–54	0.086 (0.109)	0.175 (0.231)	0.064 (0.063)
Share of females over 55	−0.101 (0.036)***	−0.103 (0.046)**	−0.065 (0.04)*
Share of males over 55	0.207 (0.097)**	0.244 (0.218)	0.141 (0.08)
Mother's income/hh exp	−0.013 (0.016)	−0.054 (0.019)***	0.002 (0.011)
Constant	−0.246 (0.101)**	−0.233 (0.139)	−0.130 (0.111)
F test gender diff 11–15	6.97**	5.59**	0.26
F test gender diff 16–18	6.39**	8.82***	1.24
R^2	0.45	0.56	0.36

Dependent variable: children's earnings/total expenditure. Clustered standard errors in parentheses. Results for separate regressions with clustered standard errors by locality. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. *Source*: CLS 1928 data

1920s show a male majority in service employment as well, including offices, until age 18, after which there was an overwhelming female majority (Rahikainen 1996, pp. 332–337). All in all, the immediate income generation potential of boys and the related pressures made it easy for them to forego secondary schooling. The pro-girl bias in schooling among worker families could well be denoted an anti-boy bias.

The separate regressions also show a significant negative relationship between the contributions of mothers and children in worker households. This suggests an explanation to the shifty effect of mothers' earnings on the gender differences in educational investment. When interactions with mother having earnings are added to the fully interacted model, the result is a mirror image of that on schooling expenditure. A mother's earnings attenuated the pressure to earn for children and diluted the gender differences (Table 10). If mothers were able to earn, children did not have to—and in the case of worker families, this affected predominantly boys. This substitutive relationship relaxed the constraint set by the opportunity costs of schooling for low-income families and reduced the pro-girl bias in educational

investment. This, rather than actual intrahousehold bargaining, is the most plausible link between mothers' earnings and children's schooling in the data.

In light of literature, the pull of the office attracted working-class girls to secondary schools for many good reasons ranging from pay to working conditions, social status and marriage market considerations. There is some econometric evidence that responding to the changing labour market also influenced schooling decisions among the households in the data. A variable on the share of white-collar employment out of female employment in the municipality where a locality was situated emerges as a significant positive determinant of schooling expenditure when added to the fully interacted model, but only when conditioned with being a worker ($p = 0.0006$). In separate clustered regressions, the effect is similar, but remains below the threshold of statistical significance ($p = 0.12$). As the variable is constructed from municipal level census data for 1930, it is a less than ideally accurate measure of locally relevant labour market characteristics. All in all, our evidence is much clearer on the penalty for being a worker boy.

As such, the pattern of industrial opportunities pulling boys away from secondary education and clerical opportunities pushing girls to continue at school bears a striking resemblance, for instance, to the analysis of early twentieth century USA by Goldin and Katz (2008, pp. 196–197). Similar findings have also emerged in development economics. As outsourced call centre employment began to boom in India, according to Munshi and Rosenzweig (2006) boys from lower caste families of Mumbai tended to remain in traditional employment readily available through caste networks, preferring schooling in local language. Girls, free of the trappings of a destined occupation, could opt for schooling in English and take up the new opportunities. Kingdon and Theopold (2008) have found that growing returns to human capital in India in the 1990s increased the school participation of all other groups except for boys from poor households. In their case, higher returns to their existing, albeit low, human capital pushed their cash-constrained families to place them to employment instead of education. The girls from poor households, then again, went to school more than before and benefited. Himaz (2010) concludes that in rural Sri Lanka, superior female returns to education stemming from lower opportunity costs have been a likely cause for the observed pro-girl bias in educational spending.

5.3 Expected returns

Was this globally recognizable pattern about maximizing returns to the household, under financial pressure or otherwise, or about striving for the best possible future for all children under prevailing constraints? (cf. Logan 2007). It can be assumed that boys would certainly have benefited from secondary education as well and in the absence of gender-based "glass ceilings" on the labour market, possibly far more than girls (Kaarninen 1995, p. 220). On the other hand, it can be argued that if financially constrained families were forced to choose, sacrificing the education of boys did less damage than casting girls to perpetual unskilled employment or early marriage with poor outside options.

However, there are indications that worker families also had reasons to expect more certain financial returns from educating girls than from educating boys. As has

Table 10 Children's contribution Engel estimates for ages 11–15 and 16–18 interacted with mother having earnings and with group interactions: OLS regressions

	All	Workers	White collar and elite
Share of females 11–15	−0.219 (0.05)***	−0.126 (0.097)	−0.170 (0.076)**
Share of males 11–15	−0.122 (0.05)**	0.051 (0.097)	−0.162 (0.075)**
Share of females 16–18	−0.075 (0.064)	−0.196 (0.124)	0.042 (0.097)
Share of males 16–18	0.143 (0.058)**	0.391 (0.111)***	−0.037 (0.083)
Earning mother × share of females 11–15	−0.012 (0.044)	0.026 (0.091)	−0.021 (0.075)
Earning mother × share of males 11–15	−0.075 (0.047)	−0.187 (0.098)*	0.024 (0.081)
Earning mother × share of females 16–18	0.109 (0.067)	0.108 (0.136)	0.019 (0.112)
Earning mother × share of males 16–18	0.028 (0.078)	−0.195 (0.175)	0.004 (0.149)
F test gender diff 11–15	5.25**	4.92**	0.02
F test gender diff 16–18	11.09***	22.59***	0.76
F test gender diff earning mother × 11–15	0.98	2.52	0.16
F test gender diff earning mother × 16–18	0.60	1.86	0.01

Dependent variable: children's earnings/total expenditure. $n = 954$. Standard errors in parentheses. Estimates obtained from models identical to Table 7. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. *Source*: CLS 1928 data

been shown, boys were more likely to drop out of school than girls, making the investment more risky. Economists of education have often identified linear returns to years of schooling, even when a degree is not obtained. However, in most contexts, families making the decisions have probably been unaware of this and likely to assume that finishing without a certificate renders schooling much less valuable, if not worthless (Duflo and Banerjee 2011, pp. 86–89; cf. Son 2013). The changes in enrolment figures during the economic crisis of the 1930s discussed in the next section, where starting seems to have been affected more clearly than stopping, suggest this is how families in interwar Finland were reasoning as well. Although rapid transition to work was probably sought for a male dropout from a worker family, any direct and indirect costs for years at school would already have been sunk. Assuming that families took their cue on dropout probabilities from correctly perceived behaviour around them rather than the elite educators who thought girls had less stamina and needed special schools, expected returns would have been that much lower.

The variable observed in the data measures the financial contribution of children to the household common pool, not their individual earnings. A factor conducive to sharing personal income was continued coresidence by working-age children. While remittances existed, the transfers recorded in the survey were tiny compared to contributions from coresident children, even if the burden of grown children to household consumption is considered. For the 24 % of worker households receiving transfers in cash from any source—including but not limited to remittances from adult children—the mean receipt was FIM 573, which was about 11 % of the mean positive contribution from children living with the family (for an analysis of informal transfers in Helsinki in the same data, see Saaritsa 2008b, 2011).

Figure 3 tracks the presence of working-age children (ages 15–29) of both sexes in households by social group and the contribution of children as ratio to total expenditure (right axis), against household head age using locally weighted scatterplot smoothing (cf. DiMatteo 1998). Firstly, it is again obvious that the contributions of children were far more important for workers than for the higher socio-economic groups. Secondly, there is a clear gender difference pertaining only to worker households: in this group, female children remained home more often than male children. While over 25 % of worker households had at least one working-age female besides the mother present, the corresponding figure for males was 21 %. In the 70 worker households with a head aged over 50, there were altogether 18 females aged 23–29 present and 6 males.[20]

Both the decision to leave home early and the propensity to drop out of school could have been endogenous to household human capital investment decisions

[20] The presence and contributions of older male children were also influenced by mandatory military service, which lasted 12 months and was usually performed at around year 20. The children's contribution Engel curves still indicate significant returns to households on the relevant male age category. The effect of the service on human capital formation is unclear, but selection to superior ranks tended to replicate attained civilian levels of education. In the late 1920s, around a third of conscripts were rejected, primarily on medical grounds, but to a highly disputed degree possibly also on grounds of perceived loyalty issues related to the legacy of the civil war of 1918. Both causes were likely to affect workers more than others (Ahlbäck 2010, pp. 77–78, 236–237; Ylikangas 2009).

rather than robust characteristics of the behaviour of worker boys. The next two graphs (Fig. 4) are an experimental attempt to capture the opportunity costs and returns of education by sex among workers. Using the age of the eldest child of each sex as the independent variable, children's contributions have been graphed in the same figure for two sets of households: those with and those completely without educational expenditure. If we were to assume that this roughly gauges the difference between families that did and did not school their children and that the conditioning of the moving average with the age of the eldest child of each sex makes the contribution of that child a key determinant of the graph, the figures can be read as mapping the returns of children of different sex to their families with and

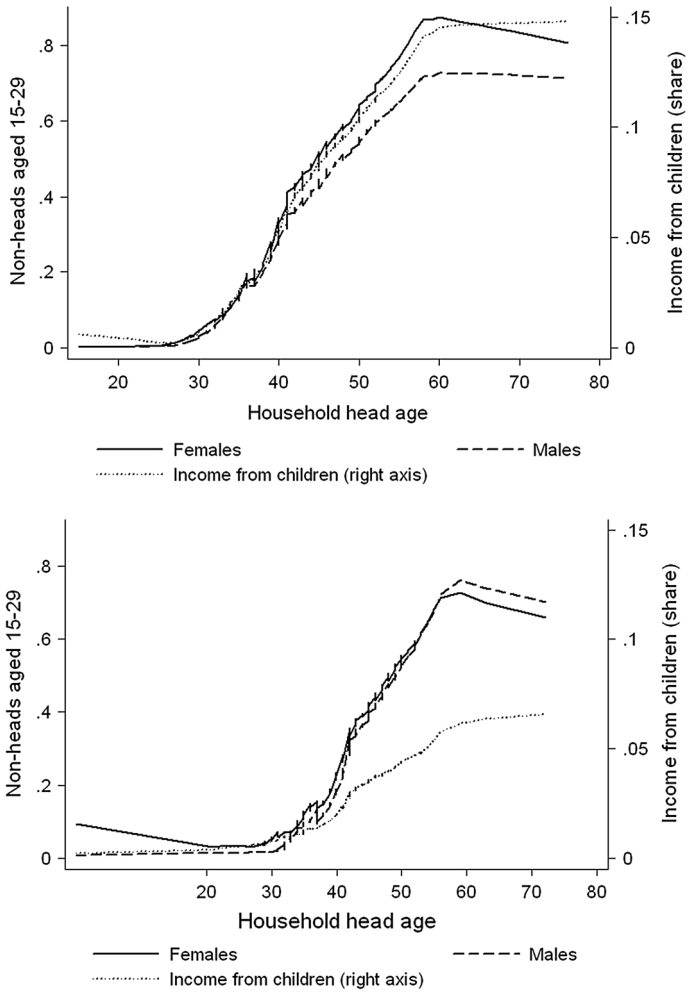

Fig. 3 Presence of working-age children by sex and children's contribution as share of total expenditure on household head age. LOWESS lines with running-mean smoothing (bandwidth 0.8). Workers (*top*) versus white collar and elite (*bottom*). *Source*: CLS data

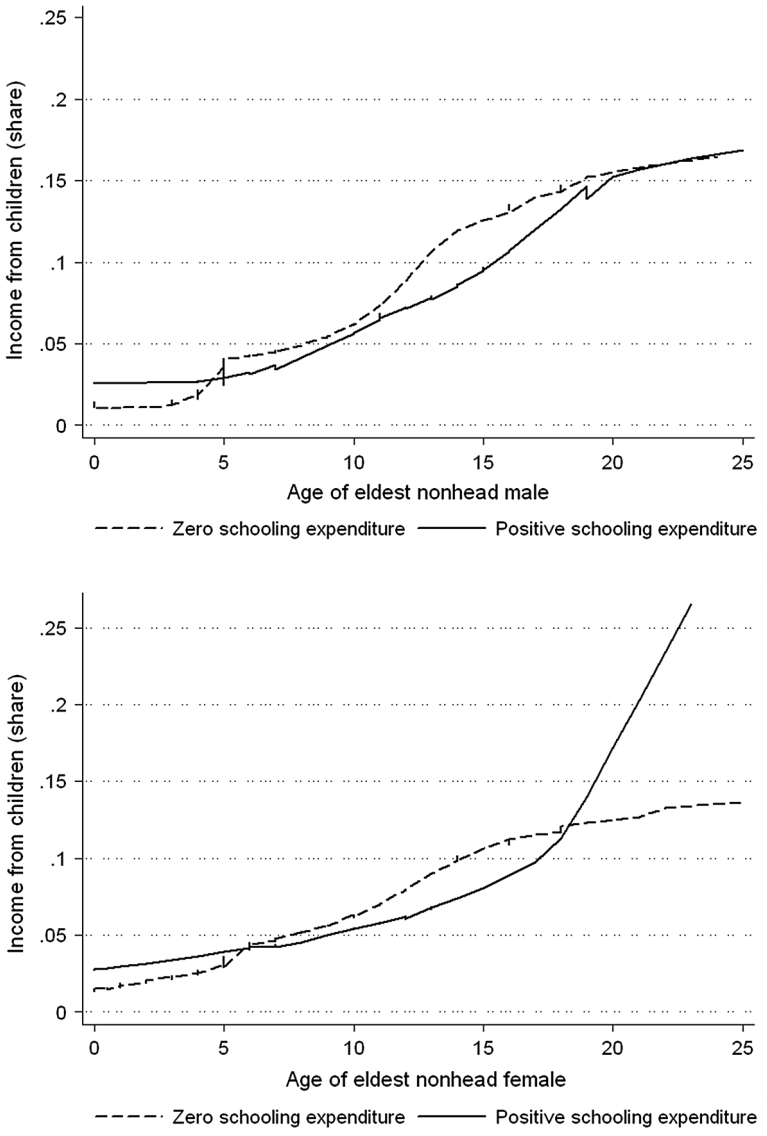

Fig. 4 Children's contribution to worker households as share of total expenditure with and without schooling investment, on age of eldest male child (*top*) versus eldest female child (*bottom*). LOWESS lines with running-mean smoothing (bandwidth 0.8). *Source*: CLS data

without schooling. In this reading, the difference between children's contributions in "schooling" and "non-schooling" households reflects the opportunity costs and returns of education in different periods. Foregone earnings are expected in earlier years and positive returns in the latter.

At face value, the figures would appear to validate our explanation for the pro-girl bias in schooling among worker households. At earlier ages, "schooling"

households lose income and more so when educating boys than when educating girls. At later ages, there are no discernible returns to schooling for the households in the figure on boys. In the case of girls, however, the graphs neatly map a human capital investment pattern where earlier earnings loss is compensated by considerably higher returns to the household at a later period. This basic pattern remains the same if households are divided by the dummy used in the probit analyses in Sect. 4.2. In absence of evidence based on more robust techniques, however, we must emphasize that this remains tentative and descriptive support for our hypothesis. Experimentations including interactions with schooling expenditure dummies in the OLS specifications do not replicate the patterns of these nonparametric figures.

All in all, our findings do clearly support the conclusion that the structure of expected costs and returns faced by worker households in early twentieth century Finland had an important role in their enthusiasm to educate girls, or more accurately, their reluctance to educate boys.

6 Class, enrolment and the Great Depression

As a further validation to our analysis, our microeconometric findings are compatible with macro-level data on changing enrolment patterns in the interwar years. While the aggregate effect of the global crisis of the 1930s on GDP and employment was smaller than in many other countries, the Great Depression caused high unemployment, income loss, poverty and hardship among urban worker families in Finland, particularly those previously dependent on hard-hit sectors like construction in Helsinki (Hjerppe 1988, pp. 45–46, 51–54, 91; Hannikainen 2008; Parikka 1994; Peltola 2008). The enrolment share of girls in secondary schools fell in the 1930s, recovering towards the end of the decade. While the reasons for this have not been analysed, the misperception of a higher propensity of girls to drop out has rendered the observation intuitively unsurprising. On the contrary, we have suggested that girls demonstrated a number of relative strengths in secondary schooling: domination of the middle school, lower dropout rates and pro-girl bias in educational investment among families of low socio-economic status, supported by structural change in the economy. Against this backdrop, the disproportionate fall in female enrolment during the Great Depression calls for an explanation.

Dropouts alone are a weak candidate, particularly as girls were not dropping out of secondary schools more than boys at any point in time. Proximate causes were increased postponement of transition to secondary school until class III and a fall in the number of girls who started secondary school at all. Of these, the effect of the former was numerically big, as cohort sizes were large in the first 2 years of school, but misleading, if students were only spending a further year in common school before transitioning to secondary schools.[21] Figure 5 demonstrates the pattern of

[21] A gender difference in the propensity to postpone the start of secondary school also biases the Engel estimates slightly downwards for girls when standard age categories are applied, but this pattern was less pronounced in 1928.

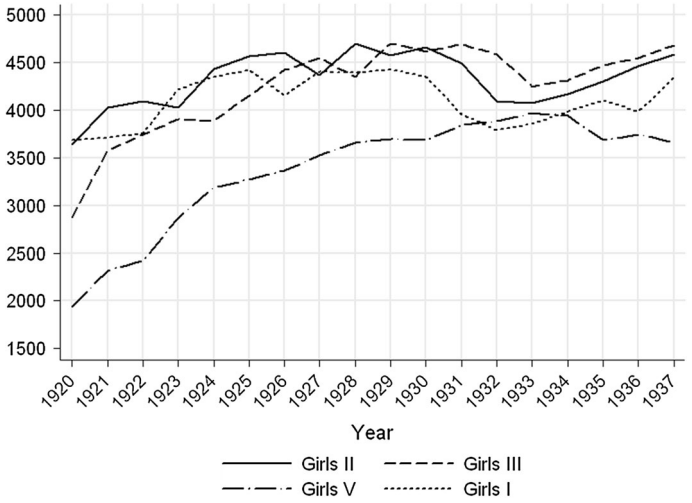

Fig. 5 The enrolment of girls on secondary school classes I–III and V, 1920–1937. *Source*: SVT IX Oppikoulut 47–64, combined tables on the number of secondary schools, teachers and students

deferred starting setting in with the economic crisis, and the reduction in the number of girls starting secondary school. Parallel with the decline from 1930, in the first 3 years of lower secondary school, higher grades always had *more* female students than lower grades in the previous year. The shock caused by the crisis only reached the final class of middle school with a delay in mid-decade, when the intake to lower classes was already recovering. This strongly suggests that changes in starting rather than dropping out of secondary school were driving the variation.

Figure 6 provides an explanation consistent with the econometric analysis. The graphs at the top show that the decline in overall enrolment was indeed limited to girls: the number of boys kept on climbing throughout the crisis, which caused the share of girls to fall slightly. Below, we have graphed indicators for the changes that occurred in the reported student background by social group in the same period, computed from published statistics. The number of students from "worker" families is graphed at the very bottom. Next above, the graph for "lower SES families" adds to workers all farmers, tenant farmers and agricultural labourers, leaving out civil servants and large and small business. While these data are unfortunately not available by sex, and the group definitions obviously differed between CLS data and the published school statistics, the patterns are suggestive.

With the breakout of the crisis, the number of students from families of lower socio-economic status immediately started to fall. While not equally discernible, the same applied to the group of workers, whose share declined from 13.6 % in 1928–1929 to 12.2 % by mid-1930s. Our analysis revealed a pro-girls bias among the workers of the CLS 1928 data. It can be safely assumed that the average incentives of households in the other, predominately agrarian "lower SES" groups were similar, particularly in terms of the opportunity costs of schooling boys (Rahikainen 1996, pp. 328, 331–332). The changes in student background are therefore a highly likely candidate for explaining the changes in the enrolment of

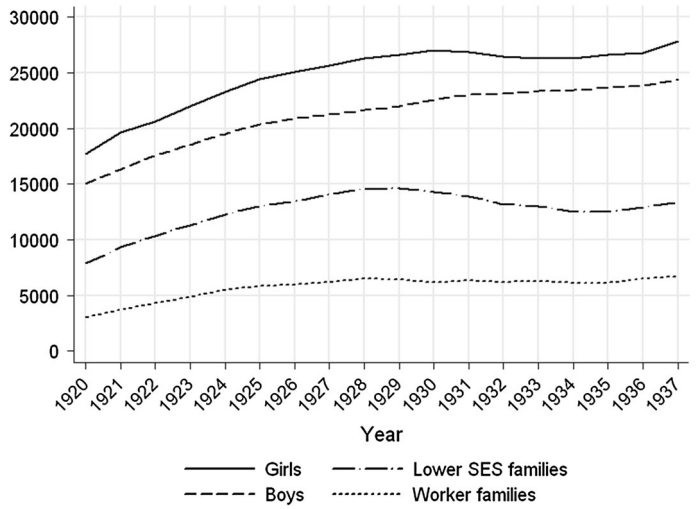

Fig. 6 The enrolment of all boys and girls, the enrolment of children with fathers from lower socio-economic groups and the enrolment of children of workers in secondary schools, 1920–1937. "Lower SES families" include workers, all farmers, tenant farmers and agricultural labourers. Absolute numbers estimated on the basis of shares and total numbers of students. *Source*: SVT IX Oppikoulut 47–64, combined tables on the number of secondary schools, teachers and students; computations from Appendix in Table 11

girls in the period. In the figure, the graphs on low SES and on girls move in unison, while the number of boys is unaffected and keeps growing. The shares of "lower SES" students and girls are correlated at 0.78 ($p < 0.001$). The drop in the share of female students was around 2 percentage points (from 54.9 to 52.9 % in 1928–1935), while the share of students from all "lower SES" families fell around 5.5 percentage points (from 30.4 to 24.9 % in 1928–1935) in the same time.

It seems plausible, then, that the setback in the secondary schooling of girls during the 1930s did not occur because girls were discriminated against by families during the economic crisis. Rather, it happened because during the crisis, more families from the lower social strata that were prone to educate girls rather than boys were no longer able to send their children to secondary school at all, probably due to the direct costs involved.[22] This may also partly explain the growth in female industrial employment over the 1930s. All in all, our microeconomic analysis is consistent with the enrolment data.

7 Conclusions and discussion

We have argued that a significant part of the female majority in secondary schooling in early twentieth century Finland can be explained by analysing the expected costs

[22] The direct connections between secondary schooling, social groups and gender also make it improbable that the household budget data results were driven by investment into other types of education, like vocational training.

and returns of education to families with a classic unitary Beckerian human capital investment model. Applying an Engel specification to schooling expenditure in a 1920s household budget data, we find that worker households exhibited a robust pro-girl bias. This is explained first and foremost by the higher opportunity costs and more uncertain returns related to educating boys in this group, although increasing returns to educating girls driven by the rise in female employment in modern services were undoubtedly also a factor. There are good reasons to believe this also applied to the agrarian groups not included in the data. The importance of the link between social class and gender preference for explaining the early female majority is corroborated by the correlation between female and non-elite enrolment during the interwar years. At the macro-level, variation in the share of girls was driven by variation in the share of lower socio-economic groups.

We find no econometric evidence to support a bargaining approach, related to either mothers' earnings or to children's own income. Maternal earnings did influence gender ranking in schooling expenditure in some specifications, but the changes were inconsistent with stable preference for either sex and are best understood through the effect of additional earnings on the opportunity cost of schooling children rather than changes in internal bargaining power.

As the evidence on gender differences in financial returns rests on descriptive nonparametric exploration, we cannot rule out a more altruistic as well as a purely profit-seeking interpretation of the behaviour of the households. Broader returns to education may have taken various non-monetary forms like status, quality of working life or marriage market considerations, which might have motivated both girls and their parents without contradicting financial incentives. The expected personal cost of foregoing education was higher for worker girls than for worker boys. The fact that wealthier socio-economic groups relied less on child labour and spent more on education—as well as the mitigating impact on the pro-girl bias of maternal earnings in worker households—suggests a variant of the "impoverished unitary" model (Horrell and Oxley 2013, pp. 149–150; Horrell et al. 2009, p. 95). Sacrificing the education of boys in worker families was driven by poverty, not by unequal bargaining power. Higher socio-economic groups were likely to educate both boys *and* girls. However, they spent significantly more on boys. This conformed to the top end of the prevailing opportunity structure, where academic studies and higher offices were still predominantly a male domain, and this "glass ceiling" made educating girls *beyond* lower secondary school a far more uncertain investment. Thus, it could be argued that under varying budget and opportunity constraints, parents strove to maximize the joint utility of all their children with Pareto optimal rather than strictly egalitarian outcomes, whether this was done in hope of future returns or not.[23]

In addition to cases in development economics, the findings bear a striking resemblance to the USA, where "[…] high school education for a young woman meant entree to office jobs, whereas its absence meant a low-wage manufacturing

[23] Logan (2007) has suggested seemingly egalitarian allocations might reflect parental uncertainty over future returns in absence of devices for making binding commitments, and argues similarly with Horrell and Oxley (1999) that children of the sex more likely to leave home early were treated preferentially to influence the decision.

job as an operative. At a time when physical strength still mattered and jobs in various crafts were strictly limited to males, secondary schooling for girls had a higher relative return than for boys" (Goldin 1998, pp. 362–363). American high school graduation rates were consistently higher for women throughout the twentieth century. Variation in opportunity costs, proxied with industrial employment and wages, had a significant effect on particularly male attainment across regions and over time (Goldin 1998; Goldin and Katz 2008, pp. 211–217).

Besides introducing the perspective of historical economics into the prehistory of Nordic gender equity, our findings on male disadvantage link with another current issue. On the long run, Finland, Scandinavia and the USA converged to a growing bundle of high-performance countries where women have acquired a robust majority in tertiary education (Pekkarinen 2012, pp. 166–173). A significant factor behind this "new gender gap" is the disproportionate representation of males at the lower tail of the educational attainment distribution, reflected by consistently higher dropout rates[24] from secondary education. This is currently associated with factors such as higher propensity to behavioural disorders and higher "effort cost" of education among males, rather than the diminished pull of industrial work (Pekkarinen 2012, pp. 173–174, 180–183). According to Goldin et al., such "developmental differences" were "most likely, always there", but only started to affect educational outcomes when historical upheavals in gender roles, opportunities and institutions gradually begun to level the playing field for men and women. In recent decades, the US gender gap in college education has been greatest in lower socio-economic groups (Goldin et al. 2006, pp. 3–4, 14–15).

The Finnish educational system was overhauled in the 1970s, when the elitist model was replaced with a mandatory nine-year elementary school followed by free, coeducational 3-year high school. The reform increased social mobility by significantly reducing income correlation between generations (Pekkarinen et al. 2009). However, it also increased gender differences in the probability for attaining secondary and tertiary education. The odds for boys—but particularly boys with non-academic fathers—to acquire secondary education actually *worsened*, while girls benefited of the reform irrespective of background. This is possibly explained by gender differences in the onset of puberty and related behavioural issues, which have been found more prevalent among male children from families with low socio-economic status (Pekkarinen 2008). As this also happened to be the decade when child labour had officially ceased to exist in Finland, it is as if a new type of handicap was accidentally meted to working-class boys just as the pressure to earn was finally gone (Rahikainen 1996, p. 339).

In many countries, policy makers are being sensitized to a new kind of gender inequality setting in, if the ever higher returns to tertiary education will finally be realized for women, while at the same time the share of men struggling to achieve employability is growing. Consequently, there is demand for revisiting the economic and social history of schooling with an eye not only for the centuries of unfair institutional treatment of girls aspiring towards the top of the distribution,

[24] Measured including all those who never started secondary education.

but also for the factors and structures repeatedly pushing a disproportionate number of boys towards the bottom of the distribution as well.

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Appendix

See Tables 11 and 12.

Table 11 The social background of secondary school students, 1920–1938

Father's occupation (%)	Civil servant	Large business	Small business	Worker	Large farmer	Small farmer	Tenant farmer	Total students
1920–1921	25.4	11.5	39.1	9.3	4.5	8.9	1.3	29,916
1921–1922	23.5	10.7	39.9	10.3	4.4	9.7	1.5	34,980
1922–1923	23.0	10.6	39.3	11.3	4.5	9.9	1.4	37,624
1923–1924	22.6	10.2	39.3	12.0	4.3	10.0	1.6	39,879
1924–1925	22.2	9.7	39.5	12.9	4.3	10.1	1.4	41,741
1925–1926	21.7	9.3	40.0	13.0	3.6	10.8	1.6	43,781
1926–1927	22.1	9.2	39.4	13.0	3.8	10.9	1.6	44,895
1927–1928	22.0	9.1	38.9	13.2	4.1	11.2	1.5	45,866
1928–1929	22.6	8.5	38.5	13.6	4.0	11.3	1.5	46,900
1929–1930	22.8	9.1	38.1	13.2	4.0	11.3	1.5	47,824
1930–1931	22.6	9.4	39.2	12.4	4.4	10.8	1.2	48,769
1931–1932	23.5	9.5	39.1	12.7	4.1	10.1	1.0	49,201
1932–1933	24.6	9.6	39.2	12.5	4.0	9.1	1.0	48,873
1933–1934	25.3	9.8	38.7	12.7	3.8	8.8	0.9	48,977
1934–1935	25.7	9.9	39.2	12.3	3.9	8.1	0.9	49,070
1935–1936	25.9	9.8	39.4	12.2	3.8	8.2	0.7	49,718
1936–1937	25.6	9.7	39.2	12.9	3.5	8.4	0.7	50,044
1937–1938	25.6	9.7	39.7	12.8	3.6	8.5	0.7	51,706

Liberal professions included under civil servants; agricultural labourers included under tenant farmers.
Source: SVT IX: 52–58 Oppikoulut 1925–1932; SVT IX: 62–64 Oppikoulut 1935–1938

Table 12 Retention and dropout rates of secondary school students by sex, 1922–1937

Year	Retention class II–V (%)		Retention class III–V (%)		Dropouts/students (%)	
	Boys	Girls	Boys	Girls	All	Girl schools
1922			78.0	84.1	9.9	8.2
1923	69.9	78.8	75.9	80.3	9.8	8.8
1924	70.7	79.3	78.8	85.2	10.2	8.6
1925	69.9	79.9	77.1	83.8	10.3	9.3
1926	73.3	83.6	79.4	86.6	10.3	9.7
1927	70.2	79.5	79.5	84.9	10.7	9.7
1928	70.9	80.2	78.7	82.8	11.2	9.9
1929	69.0	80.2	77.4	81.2	10.5	8.6
1930	71.3	84.4	76.4	84.7	10.2	9.1
1931	74.1	81.8	78.4	81.7	11.1	11.0
1932	74.4	84.9	77.6	84.2	10.7	9.6
1933	78.1	85.2	79.2	84.5	10.8	9.6
1934	78.1	87.8	80.6	85.9	10.6	9.2
1935	78.9	90.0	80.2	86.7	10.4	9.3
1936	79.1	92.0	78.6	86.9	10.2	6.3
1937	79.6	87.7	78.9	81.8	10.0	7.6

The dropout rate for Girls schools includes all single-sex institutions for females only. *Source*: Computations from SVT IX Oppikoulut, 47–64 (1920-21–1937-1938), combined tables on the number of secondary schools, teachers and students

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