European University Institute

DEPARTMENT OF POLITICAL AND SOCIAL SCIENCES

The Demographic Echo of War and Social Mobility in Russia

Gordey Yastrebov

Thesis submitted for assessment with a view to
obtaining the degree of Doctor of Political and Social Sciences
of the European University Institute

Florence, 11 June 2019 (defence)

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Department of Political and Social Sciences – Doctoral Programme

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Abstract

Recurring variations in cohort size (also known as 'baby booms' and 'baby busts') are known to be a factor affecting the fortunes of people born to different cohorts. However, existing evidence in this regard comes overwhelmingly from Western countries, while little is known about the impact of similar processes in Russia despite the fact it is the country in which the Second World War has left, perhaps, the most sizeable and far-reaching demographic trace. Apart from immense casualties and devastating effects on the health of the surviving population, it had a major impact on the fertility of several generations that sent ripples through Russia's population age structure for years to come – the phenomenon that Russian demographers metaphorically refer to as the 'demographic echo of war'. In this study, I explore the effects of this peculiar demographic context on individual social mobility both during the Soviet and the post-Soviet period, using rich data from the Max Planck Education and Employment Survey and Russian Longitudinal Monitoring Survey. In general, I find that the demographic echo of war affected the individual mobility patterns of Russians in several intricate ways, although the magnitude of its impact does not warrant the conclusion that it had a decisive effect on people's fortunes. The study also makes several theoretical contributions to existing scholarship on the relationship between changes in population age structure and the process of social stratification.

Key words: baby boom, career mobility, cohort size, educational attainment, intergenerational mobility, life course, population age structure, social mobility, social stratification, Soviet Russia, post-Soviet Russia, Second World War

to Ovsey Shkaratan,

who once and forever endowed me with passion for the social science,

and who will always remain for me more than a mentor and a colleague

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Many other people also influenced this work either directly, by providing their feedback on various parts of the thesis, or indirectly, by expanding my scholarly horizon via exposure to various new ideas, approaches and literatures on different occasions. I remain grateful to everyone involved, but, of course, several names deserve a special mention. Yuliya Kosyakova, whom I first met during selection interviews and who has remained my close friend ever since, particularly influenced my work as I learned from the high standards of academic rigour she applies in her own research. Apart from engaging in joint work, she provided me with valuable advice on different aspects of dissertation writing and smoothed my introduction to the survey data which I use in this thesis. I am also thankful to Yuliya for involving me in the *eduLIFE* project and, particularly, the project's principal investigator Hans-Peter Blossfeld for letting me join his amazing team. Even though my work in *eduLIFE* was only loosely related to this dissertation, I gained a lot from the project's stimulating intellectual environment and the new acquaintances that I made there. In addition, I am grateful to Professor Blossfeld for providing his direct feedback on the early version of Chapter 5. Further thanks go to *eduLIFE* post-doctoral researchers Jan Skopek and Moris Triventi, with whom we held many gainful methodological discussions and who helped me sharpen my analytical skills. I would also like to thank EUI Max Weber fellows Florian Hertel and Pablo Garcia for providing occasional critical feedback, and Steffen Sirries, my non-EUI acquaintance, for his thorough comments on Chapter 4.

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Importantly, writing this thesis would have been impossible without the financial support of the Russian Ministry of Education and Science which funded my scholarship at EUI. I am deeply grateful for this support, although I admit that I met the Ministry's difficult decision to cease its cooperation with EUI in 2015 with great sorrow. I very much hope this cooperation will be restored again in the near future for the benefit of both promising young Russian scholars and the unique multi-national academic community of the EUI. I separately thank EUI itself for maintaining its unique and fascinating research environment.

Finally, I would like to thank my wider family for their invaluable emotional support and genuine interest in my academic progress. And, of course, more intimately, I thank my wife Anastasia and son Matvey – the meaning of everything I do – who assisted me incredibly with all their love and patience.

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Acronyms

CCFR	cohort completed fertility rate
CRE	correlated random effects
CS	cohort size (at birth)
EES	(Max Planck) Education and Employment Survey
EUI	European University Institute
FE	fixed effect
GCM	growth-curve modelling (or model)
GFR	general fertility rate
GGS	Generations and Gender Survey
GLM	generalized linear models
GRP	gross regional product
HSE	(National Research University) Higher School of Economics
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ISEI	International Socioeconomic Index
MMI	Maximally Maintained Inequality
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
RCS	relative cohort size
RE	random effects
RLMS	Russian Longitudinal Monitoring Survey (also RLMS-HSE)
TFR	total fertility rate
WW2	World War Two

Chapter 1. Introduction

1.1. The origins of enquiry

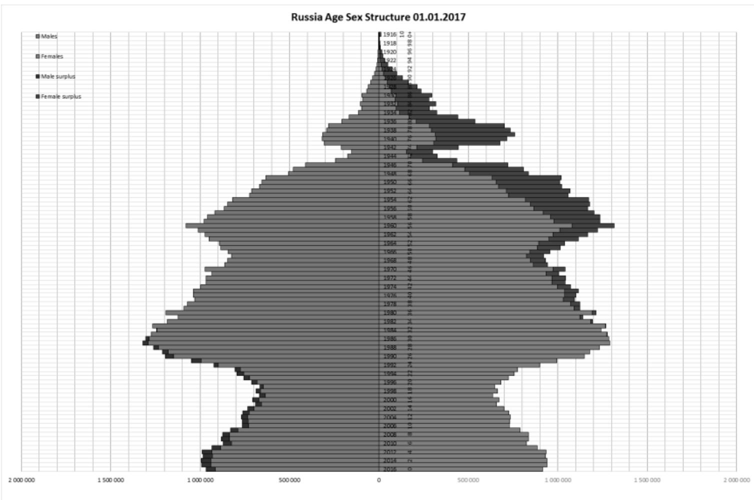
Identifying an uncommon and promising perspective on an age-old issue such as social inequality is not an easy task. Having developed substantive interest in social stratification research sometime before embarking on a doctoral programme at the European University Institute (EUI), this was exactly the challenge I imagined for myself as a newly-minted doctoral student.

An inspiring approach revealed itself very fast. Following the advice of my supervisor, Professor Fabrizio Bernardi, who suggested considering various interconnections between demography and social inequality – a subject that is attracting so much attention currently – I looked first, quite naturally, at the case which I know best. Russia – my home country – was a potentially promising source for rewarding insights because, over the last century, it has experienced a staggering change in both these dimensions. On one hand, it went through an unprecedented increase in social inequality following the collapse of the USSR and the transition to a market economy (see Brainerd 1998; Gerber and Hout 1998). On the other hand, it was also affected by tremendous demographic changes, some of which were similar to those experienced by Western developed countries, while others were quite unique (Вишневский 2006), making Russia a particularly intriguing case. However, while we currently know a great deal about the possible causes of the rise in inequality (i.e. the large-scale structural and institutional transformations following the transition from socialism to a market economy (see Gerber 2002; Hedlund 2000; Goldman 2003) and the fact that this rise and its causes were partly accountable for the demographic crisis of the 1990s (Shkolnikov and Cornia 2000; Grogan 2006; Вишневский 2006; Stuckler, King, and McKee 2009), the causal link from demography to inequality has never been considered in Russia. This motivated me to think about the possible existence of such a link.

Armed with several bold hypotheses, I immersed myself in an examination of what seemed to be the most obvious and relevant demographic indicators such as mortality, fertility, marriage and divorce rates, each of which was inspiring in its own way. Yet all of them suddenly faded in relevance, when Russia's population pyramid – the dim silhouette stuck in my memory from occasional exposures to Russia’s demography during undergraduate studies – came as a flash of inspiration as it finally, and fatefully, reappeared in front of my eyes from the results of a naïve Google search.

The catchiest feature of the ‘pyramid’, which I illustrate in Figure 1-1 (and which is basically a plot of current population distribution according to age – the vertical axis) is its peculiar dissected shape[1] exposing shocking differences in the sizes of different generations. Suddenly, the notion of the ‘demographic pitfall’, frequently sweeping through Russian media in the form a bugaboo anticipating future labour shortage and the insolvency of the national pension system, acquired a tangible form. Suddenly, an intuitive analogy with rush hour traffic jams invoked a conjecture that people born to less numerous generations may find their life a bit easier than people born to larger ones.

Figure 1-1. The silhouette of Russia’s demographic pyramid, 2017



Notes: This image is merely an illustration of a result from ‘a naïve Google search’ mentioned above. This is Russia’s demographic pyramid as of 2017 as it appears in the Wikipedia entry on Russia’s demographics (https://en.wikipedia.org/wiki/Demographics_of_Russia, last visited April 1, 2019). For properly annotated pyramids see Figure 1-3 on p.6.

Indeed, with a twist of sociological imagination, one could easily extend the analogy of rush hour traffic jams to social institutions which rely to a great deal on age stratification for allocating their limited resources (Sørensen 1983; Mare 1991). Moreover, this intuition also resonates with the intuition of some prominent Russian demographers, who, in describing this

[1] Having had the chance to present my work to a variety of audiences, one of the most frequently invoked associations was with a Christmas tree. The metaphor would be indeed appropriate, were it not so dissonant with the tragic events that ruptured Russia’s demography (explained in Section 1.2.1).

striking phenomenon, which they metaphorically term as the 'demographic echo of war' (see Section 1.2.1 below), wrote that "[…d]emographic waves make social and economic life difficult. The passing of large cohorts after small ones always creates additional tension in a society, as well as impacts on the fortunes of generations themselves. When fewer in number, generations have an easy social life: they enjoy less populated maternity hospitals, kindergartens and schools; they face less competition in access to higher education institutions and enjoy more favourable prospects in professional careers as well as marriage markets. However, the social institutions that have adjusted to accommodate those cohorts soon become insufficiently developed, and the channels of social mobility become too narrow for the larger generations that follow…" (Вишневский 2006:491 translated from Russian).[2] Surprisingly, however, in the course of investigating the existing literature, I soon found out that no particularly reliable empirical evidence has ever been produced to back such accounts in Russia. Existing estimates that pretend to substantiate such generalizations make use, at best, of aggregate official statistics (e.g. Горшков and Шереги 2010; Чередниченко 2016), which do not provide good means of getting at *real* 'fortunes of [*real*] generations' [emphasis mine]. Besides, they were limited to studies of enrolment at different levels of the formal educational system and did not therefore observe the successful attainment of education and/or occupational positions – two of the most salient indicators of social mobility. Thus, the bold claims and the generalised preconceptions on which they rest, did not have a sound empirical basis. Needless to say, I appreciated this gap in empirical knowledge as an encouraging opportunity for my dissertation project.

[2] This speculation reflects the somewhat extended citation of Canadian economist Scott Gordon quoted by American economist and demographer Richard Easterlin, who was the first to systematically study the effect of generation size on individual welfare: [speaking of large generations in Rumania] "These poor souls came into a crowded world – crowded by themselves. There was crowding in the maternity wards when they first saw the light of the day; there was crowding in the kindergarten classes when they entered the school system in 1971; there will be crowding in universities in the mid-1980s; crowding in the search for jobs and housing a few years later; and so on until there is crowding in the funeral parlors and the cemeteries…" [speaking of smaller generations] "When he opens his eyes for the first time it is in a spacious hospital, well-appointed to serve the wave that has preceded him. The staff is generous with their time, since they have little to do while they ride out the brief period of calm until the next wave hits. When he comes to school age, the magnificent buildings are already there to receive him; the ample staff of teachers welcomes him with open arms. In high school, the basketball team is not as good as it was but there is no problem in getting time on the gymnasium floor. The university is a delightful place; lots of rooms in the classes and residences, no crowding in the cafeteria, and the professors are solicitous. Then he hits the job market. The supply of new entrants is low, and the demand is high, because there is a new large wave coming behind him providing a strong demand for the goods and services of his potential employers […]. Finally, he retires, and shortly thereafter the Congress raises social security benefits by a generous sum, finding that it can do so without raising payroll taxes because of the increased number in the labour force, and the decline in the number of beneficiaries. He is truly demographically lucky." (Easterlin 1980:31–32)

1.2. The research question(s)

Having identified the gap above, in my dissertation I ask specifically

> *Whether (and how) the peculiar dynamics of Russia's population age structure* (which, following the tradition of Russian demographers, I will refer to as the demographic echo of war) *impacted on the social mobility of different generations of Russians?*

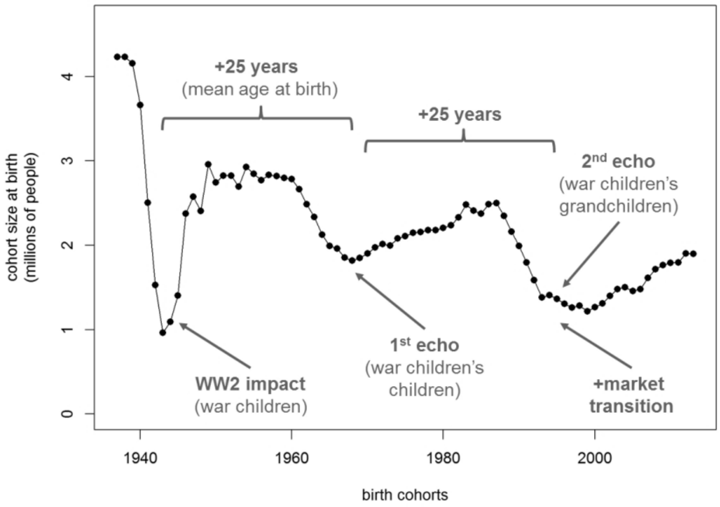
In the following, I expand on what the question precisely implies in the context of my study, by (1) explaining the phenomenon of the demographic echo of war, (2) defining social mobility, and (3) highlighting the importance of the Russian context.

1.2.1. Demographic echo of war

The Second World War (WW2), which Russians also refer to as the Great Patriotic War, had a deeply scarring effect on Russia's demography. Apart from ending more than 27 million (the estimate most generally agreed, see e.g. Вишневский 2006:441) lives of Soviet citizens during the conflict itself as well as having devastating effects on the health of surviving generations, the war had a major impact on fertility (Вишневский 2006; Brainerd 2016). From the 3.7 million children born in 1940 (see Figure 1-2), the last peaceful year before WW2 reached Soviet Russia, the number dropped sharply to some 1 million in 1943–1944, the most gruelling phase of the conflict. Clearly this was no time for having children, and most women were forced to postpone their plans for starting a family until the end of the conflict.

Indeed, by 1946, the first peaceful year after WW2, fertility rebound to roughly 2.4 million (although slowed by the famines of 1946−1947) and reached as much as 3 million in 1949, as life was getting back to normal finally allowing women to compensate for the missing births during the war. Since then the birth rate maintained an average around 2.7 million a year until the beginning of 1970s, when it finally started to decline again rather sharply. Fertility reached its second local historical minimum since the Second World War in 1968 with a total number of 1.8 million births. Yet this time the reason for the decline was the sheer logic of numbers: as the women from the thin cohorts born during WW2, the so called 'war children' generation, who, having approached childbearing age[3] at that time, could obviously contribute only a smaller number of children to the total fertility.[4] In other words, the fertility decline in the late 1960s was the first and, in fact, very audible echo of WW2.

Figure 1-2. Cohort size at birth in Russia, 1937−2015

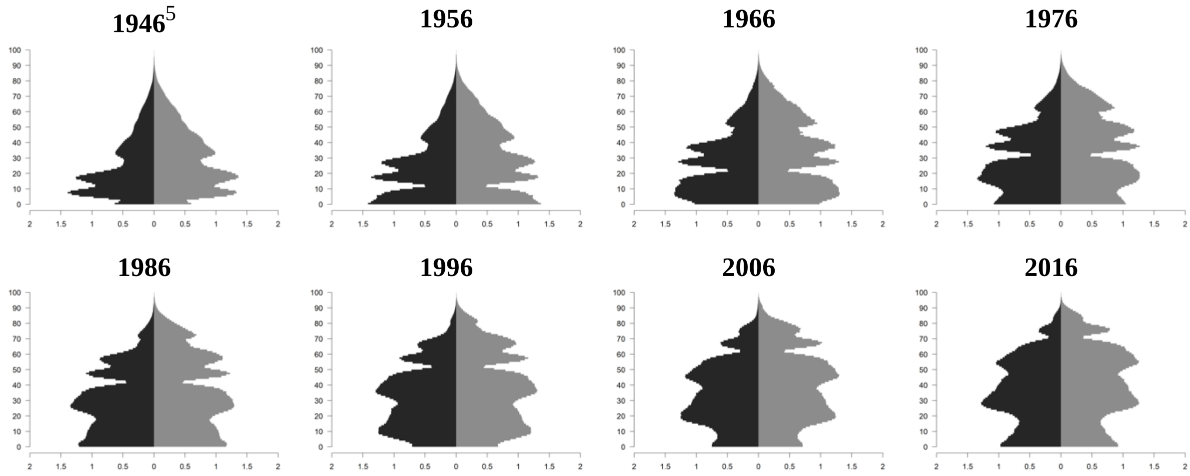


Notes: Cohort size at birth – total live births in cohort's birth year.
Source: Cohorts born 1959–2015 – Russian source data from Human Fertility Database (http://www.humanfertility.org, last visited April 1, 2019). Cohorts born 1937–1956 – Demoscope Weekly (http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019).

After some slow recovery throughout the 1970s, the same pattern repeated at the end of the 1980s – the beginning of the 1990s marking the second demographic echo, although, strictly speaking, it partly resonated with further shocks to fertility that had nothing to do with the war. For instance, some commentators argue that the pronatalist demographic policies introduced by the Soviet state in the late 1980s may have hastened some of the births that were planned for the early 1990s (Вишневский 2006:171, 491). Yet perhaps a more powerful blow to fertility was dealt by an unprecedented economic crisis following the collapse of the Soviet Union and Russia's subsequent transition to a market economy (Grogan 2006). That blow landed precisely during the years when the thin generation of the 'war children's children' (i.e. those born in the late 1960s) was approaching its own childbearing age. As of today, the signs of the third echo are revealing themselves in yet another fertility decline beginning in 2015−2016.

[3] According to Human Fertility Database (http://www.humanfertility.org, last visited April 1, 2019), the average age of women giving birth for the cohorts born in Soviet Russia in 1944 was 26.
[4] This would not have been the case, had these women substantially increased their fertility compared to women in other generations, yet this was not the case (for details see Section 2.3.3).

Figure 1-3. Changes in the age-sex structure of Russian population, 1946–2016



Notes: Horizontal axis – male (left) and female (right) population size in millions. Vertical axis – age groups. *Source:* Russian source data from Human Mortality Database (www.mortality.org, last visited April 1, 2019)

Figure 1-3 provides yet another illustration showing how the changes in fertility described above shaped Russia's population age structure up until today. As time went on, the demographic effect of WW2 was absorbed into the major feature of the post-WW2 dynamics of Russia population pyramid, overshadowing even the earlier critical shocks, such as the First World War, the Revolution of 1917 and the famines of 1918−1923 and 1932−1934. It also reveals that migration, social and demographic policies in the Soviet Union and, later, post-Soviet Russia did not achieve much to discontinue these self-perpetuating dynamics.

Russia was not unique in experiencing the profound impact of WW2 on the structure of its generations, and yet it is perhaps the only country in which this impact is dubbed with the grim metaphor of 'war echoes'. This metaphor is clearly different from the more auspicious notion of 'baby booms' that more often penetrate the narratives of post-war fertility rises in Western countries. There is a good reason why it is the case. Unlike the USA, Canada and a handful of European countries (exceptions being southern European countries and Germany (Вишневский 2006:164)), in which the post-war surge in fertility may indeed have looked like an explosion as it was the cause of both the change in the *tempo* and the *quantum* of births, the post-war rise in fertility in Russia was short-lived as Russian women were merely compensating

[5] The smaller dips correspond to fertility declines caused by the First World War, the Revolution of 1917 and the famines in 1918−1923 (the upper dip), and the Great Soviet Famine of 1932−1934 (the lower dip). The lowest narrow bottom of the 1946 pyramid reveals the direct impact of WW2.

for the reduced number of births due to the war. In fact, many factors suppressed, rather than encouraged, fertility in the post-war years, of which the stark deficit of men was perhaps the most profound as it both constrained the number of effective families and also pushed many women into the labour force making them less prone to bearing and raising children (Brainerd 2016). Incidentally, as I show in Chapter 2, most of what we know about how differences in generation size affect individual welfare is based on studies carried out in countries that experienced 'baby booms' rather than suffered from 'war echoes'. In that sense, the current study is already a potentially interesting contribution to the existing literature, because it attempts to investigate similar issues in a slightly different demographic context.

To summarize, the Second World War had a profound effect on Russia's demography, and one so strong that it continues to reverberate even among recent generations. In the following, I will adhere to the tradition of Russian demographers, and use the notion of *the demographic echo of war* as a shortcut to refer to the developments described in this section. Where necessary, I will also emphasize what exactly is implied by this notion, as I outline and scrutinize more specific research questions in the rest of the chapters.

1.2.2. Social mobility

Most people understand *social mobility* as a process, by which individuals upgrade or downgrade their standing in a society. This is the understanding which I endorse here as well, although a more precise definition, which I adopt in my analysis, distinguishes between two types of social mobility. First of all, I am interested in how people fare in their educational careers, and thus their *educational attainment*. Indeed, education is an important asset in all modern societies that is known to positively affect many domains of individuals' well-being, ranging from access to better jobs (see Kerckhoff 1993; Breen and Jonsson 2005) to better health outcomes (Elo 2009; Galama, Lleras-Muney, and Kippersluis 2018; Zajacova and Lawrence 2018). Moreover, information about educational careers is one of the few types of data that are typically most often available to scholars of social mobility – and the case of Russia is no exception. Second, in addition to educational mobility, I am interested in people's *career mobility*, in other words what types of jobs they attain and how stable or successful they are in keeping or upgrading them over time.

Even though educational attainment and career mobility are often aligned, there at least two good reasons to consider them separately in the context of my study. First of all, both are distinct in the sense that each may be influenced by a non-overlapping set of determinants. In fact, there is hardly any society in which individuals' careers can be perfectly predicted by their educational attainment (Handel 2003; Breen et al. 2009; Breen 2010a). Second, the social structures surrounding educational attainment and career mobility are also different, and this, in turn, can have important implications for how the demographic developments described in the previous section affect each type of mobility. For instance, educational systems with their highly algoristic age-graded rules of progression are quite different from the labour market structures and organizational hierarchies, in which career promotion might be less strictly determined by age. In turn, the degree of such age-grading has important implications for the likelihood with which different generations (i.e. either small or large) will confront each other in an open competition for the chance to obtain a promotion.

Another important distinction, which I make with regard to defining social mobility, is the one between *intra*generational and *inter*generational mobility – a classic distinction in social stratification research (Sørensen 1975). Whereas the former refers to how far an individual gets ahead over his or her life course (or over a specific age range), the latter refers to how far he or she gets ahead with respect to his or her parents. The latter is also directly related to the extent of intergenerational transmission of social inequality, or the association between children's achievements' and parents' endowments. It is important to make this clear, as several analyses in my dissertation involve explicit comparison of different generations (i.e. birth cohorts), and therefore, to some readers, the idea of comparing intergenerational (or literally between-generation) mobility may otherwise sound a bit tautological. In the context of the current study, I am interested in the effects of demography on both *intra*generational and *inter*generational mobility, because each of them is also contingent on different sets of mechanisms that are potentially affected by changes in the population age structure.

More importantly, however, by distinguishing between these aspects of social mobility I expand on existing literature that linked individual fortunes with post-WW2 population changes in other developed countries. As I will again show in Chapter 2, to date the existing research in this area has been (1) dominated by methodologies which neglect the life course perspective (i.e. *intra*generational mobility), and (2) has remained surprisingly silent on the issues of intergenerational transmission of socioeconomic advantage (i.e. *inter*generational mobility).

1.2.3. The Russian context

Finally, the importance of the Russian context must be highlighted. Both my origins and the deep personal interest in the social history of Russia notwithstanding, there are at least three independent reasons that make this case particularly worth investigating.

First, as already mentioned in Section 1.1, to date practically no research has focused on the impact of Russia's demographic changes on the social mobility of its generations. Although a handful of studies exploring different aspects of social mobility exist (Marshall, Sydorenko and Roberts 1995; Gerber and Hout 1995, 2004, Gerber 2000, 2002; Sabirianova 2002; Yastrebov 2016; Bessudnov 2016), all lack an explicit focus on the role played by the demographic forces.

Second (and in addition to the demographic specifics outlined in Section 1.2.1), of the countries featured so far in similar research (such as the USA, United Kingdom or Canada), Russia stands out due to the enormous differences in its generation sizes (Вишневский 2006). Given that any large variation in the key 'independent variable' of interest is often important for the proper testing of theoretical ideas (such as the relationship between social mobility and generation size), the lack of research on Russia is particularly surprising as it might provide the most suitable setting for identifying corresponding effects in the first place.

Third, Russia is undoubtedly an interesting case because of its unique historical experience of institutional development. Although focusing on a single country, this research is essentially an investigation of two: (1) Soviet Russia (in its 'mild', i.e. post-WW2, variant) – a country with a planned economy, state socialist institutions and redistributive egalitarian ideology, and (2) post-Soviet Russia – a country that went through rapid market transition and adopted the social structures and institutions of the more advanced capitalist societies. To my knowledge, no research has ever investigated the relationship between demographic change and individual mobility patterns in a socialist country and/or a country that underwent a market transition. Yet, as I will argue and show, this has important implications for the current theories that link the changes in population age structure with individual mobility patterns.

Finally, and perhaps, most importantly, unpacking and reconstructing the trajectories of social mobility according to the definitions outlined in Section 1.2.2 requires appropriate data. Specifically, the focus on intragenerational mobility embracing a life course approach to how individuals improve their social positions over time requires data on individual social biographies (obtained either prospectively or retrospectively). Moreover, given the explicit focus on comparing the experiences of different generations, the samples of such biographies should be able to include a sufficient range of the relevant birth cohorts. Fortunately, Russia is one of the few countries in which data satisfying those requirements exist and are readily available to researchers. In my empirical analyses, I will draw on two such sources. The first is the Max Planck Education and Employment Survey (EES), which provides a cross-sectional representation of population aged 18−55 in 2005. It features a fairly large sample size (N=5,973) and includes detailed retrospective information on respondents' educational histories allowing the reconstruction of those which unfolded predominantly in the Soviet era. The second is the Russian Longitudinal Monitoring Survey (RLMS) – the primary workhorse for a large amount of academic and applied research on post-Soviet Russian population. RLMS is a longitudinal household survey running in Russia since 1994 and featuring a variety of information on both household and individual levels. Most importantly, it contains detailed information on respondents' occupational careers, which I utilize in my analyses of career mobility.

1.3. The structure of enquiry

The rest of the dissertation is organized as follows. In Chapter 2, titled "The Origins and Current Status of the Theory of Relative Cohort Size", I summarize existing research on the relationship between cohort size and the process of individual attainment. This chapter reflects my work in the initial stages of the research process, during which I tried to summarize and critically reflect on existing theories and findings in order to highlight important gaps and shape a better understanding of where to focus my own potential contribution. The gaps, among others, include 1) the fact that most empirical evidence in this regard comes primarily from the USA context with just a handful of other Western nations (which justifies the focus on the Russian case with its highly pronounced demographic aftermath of WW2, as well as its distinct institutional trajectory); 2) the lack of a dynamic, or life course, perspective on the individual attainment process (which justifies the use of both retrospective and longitudinal data on educational and occupational careers in my own investigation); 3) the lack of a sociological focus in examining the effects of population age structure on a social stratification process, due to the fact that to date the field has been primarily dominated by demographers and economists.

Chapter 3, titled “Cohort Size at Birth and Educational Attainment in Soviet Russia”, opens the series of empirical chapters. In this chapter, I use EES data to analyse differences in the educational attainment process of different generations of Russians, whose educational careers unfolded primarily during the Soviet era. In this study, I find that smaller (‘war echo’) cohorts were consistently advantaged in terms of the educational attainment process due to lower competition for existing educational opportunities. Cohort size at birth affected both 1) access to and successful completion of higher quality (i.e. full-time) education; and 2) the time it took individuals to acquire a given level of schooling. I also find that for Russian men the disadvantage of being born to large cohorts was partly compensated due to their liability to military conscription (which, in larger cohorts, they could more easily avoid and therefore more safely try their fortunes in education). In light of these findings, I call for a revision of the dominant agency-based explanations widely embraced by economists who have consistently viewed the same relationship in market contexts (primarily, the USA: see Ahlburg, Crimmins, and Easterlin 1981; Falaris and Peters 1991, 1992), and argue that they may have seriously downplayed the role of structural factors in shaping the educational outcomes in different cohorts.

In Chapter 4, titled “Cohort Size at Birth and Social Inequality in Educational Attainment in Soviet Russia” I explore more specifically how the demographic echo of war shaped the patterns of intergenerational social inequality in the Soviet context. Re-analysing EES data, I find that relative social inequality in educational attainment remained intact in response to competition pressures. At the same time, absolute social inequality substantially decreased reflecting the trivial effect of cohort size differences on the marginal distribution of educational attainment across generations. I discuss these findings in light of existing theories and previous empirical generalizations, the substantive distinction between relative and absolute social mobility, as well as the specifics of the institutional context surrounding educational decisions in Soviet Russia.

In Chapter 5, “The Demographic Echo of War and Career Mobility in Post-Soviet Russia”, I use RLMS data (waves covering 1994 through 2016) to analyse how dramatic differences in the age structure of Russia’s population affected individual labour market outcomes in post-Soviet Russia. Easterlin’s standard theory of relative cohort size (1980) suggests that the negative relationship between cohort size and career success is rendered by an imperfect substitutability between young and old workers. Yet this may not have been the case in post-Soviet Russia, where older generations may have lost some of their competitive advantage (i.e. specific skills and experience) with respect to younger ones within a rapidly transforming labour market, essentially meaning that different cohorts were competing for positions in the new labour market structure on a par with each other. Indeed, my findings reveal that relative cohort size per se turns out to have little if any effect on the labour market careers among post-Soviet Russians. What I do find, however, is that over individuals' life course the demographic echo of war significantly affects the dynamics of labour market demography, specifically the retirement rate, whereby employment and promotion for current labour market participants can be temporarily boosted or suspended according to the swings in cohorts at retiring age. Again, I find this consistent with sociological theories emphasizing structural constraints to social mobility.

Table 1-1. Schematic description of empirical chapters

Social mobility aspects	*Educational mobility*	*Career mobility*
Intragenerational mobility	Chapter 3	Chapter 5
Intergenerational mobility	Chapter 4	
Institutional context	*Soviet*	*Post-Soviet*

Finally, in Chapter 6 I summarize the results of my research, discuss its limitations and expand on the implications of my findings for theoretical and practical knowledge, as well as for (my possible) future research in this area.

Chapter 2. The Origins and Current Status of the Theory of Relative Cohort Size

2.1. Introduction

The purpose of this chapter is two-fold. First, it is intended to provide a summary of what is already known to date about the ways in which the age structure of population can affect individuals. As will be shown, the existing literature is vast and tends to span across a range of disciplines, although there is an apparent bias for the field to be dominated by economists and demographers. Yet another important purpose is a critical assessment of this literature, since existing research is neither entirely consistent in its findings (thereby raising questions regarding the validity and completeness of the underlying theoretical arguments), nor is it complete with regard to the questions which have been of particular interest to scholars of social inequality, especially their understanding of the process of individual attainment and how it unfolds throughout the life course. I will therefore try to articulate these deficiencies as I proceed with my review and set the stage for my own contributions in the following chapters.

2.2. Easterlin's theory of relative cohort size

Whereas the question of what brings about certain patterns and changes in the age structure of different populations is interesting in itself, this is not the main issue to be addressed here. The concept of age structure in this review is primarily conceived as an 'independent variable' which has potential causal implications for the process of individual attainment. Importantly, in recognizing that the former *is* a variable and that it can be an interesting one, it is useful to stretch the imagination beyond the stylized notion of a 'population pyramid' – a metaphor adopted by demographers to acknowledge the commonalities in the general shape of age distribution in most populations. Of course, the metaphor absorbs only the common features of population age distribution, in other words the natural tendency for the size of population to diminish with age, whereas in reality many different shapes of the pyramid exist pertaining to specific demographic situations in each country. Demographers distinguish between several basic types relating to different historical contexts, cultural settings and stages of socioeconomic development (Rowland 2003, Chapter 3; Poston and Bouvier 2010:240–45). Furthermore, these pyramids may exhibit other peculiar patterns, such as ripples in the age distribution of population showing the effects of extreme demographic shocks caused by wars, revolutions, epidemics, or more auspicious demographic events, such as baby booms. In other words, population demography can indeed be highly diverse across both national and historical contexts.

Perhaps one of the first big and theoretically substantiated attempts to draw the link between population age structure and the fortunes of people born to different cohorts was achieved by the economist Richard Easterlin. Initially concerned with explaining the swings in fertility rates in USA, he intuited that they are intimately connected to the sizes of birth-giving generations (Easterlin 1961, 1966), and that cohort size differences, in general, can have far-reaching implications for the destinies of individual cohort members (Easterlin 1976, 1978, 1980). His work laid the foundation of a comprehensive theory of relative cohort size, outlined briefly below.

The theory distinguishes two types of mechanism, through which cohort size translates into individual outcomes. The first mechanism is quite intuitive and corresponds to overcrowding. Simply put, members of larger cohorts face higher competition for a given supply of opportunities or resources, compared to members of smaller cohorts. As such, they are more disadvantaged, either because fewer of them can expect to get their share of resources, or because these resources would have to be more diluted to accommodate everyone's needs. For instance, in a school setting, the succession of large cohorts might lead to greater class sizes and/or student-to-teacher ratios, which, in turn, could negatively affect the average performance of these cohorts. In higher education, overcrowding might affect admissions to colleges and universities, or have similar spill-over effects on the quality of training. On the labour market, it could further disadvantage members of large cohorts by increasing the risk of unemployment or depressing wages. Apparently, the list of potential consequences could easily be extended to other important domains, including housing market, provision of public services and many others, where, in general, larger cohorts would also experience some form of disadvantage due to amplified competition.

Easterlin also suggested that the effects of relative cohort size do not end with overcrowding. He contended that apart from direct consequences for personal well-being, relative cohort size indirectly affects individuals through a psychological mechanism, which he called relative income (or relative deprivation) (Easterlin 1976). Baby boomers develop specific aspirations about the desired standard of living by observing it from the generation of their parents. Yet in their adult life, once they confront the hardships associated with a larger cohort size, their expectations fail them and leave them with a sense of frustration, which may itself have important implications. For instance, in order to keep up with the desired standard of living, members of large cohorts may become less willing to form families, have fewer children or postpone births. Easterlin also contended that the negative effects of such relative deprivation are not limited to demographic behaviour, but potentially extend to such outcomes as political alienation, health and mortality, criminal behaviour and even suicide (Easterlin 1980).

Although Easterlin's theory is indeed very prolific with regard to the set of outcomes potentially affected by relative cohort size, in my review I will only concentrate on the most central aspects of educational attainment, labour market outcomes and fertility. Unsurprisingly, the original theory and evidence presented by Easterlin inspired a large amount of research in the years following publication of his ideas. Fortunately, several focused reviews exist to help navigate through the vast literature and summarize developments in the field up, at least, until the later 1990s. One of the first comprehensive reviews on the labour market consequences of generational overcrowding belongs to Bloom, Freeman and Korenman (1988), who provided the review as a preamble their own multi-country empirical research. Pestieau (1989) and Klevmarken (1993) provide yet another good summary of studies on the effects of relative cohort size on labour market outcomes and inequality. Particularly informative and insightful is the review by Pampel and Peters (1995), which is also the broadest in scope, containing a summary of literature dealing with several outcomes, such as wages, female employment, educational attainment, marriage and divorce, fertility, crime, suicide and alienation. Finally, the most recent review by Macunovich (1998) is focused exclusively on fertility – the key component and motivation behind the theory developed by Easterlin, who was initially concerned with explaining the demographic cycles. In fact, the literature on the fertility aspect of 'Easterlin's hypothesis' is also the most prolific.[6] Again, fortunately the summary of this extensive literature is further facilitated by a more recent meta-analytic review by Waldorf and Byun (2005). I will therefore briefly outline the state of the art as it stood when these reviews

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[6] Probably because it incorporates both the first-order and the second-order effects of the relative cohort size, a useful distinction which is drawn by Macunovich (2002) in the book *Birth Quake: The Baby Boom and Its Aftershocks* summarizing her own research on the 'Easterlin effect', as well as by Macunovich & Easterlin (2008) in their entry on the 'Easterlin hypothesis' in the *New Palgrave Dictionary of Economics*.

were published and try to extend it based on the evidence and discussion of more recent works. As will be shown, extant research inspired by Easterlin enabled a much more nuanced version of his own original arguments regarding the effects of relative cohort size and also raised further interesting questions awaiting scientific enquiry.

2.2.1. Relative cohort size and educational attainment

One of the most basic and important aspects of individual attainment, which is directly affected by distortions in the population age structure, is educational attainment. To date plenty of supportive evidence has been accumulated with regard to the negative relationship between success in educational careers and cohort size, both in terms of academic performance in schools (Angrist and Lavy 1999) and educational attainment as such (Wachter and Wascher 1984; Falaris and Peters 1991, 1992; Jeon and Berger 1996; Bound and Turner 2007; Fertig, Schmidt, and Sinning 2009; Saavedra 2012). These are what can be called the direct effects that work through changes in the degree of competition for the scarce resources available within the educational system.

However, the differences in relative cohort size may also affect educational attainment indirectly. The first possible mechanism is through expected changes in returns to education. Some scholars have noted that more educated workers have more to lose if they belong to relatively large cohorts compared to more educated workers from smaller cohorts, whereas for less educated workers the relevance of relative cohort size is usually weaker (Welch 1979; Smith and Welch 1981; Dooley and Gottschalk 1984; Stapleton and Young 1988; Berger 1989; Wright 1991; Brunello 2010). Economists attribute this to the lower substitutability of young and old workers with higher levels of education, because it weakens the pressure on wages caused by the entrance of large cohorts. An increase in the expected premium for a college or university degree as observed, for instance, in smaller cohorts on the labour market, may therefore dampen the incentives to acquire higher education for the younger – and larger – cohorts who are forced to rationalize their educational decisions.

A more nuanced approach to thinking about the shape of age distribution, which distinguishes between the leading and the trailing edge of a large cohort, is further encouraged by a slightly different explanation. People on the leading edge of a large cohort may be additionally incentivized to attain more education in order to cope with the future difficulties of excess labour market supply, whereas people on the trailing edge have the least incentive to do so (with the peak of the cohort 'trapped' somewhere in between) (Wachter and Wascher 1984; Falaris and Peters 1992). However, the difficulty with this kind of argument (apart from the very strong assumption that most individuals are indeed capable of rationalizing their decisions to such an extent) is that it can actually be reversed if it is taken into account that different levels of educational attainment require different amounts of time. Therefore, viewed from this perspective, longer schooling (and hence higher attainment) can also act as a kind of additional remedy for people on the trailing edge of a large cohort to distance themselves from the bulk of the cohort entering the labour market immediately before them (Falaris and Peters 1991). However, these somewhat contradictory and inconsistent explanations regarding the indirect effects of distortions in the population age structure on educational attainment also translate into inconsistencies of the existing empirical evidence, probably calling for more elaborate theoretical models. This does not, however, undermine the utility of such explanations with regard to the development of Easterlin's original argument, as they nevertheless contain useful insights regarding the ways in which people can actually adjust their behaviour in response to changing demographic cycles.

Empirically, the studies of cohort size effects on educational attainment rely on two approaches, which are fairly equally represented in the literature: 1) multivariate analyses using micro-data (Falaris and Peters 1991, 1992; Jeon and Berger 1996; Fertig et al. 2009); and 2) multivariate analyses using aggregate statistics (Ahlburg et al. 1981; Wachter and Wascher 1984; Stapleton and Young 1988; Bound and Turner 2007; Saavedra 2012). In the first case, the procedure is relatively straightforward: the level of educational attainment (or some other characteristic of the educational attainment process) is typically regressed on the demographic variables of interest plus a number of micro-level (e.g. gender, social background) and macro-level covariates (e.g. youth unemployment rate, gross national product per capita). Estimation techniques typically involve simple ordinary least squares (OLS) or some form of generalized linear models (GLM), depending on the type of outcome variable. In the second case, observations are typically some aggregates comprised of individuals sharing several characteristics such as birth year, age (or age group), gender (sometimes complemented by further additional grouping dimensions such as state, etc.). The analysis then proceeds by regressing the dependent variable of interest (e.g. cell-specific enrolment rate or the share of people with a given level of attainment) on a number of relevant covariates. OLS is the dominant estimation procedure. Interestingly, however, it is rarely the case that such analyses include some discussion of statistical reliability of the estimates obtained, especially given that aggregates are also often constructed from micro-level survey data (e.g. Current Population Surveys in USA). As a result, the standard errors in such analyses are most likely underestimated, and therefore the effects reported in them need to be treated with some caution. Nevertheless, studies employing both types of analyses seem to generally agree on the negative effect of cohort size at birth on educational enrolment/attainment, although precise sizes of estimates are hard to compare given the variety of measures and covariate adjustment strategies involved (besides, one must take into account that different analyses apply to different contexts, and the moderating effects of contexts are likely to be non-trivial (see Section 2.3.3)).

2.2.2. Relative cohort size and labour market outcomes

Over the past years a vast amount of evidence has been accumulated largely confirming that a larger cohort size bears negative consequences for earnings (Welch 1979; Freeman 1979, 1981; Ahlburg 1982; Anderson 1982; Berger 1984, 1985, 1989; Tan and Ward 1985; Dooley 1986; Ben-Porath 1988; Bloom et al. 1988; Ermisch 1988a, 1988b; Murphy, Plant, and Welch 1988; Martin and Ogawa 1988; Riboud 1988; Macunovich 1999; Brunello 2010). Their greater number also increases the cohort's exposure to poverty (Browne 1995) and unemployment (Wachter and Kim 1979; Ahlburg 1982; Anderson 1982; Ben-Porath 1988; Bloom et al. 1988; Zimmermann 1991; Slack and Jensen 2008; Korenman and Neumark 2000; Garloff, Pohl, and Schanne 2013). Nevertheless, a closer look at these and other studies of the effects of cohort size on labour market outcomes also reveals a more differentiated understanding of the mechanisms that generate them.

As has already been mentioned, the effects of relative cohort size can be differentiated depending on the level of workers' schooling: returns to education generally tend to decrease with the size of cohort because the poor substitutability of higher educated workers leaves the less skilled workers less susceptible to their cohorts' fortunes (Welch 1979; Smith and Welch 1981; Stapleton and Young 1988; Berger 1989; Wright 1991; Brunello 2010).

Another issue is how the adverse effects of a larger cohort size develop over the life course. At the beginning of their careers the generations of baby boomers may indeed find themselves at an additional disadvantage and with lower earnings, but the situation may improve for them (in relative terms) at later ages, since people may still respond to it by acquiring more education and training, and the economy may also gradually expand to adjust to the new demographic circumstances (Welch 1979; Smith and Welch 1981; Dooley and

Gottschalk 1984; Dooley 1986; Murphy et al. 1988; Bloom et al. 1988; Wright 1991; Zimmermann 1991; Shimer 2001). The degree to which the lifetime earning potential of the larger cohorts can actually converge with that of smaller cohorts, nevertheless remains rather debatable with some studies showing that misfortunes are more persistent than transient (Berger 1984, 1985, 1989). However, these inconsistences appear to be more of an interpretational nature, since in their empirical strategy none of the cited studies explicitly tests the mechanisms which alter the effect of relative cohort size on earnings with age, except for formal education. On the other hand, if earnings indeed behave differently with age across cohorts (as much of the empirical evidence shows), it intuitively calls for a closer examination of other changes throughout the life course of a typical cohort member potentially having an effect on his or her career.

Indeed, that the relative size of one's cohort is only a part of the bigger story regarding the influence of the population age structure on individuals is persuasively shown by Macunovich (1999). The traditional explanation for the misfortunes of the large cohorts (also reprising Easterlin's original arguments) was that they are doomed to live their lives in greater competition for opportunities, but these opportunities, such as those embodied in labour market demand, were often assumed to be either constant or to follow some secular trend, in other words to be relatively independent of the demographic fluctuations. Macunovich shows that this assumption may be too unrealistic, since demographic cycles also affect the aggregate demand: members of large cohorts may be disadvantaged, but they may benefit from an expansion of the economy by boosting overall consumption. This has two important implications. First of all, the misfortunes may play out differently for labour market entrants located on the leading edge of a booming cohort and those on its trailing edge. For the former, the disadvantages stemming from increased labour market competition may be partially mitigated as a result of consumption growth boosted by the entrance of larger cohorts on the labour market. However, the opposite situation would affect the latter group: their earnings may be additionally depressed as decreasing relative cohort size gradually leads to a contraction in the economy. This reasoning can be expanded further to account for the changes in aggregate demand related to the size of the older generation of workers as compared to the size of those who are just entering the labour market. In other words, it is not only the (relative) size of one's cohort that matters for an individual's prospects on the labour market, but his or her current location in the population age distribution as a whole as captured by a broader set of indicators. Interestingly, the argument about the response of labour market demand to demographic pressures can even be pushed to its extreme, as is exemplified in the study by Shimer (2001): he suggested that firms can actually foresee an increase in supply of workers and create more jobs, thereby compensating or even reversing the effect of relative cohort size on unemployment (although his theory and findings have been contested in later similar studies by Skans (2005), and Garloff et al. (2013)).

Macunovich's work is also important as it contains useful methodological insights with regard to the measurement of variables describing the demographic context, which is particularly relevant for examining its effects on individual outcomes, such as earnings. Much of the literature on the effects of cohort size, especially prior to her work, relied on very straightforward measures based on absolute cohort size (Dooley 1986; Brunello 2010) or measures that contrast the population of the subject cohort of workers to either total workforce or some population of older workers (Welch 1979; Freeman 1979, 1981, Berger 1984, 1985; Bloom et al. 1988; Ermisch 1988a, 1988b; Riboud 1988; Berger 1989; Gangl 2003), although many different variants of these are also widespread (including the use of log-transformations, moving averages, and group-specific measures to account for labour market segmentation along the divisions of gender, education and/or experience). One potential problem with such 'direct' measures is the potential endogeneity of the underlying concept. Although it is, at first, intuitive to suspect that cohort size is exogenous with respect to individual level outcomes, such as earnings or unemployment, the size may actually change in response to an economic situation through migration: thus, it may increase when the situation improves, or decrease when the situation worsens. This problem becomes particularly relevant for studies exploiting inter-state or inter-regional variation within countries (Zimmermann 1991; Skans 2005; Garloff et al. 2013), given that within-country geographical mobility is usually higher than mobility across country borders. In other words, the size of a cohort is also partly influenced by the same factors that it is thought to affect, and hence is not a good measure to use in drawing a causal inference. One solution to this problem is to instrument the cohort's current size with its population at birth (Zimmermann 1991; Korenman and Neumark 2000; Skans 2005; Garloff et al. 2013), which is obviously not affected by any current fluctuations in the labour market supply and demand. However, Macunovich (1999) argues in favour of an even better measure that reflects the relative nature of cohort size, corresponding to the arguments originally developed by Easterlin (1976, 1978, 1980) and extended by his successors, such as general fertility rate

(GFR).[7] With such a measure the 'supply effects' of relative cohort size can then be identified using the GFR in the subject cohort's year of birth, and the 'demand effects' using the GFR 20 years prior to the subject cohort's year of birth to reflect the relative size of the generation of the subject cohort's 'parents' (i.e. the cohorts which are supposedly more established in the labour market than the subject cohort at the time of its first entry into the labour market). The cohort's relative position between leading and trailing edges can be parsed further using the first difference between the GFRs pertaining to the surrounding cohorts: for example, the first difference between the GFR at birth of an older cohort and the GFR at birth of a younger cohort would then be negative for the leading edge, positive for the trailing edge and close to zero for the cohorts located somewhere in-between (Macunovich 1999).

In addition to the broader conception of the age structure, several studies emphasize the mediating role of labour market institutional arrangements and the role of the state in transmitting 'the impact of numbers on personal welfare'.[8] Until the late 1980s the confirmative evidence regarding the effects of relative cohort size on individuals' economic fortunes came overwhelmingly from the USA context (Welch 1979; Freeman 1979, 1981; Ahlburg 1982; Anderson 1982; Berger 1984, 1985, 1989; Tan and Ward 1985; Murphy et al. 1988), including Easterlin's own original analysis of American baby boom and baby bust cycles (Easterlin 1976, 1978, 1980). However, it was soon acknowledged that the USA context is quite specific and that a more rigorous test of the cohort overcrowding hypothesis requires the replication of findings in a wider range of contexts. For instance, in a study of several developed countries between the mid-1960s and mid-1980s Bloom et al. (1988) have pointed out the obvious trade-off between unemployment and wages for releasing the pressure caused by the succession of larger cohorts onto the labour market, a choice that depends on whether a country commits to dealing with unemployment or to maintaining a certain minimum wage. That differences in institutional arrangements and macroeconomic situation may potentially account for the marked differences in findings regarding the effects of relative cohort size between the USA and other countries was also put forward in the review by Klevmarken (1993). Some tentative evidence that national contexts matter for labour market responses to changes in demographic situation is also provided by Korenman and Neumark (2000), who compare the unemployment situation in several European countries between the 1970s and early 1990s. Somewhat more

[7] The total number of live births per specific number of women (usually 1000) at reproductive age (15−45 or 15−49 years old).

[8] Literally the subtitle of Easterlin's famous book (Easterlin 1980).

explicitly this point is raised for the period 1994−2001 by Brunello (2010) who shows that the relationship between relative cohort size and earnings tends to be weaker in countries with higher degrees of employment protection, which in his sample were represented by southern European countries (as compared to northern European countries). In his study of Israel's responses to the flooding of the labour market with the generation of baby boomers, Ben-Porath (Ben-Porath 1988) also highlights the government's role in mitigating the possible effects on wages and unemployment by, for example, expanding the school system and attracting more people to the army. According to other literature, the list of countries for which a limited effect of relative cohort size on labour market outcomes was found, also includes France (Riboud 1988), Germany (Garloff et al. 2013), Sweden (Skans 2005), Great Britain (Ermisch 1988a, 1988b; Wright 1991), Japan (Martin and Ogawa 1988), and Taiwan (Lin and Chu 1985), suggesting that national contexts need to be specified in greater detail in order to isolate the effects of fluctuating age distributions.

Women's labour force participation is also affected by relative cohort size but, more importantly, it may also mediate the effect of labour market overcrowding on earnings and male unemployment. First, Easterlin's theory predicts that the flooding of labour markets with large cohorts also leads to increased female labour force participation, because women (wives) respond to the diminishing relative earnings of men (husbands) in order to maintain the desired level of economic well-being (Easterlin 1980). However, this is also a shaky argument, because it assumes a traditional division of labour in the family (i.e. husbands as breadwinners and wives as those ones taking care of the family and children), but also neglects the fact that, depending on the degree of substitutability between men and women (Ermisch 1988a, 1988b), excess supply of male labour already caused by the cohort overcrowding may actually impede the prospects of women finding a job. Another counter-argument is that imperfect substitutability between workers of different ages is less relevant for women than for men as, due to their weak attachment to the labour force, women tend to choose jobs that require less experience (Freeman 1979). All of this potentially accounts for the inconsistencies in related empirical evidence, according to which the net positive effects of relative cohort size on female employment were largely found to be very weak and tended to be localized within younger age groups of women (see Robertson and Roy 1982; Schapiro 1988). In a more recent study Macunovich also reported a positive association for white American women, but a negative one for non-white groups (Macunovich 2012). Other findings and explanations contesting the rising participation of women in the labour force maintain that it was largely induced by factors other than changing cohort size, such as generally increasing material aspirations, rising opportunities for women and ideological changes (Oppenheimer 1976, 1982; Smith and Ward 1985; Lippe and Dijk 2002). Furthermore, as women become more active participants in the labour market in modern societies, they might be expected to experience the same disadvantages from cohort overcrowding as men, thus increased unemployment rates and earnings, and exacerbated disadvantages for both gender groups.

Given the abundance of literature on the effects of overcrowding on earnings and unemployment it is quite surprising to recognize that only a few studies have attempted to incorporate these effects as part of their explanatory framework with regard to occupational attainment. One of the few empirical studies worthy of comment here is a study by Gangl (2003), who considers the effects of relative cohort size on early career outcomes along with four other 'macro-structural' factors, which include: aggregate macroeconomic conditions, educational expansion, occupational upgrading of the labour force, and labour market institutions. He evaluates the prevalence of these factors with regard to youth unemployment, occupational status of labour market entrants (measured using the International Socio-Economic Index (Ganzeboom, De Graaf, and Treiman 1992)) and access to professional occupations using data on 12 European countries from European Union Labour Force Surveys covering the period between the late 1980s and late 1990s. Gangl's analyses do not reveal a markedly visible effect on early career outcomes and he concludes that existing variation is already well accounted for by other factors, most notably, macroeconomic conditions. The mediating role of institutional arrangements (discriminating between three different labour market regimes depending on the degree of their occupationalisation and flexibility) is also null with respect to relative cohort size effects on labour market outcomes. And yet his analytical strategy raises several important concerns in light of the nuances discussed above. First, the ten-year scope of analysis is insufficient to have caused a sizeable shift in relative cohort size between different generations of labour market entrants.[9] Second, Gangl's measure of relative cohort size is suspect because of endogeneity concerns (see the points raised above with regard to migration) and possible error, because he calculates the youth-adult ratio using survey data (rather than population statistics). Finally, neither his model, nor the discussion of its results, seem to properly address the endogeneity between current demographic situation and current

[9] In most of the European countries the period of the late 1980s and 1990s coincided with the period, when the bulk of the baby boom cohorts (born in the mid-1960s) was already half way through the typical age of entry into the labour market.

macroeconomic conditions (note the argument raised by Macunovich (2012) with regard to aggregate demand effects of current relative cohort size).

In a more recent study of occupational mobility across several generations in West Germany (people born between 1919 and 1971) Hillmert (2011) explicitly refers to Easterlin's hypothesis as part of his explanatory framework. However, his empirical analysis of life-time changes in individual occupational status (measured using Standard International Occupational Prestige Scale (Treiman 1975)) is largely descriptive and does not offer sufficient clarity or detail to fully discriminate between different alternative explanations. Rather the cohort size argument is embedded as part of a more general rationale for delineating 'generations' (i.e. birth cohorts), but somehow this is entirely omitted in the discussion of results.

Using the same data – from the German Life History Study – Manzoni, Härkönen and Mayer (2014) also explore the patterns of occupational mobility. They apply multilevel growth-curve analysis to model changes in individual occupational status (measured using Standard International Occupational Prestige Scale) during the life course and to decompose them into various individual-level determinants. Interestingly, their models also account for the differences between cohorts. Although testing the cohort size argument was not a goal in their study, commenting on their empirical findings they mention that they 'do not find any evidence of weaker occupational attainment among the particularly large cohorts born around 1940 and the mid-1960s' (Manzoni et al. 2014:1300). However, it is questionable whether a proper argument can be made with regard to relative cohort size from such a statement. Moreover, the models of Manzoni, Härkönen and Mayer do not explicitly account for any period effects, such as, for instance, changes in the occupational structure, which may partly offset the disadvantages caused by the large cohort size.

Finally, as far as analytical methods are concerned, similar to the applications in the study of educational attainment two types of methods can be distinguished – those that rely on micro- and those that rely on macro-level data. Unlike the situation with educational attainment, however, the study of cohort size effects on labour market outcomes is overwhelmingly represented by analyses of aggregate data (which also appears to be the preferred approach among economists who engage with these questions). The grouping procedure in the latter case is similar to that of applications in the study of educational attainment (with the grouping dimensions often reflecting a particular focus on heterogeneity of cohort size effects across various levels of schooling and experience), however, such studies are also characterized by the lack of explicit engagement with the issues undermining statistical inference. It is also often the case that analytical samples are restricted to men, especially in earlier studies (i.e. before 2000s), with the rationale often being the problem of the intermittent nature of women's labour force participation.

In contrast, only a handful of studies rely on individual data, and of these only three attempt to explicitly estimate the effect of cohort size on labour market outcomes (e.g. Jeon and Berger 1996 for earnings in Korea; Gangl 2003 for occupational attainment in Germany; Slack and Jensen 2008 for unemployment in the USA). Interestingly, each of these studies concludes by finding only small-to-modest negative effects of cohort size on labour market outcomes, which stands in sharp contrast to the studies based on aggregate data that report much larger effects. However, precise estimate sizes are again hard to compare given the variety of cohort size measures, cohort coverage and covariate adjustment strategies, thus prompting the conjecture that conclusions in such studies may partly hinge on the type of data analysed. This is partly corroborated by existing reviews of literature on cohort size effects on fertility, which are briefly discussed in the next section. As a final remark, the preponderance of aggregate data analyses in the study of cohort size effects on individual labour market outcomes appears surprising, given a number of obvious flaws associated with its use (e.g. issues of estimating statistical uncertainty mentioned above and the issue of ecological fallacy). In other words, individual-level analyses should be preferred as a more rigorous test of the relationships in question.

2.2.3. Relative cohort size and family behaviour

According to Easterlin's original argument (Easterlin 1980), the effect of relative cohort size on family behaviour is mediated by the economic disadvantages experienced by the members of large cohorts. Those born into a 'boom' generation enter the labour market with a certain idea about the desired standard of living, which they adopt from their parents. The affluence of the latter (which enables the baby boom in the first place) sets this standard at a relative high level, and therefore leads to an additional pressure on baby boomers struggling to attain the same level in the labour market, which is less favourable to them due to overcrowding. Easterlin contended that this pressure will force baby boomers to adjust their demographic behaviour, because people have a limited capacity to improve their situation in the labour market.

Easterlin's initial evidence regarding the post-war USA context up until the late 1970s was quite supportive of his argument (Easterlin 1980), but the temporary scope and the range of indicators were extended in several later studies (Easterlin, Macdonald, and Macunovich 1990; Easterlin, Schaeffer, and Macunovich 1993). These studies have shown that adjustments in demographic behaviour were, indeed, one of the ways by which American baby boomers adapted to adverse labour market conditions associated with overcrowding. The members of large cohorts have managed to achieve an even higher level of economic well-being compared to that of their parents (in terms of household income adjusted per adult equivalent), which is all the more remarkable given that the real earnings of men were in decline as baby boom cohorts were entering the labour market. This was accomplished 'by remaining single, by having fewer children, by doubling up with parents or others, by forming unmarried couple unions, and by coupling mother's work with childbearing' (Easterlin et al. 1990:287).

However, other studies which have tested the theory with regard to family formation moderate some of these assertions. Whereas the divorce rates have, indeed, been found to fluctuate with the relative cohort size (Preston and McDonald 1979; Schapiro 1988), there has been far less agreement with regard to its impact on marriage decisions (see Trovato (1988) for positive evidence in Canada, and MacDonald & Rindfuss (1981), and Schapiro (1988) for contrasting evidence on the USA). On the other hand, one could still argue that it is not so much the marriage itself that should be affected by the economic pressures, but the more serious obligations assumed with marriage, which may not be well recognized given the importance young people attach to the romantic and emotional components underlying such decisions. This explains why divorce rates (capturing the durability of unions) are often more susceptible to demographic cycles, and further suggests that relative cohort size also affects decisions regarding the number and timing of children.

As already mentioned at the beginning of the chapter, most of the empirical findings concerning the effect of relative cohort size on fertility have already been summarized by Macunovich (1998, 76 empirical analyses involved) and Waldor and Byun (2005, a meta-analysis of 334 estimates from 19 studies). Their conclusions generally favour Easterlin's theory, although many studies have failed to identify the relationship in question. The failure, however, was largely due to the fact that these studies 'have been only peripherally related to the Easterlin hypothesis' (Macunovich 1998:98). One of the most serious misconceptions leading to unsupportive results is the failure to recognize that the effect of relative cohort size on fertility actually works through relative income. Therefore, it is not surprising that multiple studies, in which both income and relative cohort size are included in models explaining fertility rates and fertility decisions, the residual effect of relative cohort size either becomes very small or dissipates – the effect of the relative cohort size is simply being explained by income, i.e. the most important intermediary mechanism. The same applies to studies which account for female labour force participation: larger relative cohort size depresses fertility by encouraging more women to integrate into the labour force (i.e. as a response to husbands' or partners' declining relative income).

The mediating role of relative income in transmitting the effects of relative cohort size on fertility is also likely to account for the weak performance of Easterlin's theory in the context of European countries – a fact generally acknowledged in the above-mentioned reviews and consistent with evidence regarding the relationship between relative cohort size and labour market outcomes (see above). It also corresponds with Pampel's analyses, which more explicitly evaluate the role of social protection in compensating the effects of relative cohort size on fertility and mortality. He finds that these effects are indeed less visible in collectivist regimes, which better protect individuals from market forces, compared to individualist regimes (Pampel 2001). On the other hand, the most recent comparative study of 23 OECD countries covering the period between 1975 and 1999 published since the reviews mentioned above (Jeon and Shields 2005) supports Easterlin's theory of fertility even without accounting for the differences in institutional context (although still controlling for the differences and changes in the macroeconomic situation).

2.3. A critical account of existing research

Easterlin's original enquiry into the role that macroscopic demographic forces play in shaping the lives of individuals has generated a large amount of research, some of which contested his initial assertions. However, the mixed record of the theory's empirical performance is not necessarily a sign of its weakness; rather it serves as a source of stimulating insights for refining our understanding of the relationship between individual fortunes and population dynamics. In the following, I would like to elaborate on some of these inconsistencies in order to pave several pathways for my own enquiry.

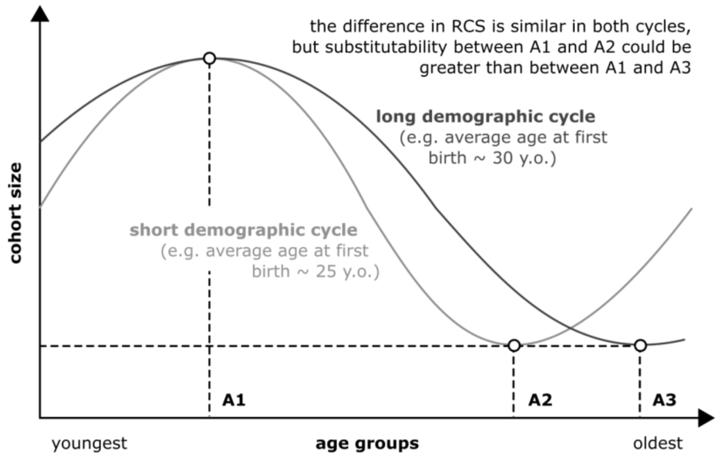
2.3.1. Beyond the concept of relative cohort size

The first major point is related to the concept of relative cohort size which is central to Easterlin's theory. As already mentioned, Easterlin embedded two mechanisms in his conceptual definition of relative cohort size: cohort overcrowding and relative income (or, in other terms, first-order and second-order effects of relative cohort size respectively as later reframed by Macunovich & Easterlin (2008)). Whereas the 'overcrowding' mechanism directly disadvantages a large cohort in terms of attainment via increased competition for scarce opportunities, the 'relative income' mechanism affects the large cohort's members indirectly by increasing the pressure to attain a comparable standard of living to the smaller cohort and thus leading to various spill-over effects (e.g. adjustments in family behaviour). However, the fact that Easterlin's concept of relative cohort size embeds two different mechanisms, generates some confusion and demands a clearer conceptual divide.

Some of this confusion has been resolved subsequently, as some commentators recognized that second-order effects (those of relative income) are shaped by forces other than relative differences in the sizes of different cohorts, and proposed to identify them more directly, by relating the incomes of respective generations (Pampel and Peters 1995; Macunovich 1998; Waldorf and Byun 2005). What remains weakly defined, however, is the part of the concept of relative cohort size that relates to the overcrowding mechanism. In other words, if cohort size is key to the kind of argument implied with this mechanism, how should we best define the reference cohort or the reference context to explain its impact on a person's welfare?

For instance, in labour market research, the argument about cohort overcrowding hinges on the assumption of imperfect substitutability between younger and older cohorts, that is, the degree at which younger and older cohorts compete for the same positions in the educational or labour market structure. However, it appears that the implications of this argument may reach farther than has been imagined so far. Although it has already been recognized in the literature that the degree of substitutability between younger and older cohorts may vary between different segments of the labour market (e.g. between skilled and non-skilled labour force: Welch 1979; Smith and Welch 1981; Stapleton and Young 1988; Berger 1989), one could in addition hypothesize this degree of substitutability to be a function of other peculiarities of the labour market. For instance, one could account for certain specificities of internal labour markets (Granovetter 1986) – such as, for instance, the prevalence of seniority vs merit-dominated promotion schemes – which, in turn, may vary across both organizational contexts and societies, in general (Stewman 1986; Kerckhoff 1995).

Figure 2-1. The length of demographic cycles and worker substitutability



Notes: RCS stands for relative cohort size. *Source:* author.

In addition to that, the logic of the substitutability argument also implies that the disadvantage associated with overcrowding (i.e. the effect of relative cohort size) can be a function of the length of demographic cycles, i.e. the span of time separating the peaks and troughs in fertility rates. In Figure 2-1, I attempt to clarify the underlying intuition graphically. The further the larger and smaller cohorts are apart in terms of their position in the age structure, the larger the difference in the average age of their members and therefore the less likely they are to be substitutes to each other. Thus, the length of demographic cycles, which itself may vary across different societies and historical contexts, can also mediate the relationship between relative cohort size and individual outcomes. To summarize, in shorter cycles, the degree of substitutability between two differently sized cohorts should be larger, and hence the effect of cohort size is smaller, whereas in longer cycles one can reasonably expect the effect of cohort size to be more pronounced.

It is also important to recognize that greater substitutability between younger and older workers (and hence greater inter-cohort competition) does not so much render the population age structure irrelevant with regard to the fortunes of a single cohort, but rather transforms it into a different kind of argument. Whereas these fortunes may become less dependent on the cohort's own size, they still remain tied to the size of competitor cohorts. For instance, a large cohort of older workers can effectively block promotion opportunities for the small cohort of younger candidates if they compete for the same positions, simply because older workers may be prioritized on the grounds of seniority and experience. Clearly the proximity of cohorts as determined by the length of demographic cycles discussed above is also a part of the scene, because a proximate set of cohorts is more likely to be competing for the same positions, than a set of cohorts which are further apart. Fairly speaking, this was partly recognized in several later developments revisiting Easterlin's theory by attempting to parse out the leading and trailing edges of the baby boom cohorts in order to argue that the former suffer an additional penalty in terms of their labour and educational market prospects (e.g. Falaris and Peters 1992; Macunovich 1999; Slack and Jensen 2008). However, simply recognizing the specificity of such positions neither explicitly captures the range of inter-cohort competition (which must hinge on a certain theoretical argument), nor does it recognize the dimension implied with the length of demographic cycles (another theoretical dimension of its own).

Finally, the story about the influences of population age structure on individuals should not be viewed simply as a story about relative cohort size. Macunovich's analysis provides a good example of the far reaching implications of population change by recognizing that the processes, which unfold at different ends of the population age structure, affect the labour market situation of individuals both through changes in labour supply and aggregate demand, (Macunovich 1999).

2.3.2. Life course perspective

From a methodological point of view, empirical research on relative cohort size has been overwhelmingly dominated by methodologies which on the whole do not take into account that many of the outcomes the theory pretends to explain are embedded in the life course of individuals. This is particularly true of aggregate data analyses and cross-sectional analyses of individual-level data and, while this is probably related to issues of data availability, it may partly be attributed to the fact that this area of research has been dominated by economists and demographers. However, such approaches limit a better understanding of the role that population dynamics play in shaping people's lives, whereas a life course approach, which is more appreciated by sociologists seems to offer a more promising approach, recognizing the interconnectedness of different life course events in forming the unique experiences of people (Kerckhoff 1993; Mortimer, Shanahan, and Kirkpatrick Johnson 2003; Mayer 2009; Shanahan, Mortimer, and Johnson 2016).

To be fair, Easterlin's theory implicitly invited a life course approach by contending that the challenge of limited opportunities associated with cohort overcrowding can force people to postpone marriage and reduce family size in order to maintain a certain standard of living. However, it is questionable whether an exact test of the underlying theory can be achieved without properly identifying the unique experiences of individuals given the complex and interactive nature of decisions regarding family behaviour and careers. Whereas cohort overcrowding may indeed increase the pressure on young individuals and force them to postpone marriage and child bearing, they can compensate for it at later stages in life, once they become more established on the labour market. Indeed many of the studies exploring the 'Easterlin effect' on fertility have already documented that such pressure is more present at earlier stages of the life course, but vanishes with age (for a review see: Macunovich 1998). Other studies have suggested a similar catch-up effect with regard to observed discrepancies in life-time earnings and the risk of unemployment (Welch 1979; Smith and Welch 1981; Dooley and Gottschalk 1984; Dooley 1986; Murphy et al. 1988; Bloom et al. 1988; Wright 1991; Zimmermann 1991; Shimer 2001). And yet to date there seems to be insufficient understanding of how population dynamics affect the sequencing of various life course events and their interrelationship approached within the single framework of an individual's lifetime experience.

Besides, in order to complete this framework, the crucial component appears to be missing: existing research on the effects of relative cohort size has remained surprisingly silent on the issues of social mobility (or status attainment process), such as intergenerational transmission of socioeconomic advantage and career (or intragenerational) mobility in terms of occupational attainment. The former has been ignored completely which, in itself, opens a space for novel and potentially interesting contributions. The relevance of the latter, on the other hand, may appear to be downplayed by existing literature on discrepancies in lifetime earnings across cohorts. However, in the next chapter I will try to argue why career mobility in terms of occupational attainment is a different kind of 'animal'. In short, in economics the standard view of career mobility tends to be overly simplistic and obscures many idiosyncrasies pertaining to mobility across organizational hierarchies and the occupational structure in general – a perspective which is more often embraced by sociologists (e.g. Sørensen 1977; Stewman and Konda 1983; Granovetter 1986).

Finally, given its explicitly longitudinal perspective on the unique experiences of individuals, the life course approach welcomes a better consideration of the dynamic nature of the contextual setting surrounding these experiences. Not only may macroeconomic conditions, political and institutional contexts change as people age, thereby affecting their decisions and behaviour during the life course, but the population age structure itself changes as cohorts continue to replace each other in a dynamic process. Beyond the relative cohort size alone (and, specifically, overcrowding) the particular pattern of population dynamics associated with the cohort's life cycle may exert a specific set of influences of its own. For instance, cohorts may adjust their decisions regarding the desired level of educational attainment by observing the fortunes of other cohorts on the labour market (Wachter and Wascher 1984; Falaris and Peters 1992), or may benefit from other cohorts' patterns of consumption (Macunovich 1999). Moreover, in the next chapters similar departures accounting for 'other cohorts' influences' will be presented by acknowledging the change in the opportunity structure induced by the passage of cohorts through their retirement age. In other words, what is happening at one 'end' of the population age structure may affect what is happening at its other 'end', and the interactive nature of this structure therefore needs to be taken into account in any comprehensive model of a cohort's life course experience.

2.3.3. The relevance of contexts

As has been shown in the review, the theme that echoes through many of the studies following Easterlin's original enquiry is the importance of contexts, which may either downplay or accentuate the effect of relative cohort size on individuals. The macroeconomic situation and governments' responses to business cycles, migration, labour market structures and broader institutional arrangements, changes in family roles and female labour force participation, among other factors can all mediate the effects of swinging cohort sizes on personal fortunes (Ben-Porath 1988; Bloom et al. 1988; Klevmarken 1993; Korenman and Neumark 2000; Pampel 2001; Brunello 2010). It is true to say that Easterlin also recognized the role of contextual factors by stressing that the effect of relative cohort size would emerge under very specific conditions and that it requires a certain degree of stability in the surrounding environment; such stability, he tried to argue, was characteristic of the USA post-war history up until the late 1980s (Easterlin 1980).

Needless to say, these specificities have to be accounted for in any future research to properly test the arguments about the impact of demographic change on individuals. In the following chapters, such an attempt will be made with regard to the contexts pertaining to Soviet

(Chapter 3 and Chapter 4) and post-Soviet Russia (Chapter 5), and I will argue why both represent particularly interesting cases to study the effects of swinging cohort sizes on personal fortunes. However, here I would like to anticipate this discussion and provide some illustrations in order to emphasize that the very nature of ruptures in the population age structure may be different in different societies and that this may have specific relevance both for population dynamics and for theorizing the effects of relative cohort size.

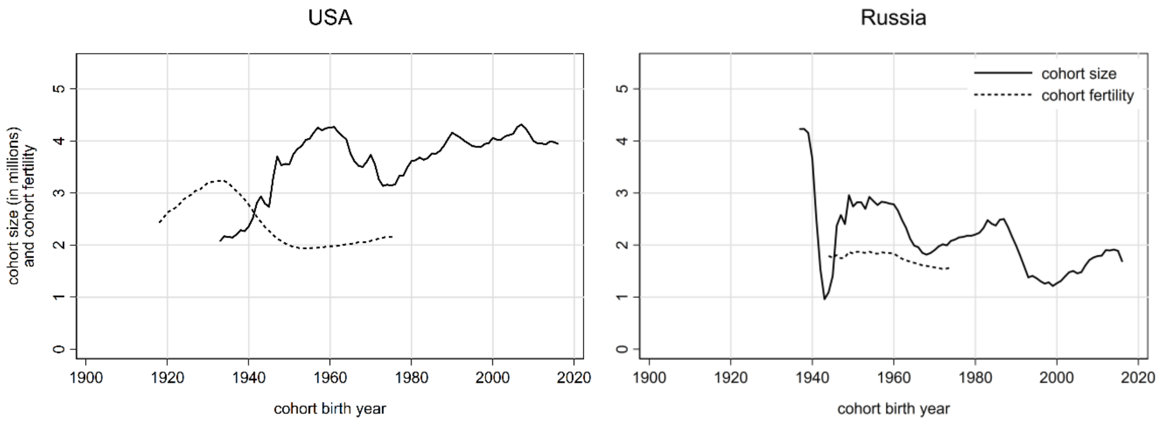
First, consider a hypothetical population, in which migration, fertility patterns and mortality rates hold constant over a reasonably long period of time. In such a population, any existing disparities in cohort size would for some time[10] be perpetuated simply by the logic of numbers: that is, large cohorts would reproduce as large cohorts and small cohorts would reproduce as small cohorts. However, Easterlin's argument suggests that cohort size itself has an *effect* on fertility. Having observed the situation in the USA, he has noticed that the large baby-boom cohorts, once generated through a specific set of conditions (the rescheduling of births from WW2 to the post-war period reinforced by an increasing number of births spurred by the post-war economic upheaval), sooner or later faced difficulties on the labour market and failed expectations, which forced them to reduce sibship size and/or postpone births. The situation was the opposite for baby-boomers' parents whose cohorts were small, and hence the compensatory nature of the 'Easterlin effect': large cohorts become 'parents' to smaller cohorts and small cohorts become 'parents' to larger cohorts.

Figure 2-2 (the USA is on the left-hand graph) provides a glimpse of this relationship by plotting changes in cohort size and cohort fertility over time. Indeed, in the case of the USA, the relationship appears to be negative: whereas the cohort completed fertility rate[11] reached as high as three children per woman among the smallest cohorts born in the late 1930s, it dropped to as low as two children per woman in the largest cohorts born in the 1950s and 1960s, followed by a slight increase in the baby bust cohorts of 1970s. This compensatory mechanism might partly[12] explain why the striking early-stage disparities in cohort size produced by the baby-

[10] Although the stochastic nature of fertility would eventually lead to an increasingly even redistribution of birth over periods, thereby allowing for the gradual dissipation of cycles.
[11] This measure is superior for inferring cohorts' reproductive capacities compared to other derivate measures used in demography, such as total fertility rate (TFR) or general fertility rate (GFR), because it is a characteristic of real, rather than synthetic (hypothetical) cohorts. The main disadvantage of cohort completed fertility rate (CCFR) is that it cannot be computed until the end of women's childbearing years. CCFR by age 40 is used here instead of lifetime fertility in order to enable longer time series to produce more country-year observations.
[12] The other driver, most likely, being intensive immigration.

boom generation did not translate into similar disparities after the 1970s (note the waning of the cycles in cohort size well into the 2000s).

Figure 2-2. Cohort size and cohort fertility in the USA and in Russia

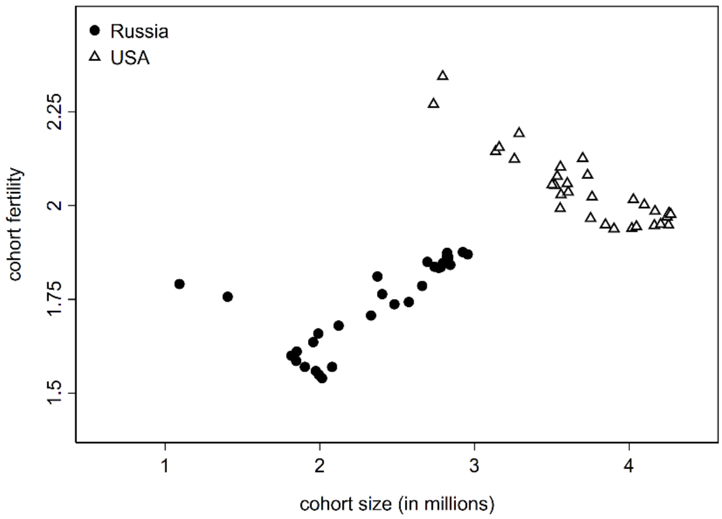


Notes: Cohort size at birth – total live births in cohort's birth year (availability: the USA 1933–2016, Russia 1937–2016). Cohort fertility – cohort completed fertility by age 40, i.e. the average total number of children born per woman from a specific birth cohort (availability: the USA 1918–1976, Russia 1944–1974). *Source:* Human Fertility Database (http://www.humanfertility.org, last visited April 1, 2019). Cohort size at birth for the Russian cohorts born 1937–1956 – Demoscope Weekly (http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019)

Now consider the same relationship in the Russian context (the right-hand graph in Figure 2-2). Although precise data availability limits the historical scope of analysis (compared to that of the USA), there is no sign of the relationship being negative. As the figure shows, there was practically no difference between the average number of children produced by the thin war-born cohorts of 1944–1945 (accurate earlier data is not available) and the average number of children produced by the much thicker post-war cohorts born between the late 1940s and late 1950s (with negligible fluctuations, completed fertility averaged at 1.8 children per woman). If anything, the relationship between cohort size and cohort fertility in Russia appears to be negative: largely driven by declines in fertility among the thin cohorts of the late 1960s (i.e. the children of the war children cohorts) it appears to be the result of confounding by parallel historical developments. First, some demographers note the negative influence of the second demographic transition which, similar to other developed countries, may already have been affecting Russian society in the late Soviet era (Вишневский 2006), and at that time the war echo cohorts were indeed at the most favourable childbearing age. Second, and perhaps most important, this generation was most exposed to the social and economic hardships of

Russia's painful market transition, which was far from being the most favourable time to have children (Grogan 2006). As a result, contrary to the case of the USA, early-stage disparities in cohort size in Russia tend to perpetuate (and even amplify) themselves, rather than to dissipate over time, as is observed in even the most recent fluctuations in cohort size – reflecting precisely the pattern metaphorized as Russia's demographic echo of war (see discussion of the specifics of Russian demography in the introductory chapter, Section 1.2.1).

Figure 2-3. The relationship between cohort size and cohort fertility in the USA and in Russia (for cohorts born 1944−1974)



Notes: Dots are country-year observations.
The indicators and the sources are the same as in Figure 2-2 (p.34).

Just for the sake of illustration, Figure 2-3 summarizes the relationship between cohort size and cohort fertility between the USA and Russia for the comparable period (1944−1974 – the only period for which accurate data on cohort size at birth and cohort fertility is available for both countries). In brief, given the stark differences in the relationship between cohort size and fertility between the two countries, the relevance of the Easterlin effect in the Russian case appears doubtful. This prompts questions as to what the reason for such an occurrence might be and what implications this has for the study of the relationship between demographic developments and social mobility in Russia. Easterlin's argument linking cohort size to fertility suggests that social mobility plays a mediating role in this relationship, since adjustments in fertility (or demographic behaviour broadly construed) arguably follow from the (dis)advantages experienced by cohorts on the labour market, and specifically the allocation of wages (as it connects to the relative income argument, see Section 2.2.3). But the labour market did not exist in Russia (in the sense that it existed in the USA or any other capitalist society), at least until the early 1990s when it was finally established after the dismantling of socialism and subsequent market reforms. In the Soviet planned economy, the distribution of wages across sectors and occupations was largely determined by the state, but what is more important is that it was heavily and intentionally compressed due to ideological reasons. In addition, the system strived to maintain full employment and eliminate poverty (Matthews 1989; Hedlund 2011). As such, the system of state socialism may not even be the right context for the Easterlin effect on fertility to emerge, as it rendered the underlying mechanism of relative income irrelevant. In fact, this resonates well with some of the previous cross-country comparisons that point to the weakening of the effect in low-inequality and strong-welfare-state contexts (Pampel 2001; Waldorf and Byun 2005).

Thus, the irrelevance of the Easterlin effect on fertility in Soviet Russia already tentatively suggests that cohort size is unlikely to be associated with much (or even any?) disadvantage during the Soviet era. At the same time, one must keep in mind that, although least pronounced in socialist societies, income and wealth inequalities represent only one aspect of social stratification. According to many accounts, social inequalities, broadly construed, were quite characteristic even of the Soviet society. It is by now well known that differences in education, occupational status, and rank in organizational and political hierarchies were associated with unequal access to resources and opportunities that, in turn, affected the life chances of individuals, and thereby maintained idiosyncratic social differentiation (Yanowitch and Fisher 1973; Teckenberg 1981; Matthews 1989; Gerber and Hout 1995; Marshall et al. 1995). It therefore remains a matter of empirical enquiry whether cohort size differences had a stake in the distribution of these opportunities, and whether the socialist system was effective enough in maintaining intergenerational equity given the demographic challenges it faced in the post-war era.

Chapter 3. Cohort Size at Birth and Educational Attainment in Soviet Russia

3.1. Introduction

Following Richard Easterlin's seminal work (1980), several studies have documented that recurring variations in cohort size (also known as 'baby booms' and 'baby busts') might be a strong factor affecting the fortunes of people born to different cohorts (Pampel and Peters 1995; Pampel 2001; Macunovich 2002 etc.). This demographic factor comes into play in particular in the process of educational attainment, yet the evidence in this regard comes overwhelmingly from studies based on the situation of the USA (Ahlburg et al. 1981; Wachter and Wascher 1984; Stapleton and Young 1988; Falaris and Peters 1991, 1992; Flinn 1993; with just a handful of other country case analyses: Dooley 1986; Jeon and Berger 1996; Fertig et al. 2009; Saavedra 2012). Instead, no comparable research exists on Russia – the single country in which WW2 has left, perhaps, the most sizeable and far-reaching traces in demography, and which for a long time after the War remained essentially different from the Western countries in terms of its institutional setup. And yet this distinction is quite important because existing explanations of the relationship between cohort size and educational attainment rely on economic theories that make highly specific assumptions about human behaviour and the structure of educational opportunities. In turn, these assumptions may prove plausible in market societies, yet unlikely in socialist contexts like that of in Soviet Russia. Thus, Soviet Russia makes an extremely interesting case that stimulates a critical review of existing theories, and also expands the collection of empirical evidence on the relationship between cohort size and educational attainment.

This chapter is structured as follows. Section 3.2 engages with existing research on the relationship between cohort size and educational attainment and makes the case for alternative explanations that might be relevant in the Russian context. Section 3.3 introduces the data and the analytical strategy to test for these explanations. Section 3.4 presents the analyses, and, finally, Section 3.5 draws conclusions and discusses some remaining issues and limitations.

3.2. Theory and relevance of the context in Soviet Russia

3.2.1. Demand-side perspective

As mentioned previously, the majority of existing studies focussing on the implications of 'baby booms' and 'baby busts' for educational attainment of different generations pertain overwhelmingly to the USA context (Ahlburg et al. 1981; Wachter and Wascher 1984; Stapleton and Young 1988; Falaris and Peters 1991, 1992; Flinn 1993). Most notably, these studies are overwhelmingly the work of economists, whose explanatory rationales derive from rather specific and often implicit assumptions. In the following, I briefly formulate these assumptions, derive implications for the relationship in question and reflect on their plausibility both in the USA and the Soviet context.

The first implicit[13] assumption is that supply follows demand in educational markets, and therefore it is only necessary to demonstrate that cohort size affects the logic of individual educational decisions. Quite remarkably, this apparently questionable and highly unrealistic assumption was often accepted unquestioningly and was rarely discussed in earlier economic research, including the studies cited above. Yet as I will argue shortly, it is essential to engage critically with this assumption to construct an appropriate theory accounting for cohort size and educational attainment.

The second basic tenet of economists' explanations is more intuitive and is based on the theory of human capital which describes how economists understand educational decisions. According to this theory, individuals approach education as a kind of capital investment, which requires money and time to accumulate, but will produce earnings afterwards. They rationally decide on the optimal amount of schooling by weighing the cost of investment against the earnings that they might enjoy over a life-time after completing a certain level of education. Thus, the theory simply predicts that whenever the cost of education increases and/or its returns decrease, individuals become less incentivized to attain it (and the other way around).

[13] Indeed, none of the works (Ahlburg, Crimmins, and Easterlin 1981; Wachter and Wascher 1984; Stapleton and Young 1988; Falaris and Peters 1991, 1992; Flinn 1993) states this assumption explicitly. However, it ultimately follows from the reasoning that attributes the effect of cohort size on educational attainment via educational decisions, i.e. the decisions that shape the demand. On the other hand, explicit discussion of the assumption that supply follows demand in the educational market in USA can be found elsewhere (Walters 2000).

The last tenet of economists' explanations relates educational returns to cohort size. While economists have long recognized that members of large cohorts suffer a general wage penalty compared to members of small cohorts, they have also found that workers in highly skilled occupations tend to be more affected by cohort overcrowding than workers in lower skilled occupations (e.g. Freeman 1979; Welch 1979; Stapleton and Young 1988). This is because, from the perspective of employers, younger and older workers in lower skilled occupations are less distinguishable from each other and thus more likely contribute to the same labour market supply. In contrast, labour markets for highly skilled workers tend to be more stratified by age, because of greater salience of experience and specific skills obtained on the job. As a result, highly skilled workers are more susceptible to fluctuations of labour supply occasioned by changes in population age distribution: while these workers can experience a greater relative advantage caused by the shortage of supply (small cohorts), they are also more likely to suffer from greater competition (large cohorts). In turn, this implies a negative relationship between cohort size and the returns to education.

A combination of all three assumptions – market equilibrium, education-as-investment and the negative relationship between cohort size and the returns of education – suggests that larger cohorts would have little incentive to invest in additional schooling compared to smaller cohorts. Such is, for instance, the argument of Ahlburg et al. (1981) and Stapleton and Young (1988), who consequently stipulate a negative relationship between cohort size and education attainment. Yet assuming such a decision-making mechanism also implies that (1) individuals recognize that they are born to a particular cohort and (2) they are able to reason that being born to a particular cohort entails corresponding consequences for its labour market prospects. Both assumptions appear either as implicit or accepted as granted in the arguments of Ahlburg et al. (1981) and Stapleton and Young (1988). However, these assumptions seem somewhat far-fetched, if not preposterous, because they endow individuals with extraordinary rationality: Although it does seem possible that some people can recognize if they are born to a specific generation, it appears far less likely that they are able to reason out the returns from education in the way that economists do. Incidentally, other economists provide little reconciliation for this problematic set of assumptions. For instance, Wachter and Wascher (1984) go as far as to suggest that by opting for a given amount of schooling individuals strategically time their education so as to avoid entering an overcrowded labour market. And while they do provide empirical evidence (again, using data from the USA) that is consistent with their ideas, in a later paper Falaris and Peters (1991) reject this explanation. Besides, in further re-examination of the evidence regarding the relationship between cohort size and schooling outcomes, Falaris and Peters even conclude that this relationship appears to be 'more complex than [the ones] predicted by any of the above theoretical models' (Falaris and Peters 1992:569). However, in spite of their confusing empirical evidence, to date most studies more or less agree on the single fact: that members of smaller cohorts typically attain more years of schooling (Ahlburg et al. 1981; Bound and Turner 2007; Fertig et al. 2009; Saavedra 2012). Yet the question remains as to whether earlier economic studies offer a plausible enough rationale to explain this relationship.

3.2.2. Supply-side perspective

Occam's razor principle in science suggests that in a set of theories, all of which perform equally well in an empirical sense, the one to be preferred is that which provides the simplest explanation and requires fewer assumptions. With all due respect to economists' intellectual effort, there indeed appears to be a much simpler and more intuitive explanation to the negative relationship between cohort size and educational attainment. The explanation merely requires that the assumption of educational market equilibrium is relaxed, and that the supply of educational opportunities is viewed as more rigid in nature than is usually assumed in economists' models. In that case, the negative relationship between cohort size and educational attainment can be explained simply as a result of changes in competition for educational opportunities, in other words, larger cohorts simply confronting more expensive education and/or fewer resources than an educational system can provide.

I find that Sørensen's sociological theory of the processes of allocation in closed and open position systems (Sørensen 1983) provides an elegant framework for reconciling the demand and the supply-side arguments, and potentially indicates why the latter might be the more appropriate explanation for the negative relationship between cohort size and educational attainment. Sørensen argued that in order to appropriately explain the attainment process one needs to distinguish between the systems of open and closed positions. Open position systems, those in which 'incumbents of positions […] can be replaced at any moment in time and the occurrence of vacancies is irrelevant for the timing of new allocations' (ibid, p. 206), are best characterized by competitive markets, where the resourcefulness of individuals and the logic of their decisions driving the demand may indeed offer a more adequate explanation. On the other hand, closed position systems, those in which positions 'are available only when vacated by the previous incumbent' (ibid, p. 206) and which are, in fact, more naturally occurring phenomena (even in market societies), are a different kind of animal and therefore require a different approach.

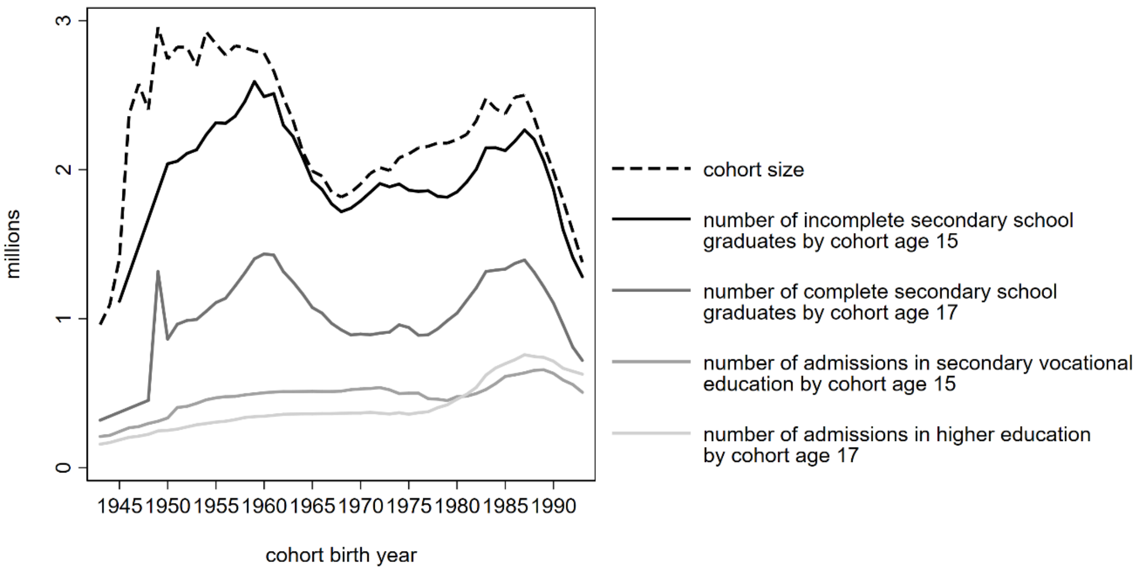
Sørensen argued that most educational systems resemble closed position systems more than open positions systems. The primary reasons for this are 1) that they have a well-defined hierarchical structure with the lower levels of the structure offering wider access, and the higher levels of the structure being more selective and restrictive, and 2) that advancement through this structure is most often strictly sequential: progression to each subsequent level requires successful completion of the previous one. Given that everybody starts their educational career at approximately the same age and that the amount of time needed to complete each grade is fixed through educational curricula, it is usually the students from the same birth cohort (or a proximate set of cohorts) who compete with each other for the opportunity of promotion to the next grade. Sørensen argued that, in such a system, mobility is determined not so much by the mere actions or the will of individuals, but by the amount of opportunities supplied to individuals at every level of the structure at each particular point in time.

Sørensen himself did not generalize his theoretical model of a closed position system to unstable populations, but the implications of changing cohort sizes in such systems for the educational attainment process are relatively easy and intuitive to infer. If the number of slots at each level of the educational system are fixed, this would imply that larger cohorts would generally face greater competition, and a relatively smaller fraction of them would actually succeed in progressing to the next level in the same amount of time. Of course, perfect rigidity of the educational system is also too strong of an assumption, but possible constraints on its expansion (or contraction) necessitated by the drastic changes in cohort size are easy to imagine. It takes time and resources to open new schools, to hire new teachers, or it may simply be the case that the educational expansion is a path dependent process: expanding structures might be less likely or able to contract, thereby leaving some additional opportunity for the cohorts which enter them in fewer numbers. Besides, one could take into account the following idiosyncratic feedback of 'the demographic of war': the educational system might be catering for large cohorts of youth simply when it is least likely to expand because of the constraints on available human resources dictated by a smaller adult population.

3.2.3. Relevance of the Soviet context

The relevance of revisiting the relationship between cohort size and educational attainment in the Soviet context should by now be clear. Soviet Russia was obviously quite different from Western societies in that it was an essentially non-market society. There was no labour market to begin with (at least in the sense in which it existed in Western countries), because of reliance on 'the planned distribution of workforce' and because wages were also largely determined by the state, rather than supply and demand forces. Of course, the Soviet state sought to remunerate higher educated workers for their effort in acquiring additional years of schooling, but these premiums were much less susceptible to the shifts in supply and demand of workers, than they were to wage equalization policies. Therefore, the human capital theory, which lies at the core of economists' demand-side explanations, is largely irrelevant for deducing the negative relationship between the size of a cohort and its educational 'choices'.

Figure 3-1. Cohort size at birth and demand pressures at different levels of Russia's educational system, cohorts of 1940s to 1990s



Notes: Only public full-time education is considered (the expansion of the private sector affecting cohorts born after the 1980s is not reflected here). Figures for the number of admissions and graduates are aligned with cohort birth year to match expected cohort entry to/exit from respective educational level. For cohorts born before the 1950s the matched data regarding the number of graduates from secondary schools is available only at 5-year intervals. *Sources:* Cohort size at birth – Russian source data from Human Mortality Database (http://www.mortality.org, last visited April 1, 2019), incomplete time series (1944–1958) filled with data from Demoscope Weekly (http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019); education statistics – combined from several sources (Narodnoe hozjajstvo RSFSR 1958–1990; Rossijskije statisticheskije ezhegodniki 1992–2015).

In contrast, the supply-side explanation maintains its relevance even in a non-market context. Moreover, a wide range of accounts suggest that the Soviet educational system did not enjoy the flexibility of Western educational markets and was less responsive to the demographic challenges of WW2 and the post-war baby boom. Apart from the well-known criticisms of the efficiency of state socialist systems in general (von Mises 1936; Hayek 1988; Kornai 1992), some scholars noted more specifically that educational policies in the USSR were sluggish, erratic and did not effectively target most of the problems which they were designed to resolve (Matthews 1982; Connor 1991; Gerber and Hout 1995; Kochetov 1994). Incidentally, the demographic challenges were ignored in those policies, as Soviet planners were excessively concerned with adjusting the education system to suit the needs of the economy in terms of 'strengthening the link between school and life', and 'scientific and technological progress'.

A rough illustration of the inability of the Soviet system to effectively accommodate demographic changes is provided in Figure 3-1. In this figure, I juxtapose data about the sizes of different birth cohorts with the data on admission and graduation rates at different levels of education. The times series in the graph are aligned to match cohorts' expected time of graduation[14] from secondary general schools (either with incomplete[15] or complete secondary education) and their admission to secondary vocational and higher education. The figure reveals that, on the whole, the lower levels of the Soviet educational system (up to complete secondary education) featured a high level of flexibility and was fairly able to adjust to changing sizes of student cohorts. However, at least as far as cohorts born before the 1970s[16] are concerned, the capacity of upper levels of education (secondary vocational and higher education) remained largely invariant to the demographic developments (note the flatness of the corresponding curves in contrast to the curves indicating the rates of graduation from incomplete secondary and complete secondary education).

[14] The figure does not take into account the shifts in the legitimate duration of general secondary education introduced in Soviet Russia through different educational reforms (see the end of Section 3.3.6 for details).

[15] The incomplete secondary education is not equivalent to drop-out and corresponds to successful attainment of so called 'middle school' education. Complete secondary education can be attained either in vocational schools or in 'high schools' – both after graduating from 'middle schools'. 'Middle school' education is preceded by 'primary school' education.

[16] A noticeable adjustment becomes evident for the cohorts born in the late 1970s and after, which may have benefitted from the post-Soviet educational expansion and the proliferation of private educational institutions occasioned by the market reforms in the 1990s (Gerber 2000; Kyui 2016).

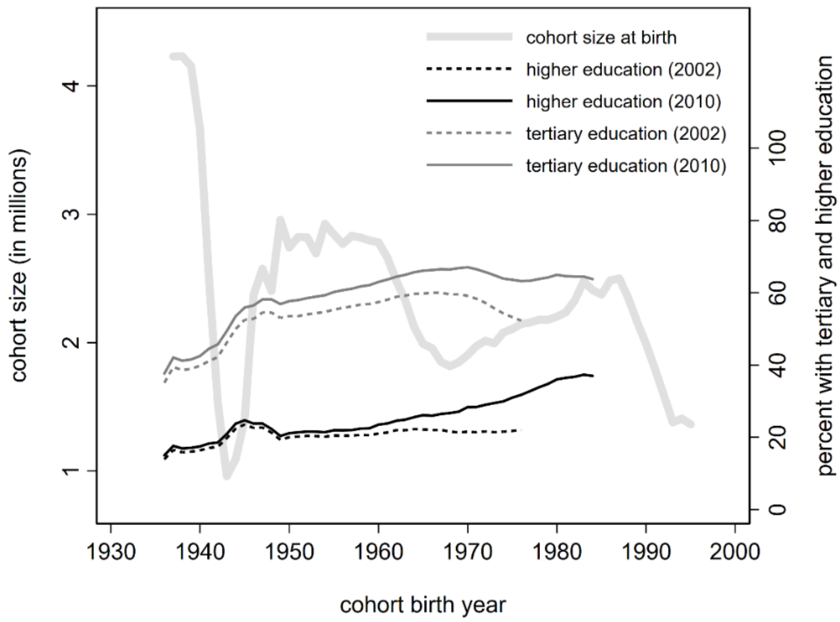
3.2.4. Hypotheses

By applying the supply-side arguments discussed in Section 3.2.2 (and the embedding context introduced in Section 3.2.3), I generally hypothesize that individuals born to larger cohorts in Soviet Russia experienced disadvantage in educational attainment. I emphasize once again that in the context at hand, this expectation results from limited educational opportunities (supply-side constraints) rather than rational educational decision-making (as described in Section 3.2.1).

From this general argument I now propose several specific hypotheses. The first simply echoes previous empirical generalizations obtained for other countries and time periods (Ahlburg et al. 1981; Bound and Turner 2007; Fertig et al. 2009; Saavedra 2012):

> *H1*: In Soviet Russia, individual educational attainment should be negatively associated with cohort size at birth.

Figure 3-2. Cohort size and higher educational attainment in different cohorts according to Russian census data 2002 and 2010



Notes: Tertiary educated corresponds to higher educated or educated in upper secondary vocational schools. *Source:* cohort size at birth – Russian source data from Human Mortality Database (http://www.mortality.org, last visited April 1, 2019); share of higher and tertiary educated in different birth cohorts – all-Russian censuses 2002 and 2010 (calculated from http://vpnmicrodata.gks.ru/webapi/opendatabase?id=VPN2002_2010L, last visited April 1, 2019).

However, reviewing recent (and readily available) census data (refer to Figure 3-2) reveals an interesting puzzle. The data presented there suggests only weak − if any − relationship between cohort size at birth and educational attainment. Apart from the noticeable bump in the share of higher educated individuals in the war-borne cohorts (which would, in fact, fall out of the scope of my analyses – see data restrictions in Section 3.3.1) there is barely any correlation between the two variables of interest.

Yet the data in Figure 3-2 allows only a superficial analysis neglecting several important aspects, such as, for instance, the timing and the type of educational attainment, as well as idiosyncratic age/cohort effects. Those aspects can potentially mask the detrimental effect of larger cohort size on educational attainment process and therefore, in the following, I develop several additional hypotheses which take into account more subtle specifics of the Soviet educational system and its institutional context (as well as the possibility of an accordingly nuanced empirical investigation using available data).

First, the rough test of *H1* using data in Figure 3-2 does not recognize the distinction between two different forms of education – full-time and part-time – which is quite important in the Russian context. Unlike full-time education, limited to a single opportunity and only up to a specific age, part-time education could be combined with work and provided an opportunity to return to education at practically any stage of one's career. It thus offered people greater flexibility and potentially served as a means of compensating for any failure to attain a desired level of schooling on a full-time basis. One could therefore reason that greater flexibility of part-time education potentially made access to it less contingent on the demographic fluctuations because it allowed 'demographically disadvantaged' individuals to make up for the disadvantage they may have experienced in a more rigid system of full-time education. I therefore further hypothesize that:

> *H2*: In Soviet Russia, the negative effect of cohort size at birth on educational attainment should be particularly pronounced with regard to educational credentials attained on a full-time basis.

One should keep in mind, however, that the downside of part-time education was that it was less intense (and therefore usually of lower quality) and that the comparable level of educational credentials was usually accomplished much later than in full-time education. All of this potentially impairs careers and social mobility, and thus a forced retreat to part-time education could be considered a particular form of disadvantage.

The temporary aspect of the educational attainment process is also important in itself. While not necessarily harming the ambitions of individuals to attain a certain amount of schooling, lager cohort size at birth can still impair educational careers by delaying or postponing certain types of educational transitions. For instance, a secondary school graduate who is determined to attain higher education but fails to be admitted in the first academic year following his or her graduation might still attempt it later. In that case, the chance of achieving a certain level of schooling would not be harmed (provided that person persists in his or her attempts), but it would most certainly delay the attainment. Therefore, one could also reasonably expect that:

> *H3*: In Soviet Russia, larger cohort size at birth should be associated
> with slower educational attainment.

Finally, an important and rather peculiar aspect of the Soviet context, related to gender differences, must be recognized. Young men in Soviet Russia were liable to military service: after graduating from secondary schools most of them were conscripted provided they were in good health and did not successfully enrol in higher education immediately after school graduation. In reality, however, not everyone who was eligible, was actually drafted: first, it was not unusual that some men intentionally evaded military service, while, second, the army did not so much seek to enrol every eligible man, but sought rather to draft the number required to maintain a certain contingent (Odom 1998). Therefore, men born to smaller cohorts were probably more likely to be drafted than men in larger cohorts. For those willing to evade, smaller cohort size could have meant more aggressive conscription campaigns (with the army facing a possible deficit of recruits), whereas those belonging to a larger cohort who wished to enlist may have faced stricter rules of selection (with the army facing an excess supply of suitable candidates). In turn, military service, which could last from two to four years (depending on the type of military force entered), almost certainly implied an interruption in educational careers for those who were determined to continue education after secondary school, and hence was a source of disadvantage. Thus, while potentially representing an advantage for men, in terms of access to educational opportunities, smaller cohort size at birth was also potentially a disadvantage as the probability of military service increased the risk of educational interruption. However, this offsetting mechanism did not exist for women. Therefore, I expect that:

H4: In Soviet Russia, the effect of cohort size at birth on educational attainment process should be less negative for men than for women.

3.3. Data and analytical strategy

3.3.1. Data

To test my conjectures, I use the combined dataset which includes data from the first wave of the Generations and Gender Survey (GGS) and the Max Planck Education and Employment Survey (EES) for Russia. GGS data were collected in 2004−2008 and contain rich sociological and demographic data on 11,261 individuals representative of the Russian population in 2004 and feature cohorts born between 1923 and 1987. EES is a follow-up survey conducted in 2005 on a subsample of GGS. A merged GGS+EES data file is distributed by Max Planck Institute Demographic Research (Rostock, Germany). More details about the dataset are provided in Soroko and Konietzka (2006) and Kreyenfeld and Konietzka (2012).

The great advantage of the dataset combining GGS and EES is that it merges rich sociological data from the GGS module with detailed retrospective information on the course of respondents' educational attainment obtained as part of EES. In the retrospective module, the respondents of EES were asked to recall various details of their life history (e.g. education) ever since the January of the year in which they turned 17. The information related to the process of educational attainment included, for instance, such details as the year and the month[17] of enrolment and graduation, the type and the form (i.e. part-time or full-time) of education attempted and its eventual outcome (e.g. successful attainment of a diploma or dropping out). Clearly such data are perfectly suited to addressing all the hypotheses introduced in the previous section and will provide a more nuanced model of the process in question.

At the same time, the use of such detailed information on educational attainment comes at a certain cost. Unlike the GGS source data, which features cohorts born from 1923 onwards, EES was carried out only on a subsample of the original GGS respondents and included individuals who were aged between 18 and 55 at the time of the survey (2005), meaning that

[17] To the extent that this could be recovered in a retrospective survey. Respondents were asked to provide the month and the year of each recorded episode. In a very few cases, they provided either the quarter or the season of a year, or roughly the year only. In these latter cases, I randomly imputed months from the range considered plausible for each of the episodes (e.g. months in a specific quarter/season).

only cohorts born between 1950[18] and 1987 (N = 5,973) were included. Thus, EES excludes the cohorts exhibiting the largest discontinuities in size.

3.3.2. Choice of modelling framework

The original EES dataset is structured in the form of episodes and spells, and with few additional manipulations it can be equipped for event history analysis (Kreyenfeld and Konietzka 2012). However, this type of analysis is limited in that it does not permit simultaneous modelling of both the time and the level of a given outcome, except for cases where the outcome is binary in nature. This limitation is overcome in the growth-curve modelling (GCM) framework, which I endorse in my analyses because it permits the modelling educational attainment process to be modelled both as a process occurring across time and as a process involving accumulation of educational credentials of different kinds and levels.[19]

For that purpose, I restructured the original EES dataset into cross-sectional time series which contain yearly measures of the highest educational attainment[20] (nested within persons) since the individuals was aged 17 until their age at the time of the EES survey (variable months of 2005). The choice of a yearly breakdown was, strictly speaking, arbitrary. On one hand, I tried to avoid artificially inflating the sample of observations (as one would most certainly do by opting for monthly, daily or any other smaller breakdown), while, on the other, I reasoned that a year represents a rather common time increment, within which most of us chronologically identify our most salient life course events.

Additionally, for my final analyses, I decided to cap the resulting sample of person-year observations by 35 years of age in order to achieve a reasonable balance of later-age observations across the cohorts represented in EES. For clarity, I schematically present my analytical sample using a Lexis diagram in Figure 3-3.

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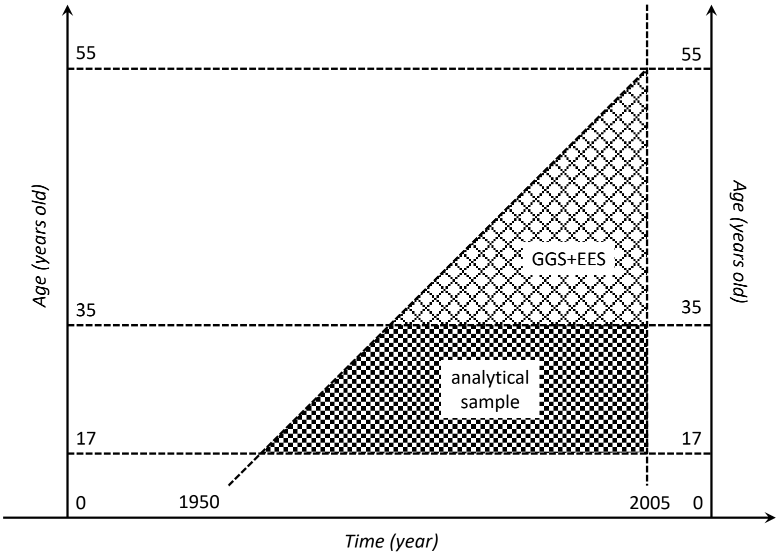
[18] Closer inspection of data has revealed that 74 of the EES respondents reported birth dates in 1949, and there was a single individual who reported being born in 1948. They are included in my analyses.

[19] At the initial stages of this research, I also considered using Mare's model of educational transitions (Mare 1980) as an alternative approach. However, my choice shifted towards the GCM framework for three main reasons. First, it was not obvious to me how the information about the timing of transitions (a crucial dimension in my analysis) can be incorporated into the model. Second, in my view, Mare's model quickly becomes overly complicated, once one accounts for the possibility of multiple educational choices at transition points (e.g. Breen and Jonsson 2000). Finally, GCM seemed advantageous in that it allows for rather intuitive communication of the main results.

[20] In a few cases respondents reported enrolling in educational programs that conferred a degree that was lower than the one they may have attained previously.

Figure 3-3. Lexis diagram showing the original coverage of GGS+EES and the coverage of the study's analytical sample



Note: The original GGS+EES coverage corresponds to both shaded areas.
The study's analytical sample corresponds to the dark-shaded area.

3.3.3. Dependent variables

As already mentioned in the previous section, I restructured the EES data in cross-sectional time series containing information about the highest level of educational attainment for each person-year observation. In doing so I also distinguished between (1) education attained exclusively on a full-time basis and (2) educational attainment that does not discriminate between the forms of education (full-time or part-time). I identified education as complete only if a respondent reported that he or she received a diploma at the end of the educational programme undertaken.

Given my choice of the modelling framework, for my analyses I opted for a continuous measure of educational attainment expressed in symbolic years of schooling. The continuous measure was imputed from the EES source classification by taking into account the standard duration of corresponding educational programmes in Russia. In cases of uncertainty I consulted EES data directly and took the average duration of study for a given level of education rounding it to 0.5 years. Table 3-1 contains the resulting correspondence table for this imputation procedure. I emphasize that the resulting scale may not (and often does not) correspond to the actual years which different individuals may have spent in education. Rather it proxies the minimum amount of time an individual would need to reach a given level of educational attainment without any interruptions in his or her educational career.[21] Thus it serves merely as a measure of convenience to differentiate between qualitatively different levels of educational attainment. The exact amount of time taken to reach a specific level of attainment would be accounted for by modelling the process of attainment as a function of time (see Section 3.3.5 below).

Table 3-1. EES classification of education and imputed years of schooling

Level of education as reported in EES	**Imputed years of schooling**
1. less than 8-9 years of school	6
2. unfinished secondary school (8-9 years)	8.5
3. secondary school (10-11 years)	10
4. professional education without secondary education	10.5
5. vocational college with secondary education (2-3 years of studies)	12.5
6. secondary special (3-4 years after unfinished secondary school)	13.5
7. secondary special (more than 2 years after finishing secondary school)	13.5
8. higher education	15
9. postgraduate education	18

3.3.4. Key independent variable

The discussion in Chapter 2 (starting on p.20) revealed that multiple measures were suggested in the literature to grasp the conceptual definition of relative cohort size. However, in this study, I opt for the simplest and perhaps the most straightforward measure – individuals' cohort size at birth – based on the following reasons. First of all, it is the least demanding with respect to data: unlike most relative measures (such as general fertility rate: see (Ahlburg 1982), or cohort size with respect to the size of adjacent cohorts (Wachter and Wascher 1984; Falaris and Peters 1992)) it can rely exclusively on information about total live births in a given year. Instead relative measures require additional information about the base of reference (i.e. denominator), which can limit effective time series (as in the case of relating to adjacent cohorts) and/or introduce undesirable measurement error (as in the case of relating to general population, since

[21] The statement is more or less valid under the assumption that the average duration of educational programmes did not change over time, which was not exactly the case. See the end of Section 3.3.6.

such statistics are generally of poorer quality compared to data on total live births)[22]. Second, the absolute measure is sufficient for the test of theoretical arguments developed in Section 3.2. Finally, the measure is simple and relatively easy to interpret. I use data on the total number of live births between 1948 and 1987 (the cohorts in EES) in Soviet Russia (or precisely, the Russian Soviet Federative Socialist Republic) published by Demoscope Weekly[23] – an on-line demographic resource maintained by the Institute of Demography at the National Research University Higher School of Economics. I then match this data to individuals in the EES dataset using respondents' reported year of birth. However, in order to account for somewhat inaccurate identification of respondents' cohorts across Demoscope Weekly tables and the EES,[24] as well as the possibility of spill-over competition between proximate cohorts,[25] instead of the original Demoscope Weekly measure, I use its 3-year moving average (i.e. total live births in an individual's year of birth + cohort sizes of the two neighbouring cohorts / 3).[26] The resulting measure of cohort size appears in my analyses in millions logged.[27]

Although the purpose of this study is to substantiate a general argument linking the process of educational attainment to cohort size, a special reservation has to be made with regard to the actual sample of cohorts. As was already specified in Section 3.3.1 above, the cohorts represented were born between 1950 and 1987. In effect, these cohorts capture roughly four different stages of Russia's post-WW2 demographic dynamics: 1) the *'baby-boom'* cohorts born 1950−1960; 2) *the leading edge of the 'war-echo'* − cohorts born 1960−1965; 3) the *'war-echo'* cohorts born 1965−1975; 4) *the lagging edge of the 'war-echo'* (which gradually transmuted into the leading edge of the first 'baby-boom' echo) – the cohorts born 1975−1987. Table 3-2 roughly summarizes exposure of different cohorts to different historical periods at different stages of their educational careers, and Figure 3-4 plots cohort size variation in the actual analytical sample.

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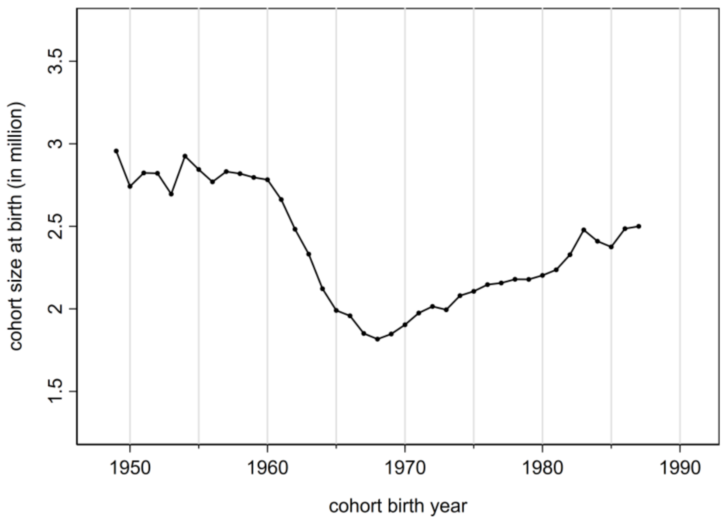
[22] For more about data issues see the documentation for the Russian data file at Human Fertility Database (https://www.humanfertility.org/Docs/RUS/RUScom.pdf, last visited April 1, 2019).
[23] http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019.
[24] EES provides birthdates in month-year format, whereas Demoscope Weekly data is provided per year. It is therefore problematic to identify the Demoscope Weekly cohort for EES individuals born at the end and at the beginning of a given year.
[25] Example: individuals, who were born in 1950 and started school at age 7, might be competing with individuals who were born in 1951 and started school at age 6.
[26] Using the non-averaged version leads to slightly lower goodness-of-fit but does not affect the substantive findings.
[27] Using the version without log transformation leads to slightly lower goodness-of-fit but does not affect the substantive findings.

Table 3-2. Cohort groups and EES observational span

Cohorts	Entering educational system	Completing secondary education*	Completing higher education*	EES observational span until age 35
Baby-boom (1950–60)	1957–1967	1967–1977	1972–1982	Completely
War-echo, leading edge (1960−65)	1967–1972	1977–1982	1982–1987	Completely
War-echo (1965−75)	1972–1982	1983–1993	1988–1998	Partly
War-echo, lagging edge (1975−87)	1982–1995	1993–2006	1998–2011	Partly

Notes: *Approximately estimated assuming full-time educational careers, seamless transitions between different grades and educational stages and no grade retentions.

Figure 3-4. Variation of cohort size at birth in the EES analytical sample



Notes: Cohort size at birth – total live births in cohort's birth year.
Source: Cohorts born 1959−1987 – Russian source data from Human Fertility Database (http://www.humanfertility.org, last visited April 1, 2019). Cohorts born 1949−1956 – Demoscope Weekly (http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019).

Although all born during the Soviet era, it should be obvious that each cohort featured in Table 3-2 was exposed to a slightly different historical context. For instance, the educational careers of Soviet baby-boomers were initiated partly during the Khrushchev era (1953−1964) but unfolded and culminated predominantly in the Brezhnev era (1964−1982). In turn, the careers of war-echo cohorts were initiated in the Brezhnev era, but were moulded largely during Gorbachev's era (1982−1991), although some of the late-comers may have been completing more advanced stages of education already in the post-Soviet period. In Section 3.3.6, I elaborate more specifically on how this differential exposure may affect my analyses and inference regarding the effect of cohort size on educational attainment and propose a strategy to overcome them.

3.3.5. Growth curve model

I endorse the GCM framework to model the process of educational attainment as a function of time – specifically biological age of individuals measured in full years of age since respondents' reported birth date. To account for the multilevel structure of data (year-by-year observations nested within persons) I opted for random effects (RE) multilevel models. The fixed effect (FE) specification, which is often deemed appropriate for eliminating bias due to time-invariant unobserved heterogeneity, seemed unhelpful, since my key independent variable of interest – cohort size at birth – is by definition fixed at birth for each individual.

After considering many different specifications for the shape of the educational attainment growth curve, I chose the spline specification for age effects. Specifically, I found that the use of five splines with four crucial nodes at 20, 23, 26 and 30 full years of age is a reasonable combination of parsimony and accuracy in modelling the underlying growth curve. Finally, in order to model the key effects of interest I interact the spline variables for age with the variable for cohort size at birth. This interaction adds flexibility to the growth curve by allowing it to change as a function of cohort size. The resulting model then has the following general form:

$$EDU_{it} = \alpha_0 + \sum_{s=1}^{5} \alpha_s Age_{its} + \sum_{s=1}^{5} \alpha_{s+5} Age_{its} \times CS_i + \alpha_{11} CS_i + \boldsymbol{\beta} \times \mathbb{Z}_{\mathrm{i}} + \mu_i + \epsilon_{it} \quad (3\text{-}1)$$

where Edu_{it} is one of the dependent variables measuring educational attainment of individual i at time t, Age_{its} is one of the five splines mentioned,[28] CS_i is individual's cohort size at birth in millions logged, $\mathbb{Z}$ is a vector of time-constant control variables (to be discussed below), and, finally, μ_i and ϵ_{it} are respectively time-invariant and idiosyncratic components of the person-specific error term. Accordingly, α-parameters and β-parameters are the parameters of the model to be estimated from the data.

[28] The age splines are intended to capture different growth rates of the dependent variable at different age intervals. For example, for individuals between 26 and 30 years of age the values of the 1st (18−20), 2nd (20−23), 3rd (23−26) and 5th (30+) age spline remain constant, whereas the 4th spline is the only one that can vary by age. For a specific individual of 28 years of age, the values of all the five splines would be 20, 3, 3, 2 and 0 respectively.

3.3.6. Potential sources of confounding and controls

The model described with equation (3-1) provides a good way of getting at the effect of cohort size at birth on educational attainment only under specific assumptions. One of the key assumptions is that cohort size at birth – the variable of primary theoretical interest – is uncorrelated with the individual error term ($\mu_i + \epsilon_{it}$).

On one hand, there is good intuition for considering variation in cohort size at birth as plausibly exogenous in the Russian context, because the historical variation in cohort size in Russia is itself largely due to an exogenous factor (the impact of WW2) and, more obviously, because individuals have no control over their own birth cohort.

On the other hand, in a finite 'sample' of cohorts, cohort size can correlate (and actually does correlate, in the sample of EES cohorts[29]) with birth year, which leads to several potential sources of confounding.

The first source is the secular trend of *educational expansion* which is pushed by modernization and the gradual upgrading of the social structure over time – a process which occurred in almost every developed country (Breen and Jonsson 2007; Bar Haim and Shavit 2013) and which almost certainly characterized both Soviet and post-Soviet Russia (Gerber and Hout 1995; Kyui 2016). This process implies a *negative* correlation between year of birth and educational attainment, or, in a cross-sectional setting, older individuals featuring, on average, lower educational attainment compared to younger individuals. I deal with this type of confounding by directly controlling for individuals' social background characteristics, in particular: (1) parents' highest occupational status[30] and (2) the area of respondents' residence at birth[31] (i.e. the underlying logic is that this accounts for the upgrading of social structure over time that pushes the demand for education). Additionally, I control for (3) respondents' birth year (a simple linear specification) to account for any residual relationship between the year of

[29] For cohorts born 1948−1987, the correlation between cohort birth year and the logged cohort size at birth (used in my analyses) amounts to non-trivial –.554.

[30] The status was measured using the International Socioeconomic Index for occupations (ISEI) developed by Ganzeboom, De Graaf and Treiman (1992). To obtain the scores for the GGS source data on parents' occupations, I utilized Stata's user-written package *isko* developed by Hendrickx (2004). The package automatically transforms most 4-digit ISCO codes into corresponding ISEI scores using the original ISCO-to-ISEI. Including these variables in the analysis slightly reduces effective sample size due to 4.7% missing cases. The alternative was to use parents' highest educational attainment, which leads however, to an even greater sample loss (9.7% missing cases).

[31] Discriminating between village, town or major city. To deal with the extremely high percentage of missing cases (13.7%) the missing case was coded as a separate category and included in the analysis.

birth and educational attainment (for instance, those that may be due to gradual supply-side adjustments).

The second source is *endogenous selection* on the outcome (Heckman 1979; Elwert and Winship 2014) due to socioeconomic differentials in life expectancy (also widely reported for Russia: Shkolnikov et al. 1998; Bessudnov, McKee, and Stuckler 2012). In a cross-sectional setting, this type of selection can give rise to a (spurious) *positive* relationship between the year of birth and educational attainment, because socioeconomically disadvantaged (or lower educated) individuals tend to have shorter life spans and therefore a lower chance of selection into the sample. However, this type of bias is unlikely to be a major source of concern for my analyses, since the age of individuals in the EES sample is bound by default between 18 and 55 years of age, thereby omitting the age groups particularly susceptible to the bias. Therefore, I assume that this type of confounding is 'naturally' controlled for by means of EES sample restrictions.

I also include two binary control variables to differentiate (4) between *cohorts* born before and after 1979 and (5) *periods* of exposure to the Soviet (pre-1991) and the post-Soviet (post-1991) contexts. The reason for including the former control (4) is because the duration of primary school was extended from 3 to 4 years by the educational reform of 1989 (Szekely 1986).[32] The population affected by the reform included those who by September 1989 had not yet completed primary school. Accordingly, this corresponds to cohorts born roughly after 1979.[33] The reason for including the latter control (5) is the rapid proliferation of educational opportunities (see Figure 3-1) brought by the liberalization of the post-Soviet educational sector and the emergence of a post-Soviet educational market.

I also include the control for (6) the number of respondent's siblings. Although this variable is conditionally unrelated to cohort size at birth,[34] it is known to be a strong correlate of educational attainment (see Steelman et al. 2002). Therefore, my primary rationale for

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[32] The educational reform of 1989 was not the first attempt to change the duration of secondary school. Previous attempts had been made during the Khruschev (1958) and Brezhnev (1964) eras. The previous reform of 1964 reduced the duration of secondary school from 11 years to 10 years by shortening the length of education in 'high schools' from 3 to 2 years (Boiter 1959; Matthews 1982). However, the most recent cohort that may have experienced this change was born in 1947 (1964 minus 7 years as the school starting age, minus 10 years in secondary education), and therefore the cohorts affected are not included in the EES sample.

[33] In reality, the exact cohorts are hard to identify due to several reasons: different school starting age for different people, inconsistent implementation of the reform across educational institutions, etc.

[34] Partial correlation of respondent's number of siblings with respondent's cohort size at birth accounting for respondent's birth year is equal to .017 (*p*-value = .200). This is quite expected given the weak correlation between cohort size and cohort fertility in Russia over time as discussed in Chapter 2, Section 2.3.3.

including this control is to explain away a part of residual variation in the dependent variable of interest and thereby improve the quality of estimates.[35]

Finally, in order to account for the differences between men and women I consider gender-specific models instead of modelling this difference with a single equation. This both allows more parsimonious model specification (which would otherwise require an undesirable three-way interaction) and provides a better fit to the data (accounting for more idiosyncrasies in the educational attainment process between the two groups).

3.4. Results

3.4.1. Cohort size at birth and educational attainment process

A full explication of the estimated growth-curve models (GCMs) and the summary statistics are contained in the Appendix (Section 3.6). However, since the models are cumbersome (due to spline specification of age effects and their interaction with cohort size at birth) and therefore their interpretation is non-intuitive, here I will only consider Figure 3-5 containing their graphic representation and Table 3-3 containing corresponding average marginal effects. Both parsimoniously and, in my opinion, rather exhaustively characterize the main findings of my analyses.

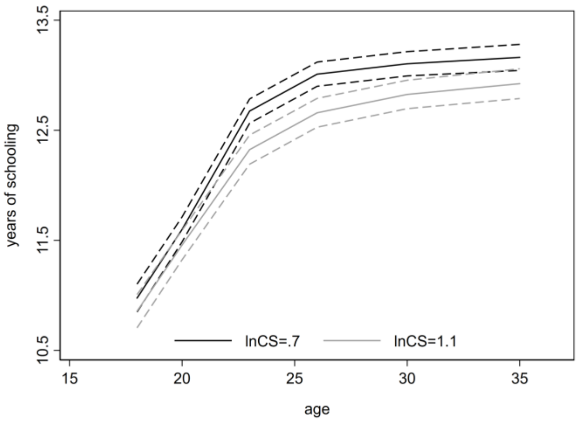
Figure 3-5 provides the most intuitive way of demonstrating the effect of cohort size at birth on the progression of educational attainment. Specifically, it compares the modelled curve patterns of two hypothetical cohorts – a smaller one with a cohort size of roughly 2 million ($e^{0.7}$) and a larger one with a cohort size of roughly 3 million ($e^{1.1}$). Both cohorts, though fictitious, roughly correspond to the real cohorts born in 1965 (1.990 million, one of the first war echo cohorts) and 1949 (2.956 million, one of the first post-war baby boom cohorts).

Table 3-3 communicates largely the same information as Figure 3-5, but in a slightly different and more precise form – it contains the average marginal effects which correspond to *the average differences in years of schooling* (as defined in Section 3.3.3) *which are due to a 50 per cent increase in cohort size at birth* (i.e. roughly the increase from the smaller to the larger cohort in Figure 3-5) controlling for the covariates in the underlying models. The average

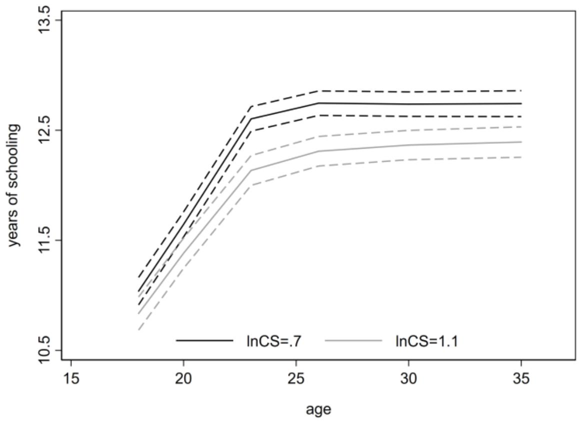
[35] In my analyses, I transform the variable by adding one to the number of siblings and taking the natural logarithm of the sum. This version picks up more residual variation, than the original variable.

marginal effects in Table 3-3 were estimated at specific ages, as well as for the entire featured age range (18–35), and, similar to Figure 3-5, are presented for men and for women separately.

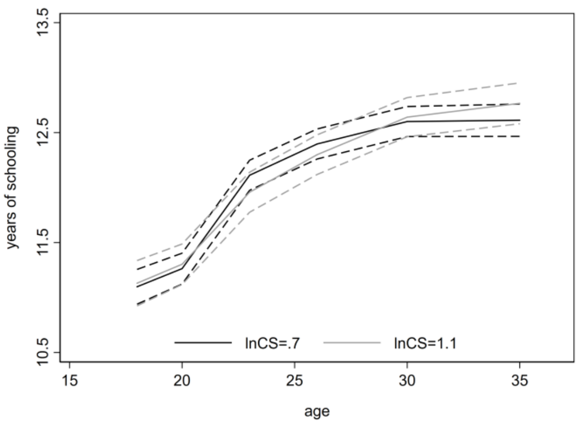
Figure 3-5. Patterns of growth in educational attainment over age as predicted from random effect models



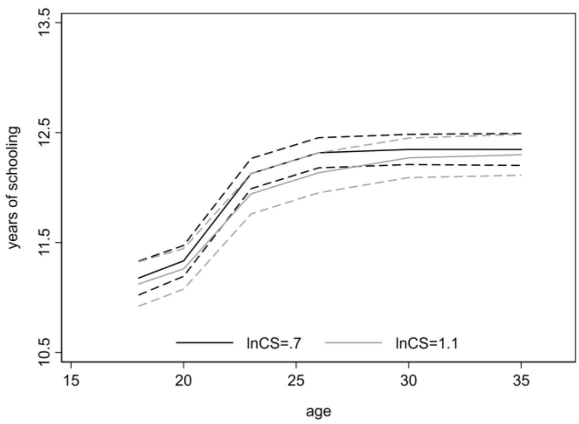
(a) Including part-time education – *Women*



(b) Only full-time education – *Women*



(c) Including part-time education – *Men*



(d) Only full-time education – *Men*

Notes: For full model estimates refer to Table 3-8 in Appendix (Section 3.6).
Dashed lines denote 95% confidence intervals.

In general, all four graphs in Figure 3-5 reveal an intuitive pattern: the level of educational attainment progresses with age with the most dynamic phase taking place roughly until 25 years of age, after which further improvements in educational attainment become substantially less likely. The growth curves also reveal subtle differences between women (Figure 3-5a,b) and men (Figure 3-5c,d), of which the most apparent is that women generally tend to have higher levels of educational attainment, and the least apparent is that men's educational careers also take slightly longer to develop. Finally, the highest level of educational attainment on a full-time basis (Figure 3-5b,d) is generally lower than the level of attainment recognizing both forms of education (Figure 3-5a,c), especially among women.

Let us now highlight cohort-related differences in the progression of educational attainment (the focus of this study) by considering these differences among *women*; these are apparently small (and, in fact, statistically non-significant, see Table 3-3) at the age of 18 – the age by which most young people are typically expected to complete some type of secondary education (which roughly corresponds to 10−11 years of schooling). However, the difference between cohorts becomes more apparent in the early 20s and persists further, as educational careers continue to unfold and reach upper levels of the educational system, e.g. upper secondary vocational and higher education. Notably, the difference is in line with *H1* (p. 44), according to which I generally expected larger cohort size to be associated with disadvantage in educational attainment. According to Table 3-3, the average difference between the two cohorts is estimated at .273 to .377 years of schooling (depending on whether one accounts for part-time education or not, see below). While not particularly large when taken by its face value, this difference is, nevertheless, only marginally larger compared to the gender gap in educational attainment as estimated from the same data and amounting to .241 to .355 points on the same scale (in favour of women).

Table 3-3. Average marginal effects of a 50% increase in cohort size on educational attainment measured in years of schooling

	Including part-time education				**Full-time education only**			
Age	*Women*		*Men*		*Women*		*Men*	
at 18	–.121	(.124)	.033	(.162)	–.206*	(.124)	–.054	(.160)
at 20	–.144	(.113)	.041	(.147)	–.266**	(.115)	–.074	(.148)
at 23	–.355**	(.111)	–.156	(.145)	–.475**	(.113)	–.187	(.146)
at 26	–.356**	(.111)	–.098	(.145)	–.442**	(.113)	–.185	(.146)
at 30	–.282**	(.110)	.040	(.143)	–.377**	(.112)	–.077	(.145)
at 35	–.242**	(.114)	.156	(.148)	–.354**	(.115)	–.049	(.148)
18-35	–.273**	(.105)	–.014	(.138)	–.377**	(.109)	–.116	(.140)

Notes: Estimates from GGS/EES data (EES subsample, cohorts born 1950─1988). For full model estimates refer to Table 3-8 in Appendix (Section 3.6). Clustered standard errors in parentheses. * $p<.10$, ** $p<.05$

Another important observation from these analyses is that the difference due to cohort size is on average 1.3−1.4 times smaller if both part-time and full-time education are included in the definition of educational attainment compared to when only full-time education is included (Table 3-3). I treat this as evidence indicating that part-time education provided women in large cohorts with an alternative to full-time education, which they could use to make up for the disadvantage in access to full-time educational opportunities. In other words, this is consistent with *H2* (p.45).

I also find that the initial disadvantage due to cohort size which fully develops at around age 23−26 tends to wane at later ages. In full-time education, the corresponding difference peaks at age 23 (.475 years of schooling per 50 per cent difference in cohort size, see Table 3-3), and reduces approximately by a quarter by age 35 (the reduction in the gap is statistically significant at $p<.05$). In attainment combining both full-time and part-time education, the gap peaks slightly later, at age 26 (.356 years of schooling), and reduces roughly by a third by age 35 (although the reduction is only statistically significant at $p<.10$). In other words, this is additional evidence that women tend to make up for the disadvantage due to cohort size over time. This is consistent with *H3* (p.46) – a less restrictive version of *H1* – which made the provision for the negative effect of cohort size on educational attainment in terms of timing rather than the level of education attained.

Let us now observe the effect of cohort size on educational attainment among men. Neither Figure 3-5 nor Table 3-3 suggest any statistically significant difference in the pattern of educational attainment that might be due to cohort size. Since the lack of statistical significance might be due to the substantially smaller sample size for men compared to that for women (for estimation sample sizes refer to Table 3-8 in Appendix), nevertheless I proceed by considering the effect sizes. Judging the effects by their face value (see Table 3-3) suggests that the effect of a 50 per cent increase in cohort size at birth on years of schooling including part-time education is indeed close to zero (–.014). However, when only full-time education is included in the outcome, the average marginal effect becomes more visible (–.116). Moreover, it exhibits roughly the same dynamic across the entire age range, as it does for women (i.e. the development of disadvantage at age 23−26 and the reduction of the gap at later ages). Thus, neglecting the statistical significance, effect sizes suggest a pattern that is also roughly in line with general predictions (specifically *H2* and *H3*). At the same time, the magnitude of the effects is much lower compared to that of women, which is in line with the last hypothesis, *H4*.

3.4.2. Cohort size at birth and probability of draft

Fortunately, EES data allows testing whether a part of the explanation underlying *H4* is valid. The retrospective biographies in EES also included information on whether men were drafted into military service. I use this data to analyse whether cohort size at birth was indeed associated with lower probability of being drafted. For that purpose, I constructed a binary variable indicating whether men were drafted into the army by age 27, the age by which they were legally liable to military service (Odom 1998). I then modelled this probability with a simple logistic regression as a function of cohort size at birth and a short set of relevant controls from the list discussed in Section 3.3.6.

Table 3-4. Predicted probability of being drafted by age 27 by cohort size at birth

Cohort size at birth	Probability of being drafted	
1.5 million	.809**	(.018)
2 million	.696**	(.011)
2.5 million	.563**	(.010)
3 million	.423**	(.021)

Notes: Estimates from GGS/EES data (EES subsample, men, cohorts born 1950–1987). For full model estimates refer to Table 3-9 in Appendix (Section 3.6). Standard errors in parentheses. * p<.10, ** p<.05

Table 3-5. Estimated OLS models of years of schooling attained by age 27 among men

	Including part-time education				Full-time education only			
	(1)		(2)		(1)		(2)	
Drafted by age 27	–1.197**	(.098)			–1.178**	(.098)		
Cohort size (in millions logged)	–1.449**	(.447)	–.760*	(.460)	–1.656**	(.444)	–1.024**	(.457)
Parents' highest occupational status (ISEI)	.015**	(.002)	.019**	(.003)	.011**	(.002)	.015**	(.003)
Number of siblings[1]	–.182**	(.088)	–.200**	(.091)	–.200**	(.088)	–.208**	(.091)
Place of birth (ref: Village)								
Town	.347**	(.106)	.428**	(.110)	.404**	(.106)	.489**	(.110)
City	.404**	(.124)	.509**	(.128)	.352**	(.124)	.455**	(.129)
Not available	.134	(.136)	.241*	(.141)	.148	(.135)	.263*	(.140)
Year of birth	–.022**	(.009)	–.001	(.009)	–.025**	(.009)	–.006	(.009)
Born after 1979	–.662**	(.193)	–.475**	(.200)	–.464**	(.193)	–.261	(.200)
Intercept	57.411**	(18.389)	15.015	(18.748)	63.642**	(18.346)	23.753	(18.735)
R^2	.134		.066		.125		.056	
F	32.3**		16.6**		28.9**		13.5**	
df	9		8		9		8	
N	1,887		1,887		1,837		1,837	

Notes: Estimates from GGS/EES data (EES subsample, men, cohorts born 1950–1987). Standard errors in parentheses. [1] Number of siblings plus one, logged. * p<.10, ** p<.05

Table 3-4 presents the predicted probabilities from the full model, which can be found in Table 3-9 in the Appendix. It clearly shows that the probability of being drafted decreased with larger cohort size, thereby substantially decreasing the risk of interrupted educational careers. For the fictitious cohorts introduced in the previous section, the difference amounts to a non-trivial 28 p.p., a reduction from 70 per cent probability for the smaller cohort to only 42 per cent probability for the larger cohort.

Accordingly, by modelling the effect of being drafted directly on to educational attainment at age 27 (see Table 3-5), I find that it accounted for a negative difference of roughly 1.2 years of schooling by the time young men turned 27, which is also a non-trivial amount (cf. the gender gap cited on p.58). In other words, for men, the risk of being drafted partly suppressed the negative effect of cohort size at birth on educational attainment, which is also evident from comparison of models (1) and (2) in Table 3-5. I therefore conclude that exposure to military conscription is a valid explanation of the weak and statistically non-significant effects of cohort size on educational attainment for men, reported using GCMs.

3.4.3. Supplementary analyses using GGS data

In the final step of analyses, I employ GGS data for a test of whether key findings hold if one considers a broader range of cohorts than the one originally featured in EES. GGS includes cohorts born as far back as 1923. However, reliable data[36] on cohort size at birth in Russia exists only for cohorts born in 1937 and later, and therefore only these cohorts are included in the analyses below. In any case, this allows for the inclusion of cohorts born before, during and shortly after WW2, which could not be included in the analyses in Section 3.4.1. However, there are several reasons why GGS data is inferior to EES. The first is that it does not contain information about the development of individuals' educational careers over time, and therefore does not support modelling the process of educational attainment as a function of age, which is essential for controlling away the variation in educational attainment which is due to age-related, rather than cohort-related, effects. The second reason is the less precise definition of educational attainment, which features only crude ISCED mappings and does not discriminate between part-time or full-time education.

[36] Restriction of Human Mortality Database times series, for which Russian demographers have supplied the most accurate data available.

Using GGS I estimate two kinds of models (both for men and women separately as in previous analyses). The first models the value of highest reported educational attainment expressed in years of schooling[37] conditional on cohort size at birth and the same set of controls as employed in my EES analyses. The second models the age at which the highest reported level of education was attained – another variable available from the original GGS dataset – conditional on the same set of covariates plus the control for the level of educational attainment reported (ISCED categories).

Table 3-6. Estimated OLS models of schooling using GGS data

	Years of schooling				**Age when education attained**			
	Women		*Men*		*Women*		*Men*	
Cohort size (in millions logged)	–.457**	(.139)	–.214	(.198)	.185	(.337)	–.179	(.425)
Education attained (ref: ISCED 1)								
ISCED 2					–.166	(4.520)	.726	(1.373)
ISCED 3					–.955	(4.501)	–.292	(1.333)
ISCED 4					–.964	(4.500)	.457	(1.337)
ISCED 5					2.418	(4.499)	4.459**	(1.333)
ISCED 6					6.284	(4.603)	8.470**	(1.582)
Parents' highest occupational status (ISEI)	.040**	(.002)	.034**	(.002)	.002	(.004)	.005	(.005)
Place of birth (ref: Village)								
Town	.055	(.075)	.426**	(.099)	.420**	(.173)	–.018	(.212)
City	.176**	(.086)	.465**	(.113)	.966**	(.198)	.490**	(.243)
Not available	.294**	(.088)	.648**	(.115)	.710**	(.204)	.021	(.246)
Number of siblings[1]	–.167**	(.018)	–.105**	(.024)	.006	(.043)	.061	(.051)
Year of birth	.003	(.003)	–.015**	(.004)	–.097**	(.008)	–.096**	(.010)
Born after 1979	–.683**	(.110)	–.391**	(.134)	.098	(.270)	.125	(.301)
Intercept	5.783	(6.419)	39.883**	(8.762)	209.44**	(15.841)	207.73**	(18.971)
R^2	.152		.115		.210		.307	
F	118.9**		53.2**		82.7**		86.1**	
df	8		8		13		13	
N	5,299		3,287		4,067		2,543	

Notes: Estimates from GGS/EES data (GGS subsample, cohorts born 1937–1987). Standard errors in parentheses.
[1] Number of siblings plus one, logged. * p<.10, ** p<.05

[37] The ISCED codes 0-6 were recoded into 0, 4, 9, 11, 12, 15 and 21 years of schooling respectively. This recoding procedure is a compromise between the original UNESCO ISCED 1997 classification for Russia and more accurate correspondence in Table 3-1.

The estimated models are presented in Table 3-6. The table generally corroborates the findings reported in Section 3.4.1. I find a negative effect of cohort size at birth on educational attainment both for men and women (as predicted with *H1*), although it is weaker (and statistically non-significant) for men (which is also in line with *H4*). The sizes of estimated effects are also not substantially different from those reported previously: for instance, for women the average marginal effect of a 50 per cent increase in cohort size at birth amounts to –.185[38] years of schooling (statistically significant at $p<.05$) compared to –.242 reported in Table 3-3.

As far as age when education was completed is concerned, which was intended as a test of *H3* (the effect of cohort size on the duration of educational careers rather than the level of attainment), I do not find any statistically significant effects for either men or women. The average effect sizes are also substantively small amounting to less than a fifth of a year per one-unit increase in logged cohort size at birth (i.e. 172 per cent increase in original units).

On the other hand, the difference/comparability of estimates is hard to judge given the differences in the representation of cohorts, the definitions of educational attainment[39] and the estimation strategies. Besides, with the GGS data one is potentially more likely to obtain biased estimates of the effect in question due to the greater likelihood of endogenous selection (i.e. differential mortality bias) described in 3.3.6. Nevertheless, I find it important that regardless of these differences the general pattern of findings is substantively consistent with the findings in Section 3.4.1, and yields additional credence to the previously reported findings.

3.5. Discussion and conclusions

The aim of this chapter was to study whether individual fortunes in the Soviet Russian educational system were partly determined at birth, owing to vast differences in the sizes of generations caused by WW2. The study has shown that larger cohort size at birth was indeed associated with certain disadvantage in the educational attainment process, although for men it was partly (and perhaps unintentionally) compensated by their liability to service in the army,

[38] Note that Table 3-6 reports the effect of a one-unit increase on a logged scale, which equals to a 172 per cent increase on the original scale.
[39] Both the underlying scales and the age spans for defining the highest level of educational attainment. For instance, the correlation between the EES highest years of schooling (including both full-time and part-time education) and the GGS highest years of schooling amounts only to .591 in the overlapping sample.

which, in a larger cohort, they were more likely to avoid. For women the disadvantage due to a 50 per cent difference in cohort size at birth amounted roughly to the size of the gender gap – a difference in the level of educational attainment between men and women of roughly of 1/3–1/4 years of schooling (or one year of schooling for one in every three to four individuals).

Importantly, my findings also show that the disadvantage due to cohort size was not irreversible. While it was particularly pronounced at the most dynamic phase of young people's educational careers – their mid-20s – the inter-cohort inequality tended to decline slightly over time revealing that people were able to make up for the initial disadvantage by postponing and/or turning to part-time forms of education. Part-time education in Soviet Russia thus proved a valuable opportunity for those baby boomers, who did not get access to for more fully-fledged, yet scarce, full-time educational opportunities.

In sum, my results corroborate the judgments of other scholars (Connor 1991; Kochetov 1994; Gerber and Hout 1995) who suggested that Soviet educational policies were not perfectly responsive to the demographic challenges induced by the long-lasting impact of WW2. Yet they also expand on existing studies by providing a richer account of the educational attainment process of Soviet Russians by explicitly considering the timing and quality of their education, rather than simply focusing on the level of educational attainment – aspects which were largely missing in similar studies addressing the relationship between cohort size and education in other countries (Ahlburg et al. 1981; Wachter and Wascher 1984; Dooley 1986; Flinn 1993; Jeon and Berger 1996; Bound and Turner 2007; Fertig et al. 2009; Saavedra 2012).[40]

The fact that cohort size determined educational fortunes in a system which was explicitly oriented towards eradicating social injustice,[41] is itself somewhat ironic. Unlike the inequality between working class *vs* bourgeois or rural *vs* urban origin, which was determined at birth, the inequality between generations – obviously a source of injustice on similar accounts – was not at all articulated in the Soviet ideological agenda. Yet the actual failure of the Soviet system in this respect, in addition to its mixed success in struggling with more 'traditional' social inequalities (Yanowitch and Fisher 1973; Teckenberg 1981; Teckenberg and Vale 1989;

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[40] Originating from the economics literature, the majority of these studies seek to explain only temporal variations in enrollment, and rarely draw on micro-level data. Yet even in the latter case, the analytical endeavor boils down to explaining educational attainment and its relationship to wages (i.e. 'returns to human capital'), completely neglecting other important aspects of the educational attainment process.

[41] The particular extent, to which demographic (mis)fortunes affected social inequality in general – school-to-work transitions and further career mobility – remains a matter of empirical investigation. However, there are good reasons to believe it played a serious role – education was an important factor of social stratification in the Soviet era (Yanowitch and Fisher 1973; Teckenberg 1981; Teckenberg and Vale 1989; Gerber and Hout 1995), and remained such in post-Soviet Russia (Gerber 2000, 2002, 2003; Bessudnov 2016; Kyui 2016).

Gerber and Hout 1995), reveals once again how vulnerable this system was in its naïve hopes of maintaining a socially just society.

One further insight can be derived from the fact that demographic processes affected the process of educational attainment among Soviet Russians. As we have seen, they did so in ways similar to the processes at work in the USA and other market contexts (Ahlburg et al. 1981; Dooley 1986; Falaris and Peters 1991, 1992; Jeon and Berger 1996; Bound and Turner 2007; Fertig et al. 2009). This potentially indicates that the supply-of-educational-opportunities perspective (Sørensen 1974, 1975, 1977, 1983), which so surprisingly was neglected in favour of agency-driven explanations, perhaps deserves greater attention. This chapter does not claim that the theory of human capital, which was often invoked in this regard, is completely irrelevant, but it definitely raises the possibility that earlier interpretations of similar results in market contexts might have seriously underestimated the role of structural factors. As such, the relative contribution of agency-based *vs* structure-based explanations remains a matter of further empirical investigation. One possible prospective study which might shed light on this issue could compare the magnitude of the demographic effects on the educational fortunes shaped before and after Russia's market transition (as there is little doubt that Russia's enduring demographic echoes would cease in the near future). Another, perhaps more ambitious possibility, is a large-scale cross-national comparison that could involve countries of both varying demographic and institutional contexts.[42]

[42] For instance, one plausible argument could be that the effects of cohort size on educational attainment are more pronounced in educational systems with substantial private funding, compared to systems where education is predominantly public funded, since the former is more consistent with the idea of a flexible supply of educational opportunities (one of the cornerstones of discussion in Sections 3.2.1 and 3.2.2). Several sketchy analyses I performed for another project yielded positive evidence in favour of this idea.

3.6. Appendix

Table 3-7. Summary statistics for growth curve analysis

Variables	Mean/Percent	SD	Min	Max	N valid[2]
Dependent variables[1]					
Years of schooling	12.8	2.03	6	19	5,329
Years of schooling (fulltime)	12.4	1.92	6	19	5,139
Independent variable					
Cohort size (in millions)	2.40	.362	1.82	2.96	5,974
Control variables					
Male	38.3%				5,974
Parents' highest occupational status (ISEI)	43.7	17.7	16	90	5,691
Place of birth					
Village	41.8%				5,155
Town	36.2%				5,155
City	22.0%				5,155
Number of siblings	1.74	1.64	0	16	5,974
Year of birth	1966	10.5	1948	1987	5,974
Born after 1979	16.7%				5,974

Notes: All summary statistics calculated from valid observations using GGS/EES data (EES subsample, cohorts born 1950–1987). [1] Summary statistics provided for last reported years of schooling. [2] Corresponds to persons in the sample. EES full sample size is 5,974.

Table 3-8. Estimated random effect growth-curve models of years of schooling

	Including part-time education				**Full-time education only**			
	Women		*Men*		*Women*		*Men*	
Cohort size (in millions logged)	.220	(2.137)	–.092	(2.806)	.819	(1.936)	.294	(2.517)
Age splines[1]								
18–20 y.o.	.332**	(.096)	.076	(.125)	.355**	(.087)	.095	(.112)
20–23 y.o.	.480**	(.046)	.396**	(.059)	.440**	(.042)	.330**	(.053)
23–26 y.o.	.112**	(.041)	.061	(.053)	.029	(.037)	.062	(.048)
26–30 y.o.	–.008	(.029)	–.009	(.037)	–.030	(.027)	–.039	(.034)
30–35 y.o.	–.002	(.029)	–.037	(.037)	–.007	(.026)	–.010	(.033)
Age splines × Cohort size								
18–20 y.o.	–.029	(.110)	.010	(.144)	–.074	(.099)	–.024	(.129)
20–23 y.o.	–.174**	(.052)	–.162**	(.069)	–.172**	(.048)	–.093	(.062)
23–26 y.o.	–.000	(.047)	.048	(.061)	.027	(.042)	.002	(.055)
26–30 y.o.	.045	(.033)	.086**	(.043)	.040	(.030)	.066*	(.038)
30–35 y.o.	.020	(.032)	.057	(.041)	.011	(.029)	.014	(.037)
Year of birth	.008	(.005)	.020**	(.007)	.003	(.006)	.013*	(.007)
Born after 1979	–.255**	(.118)	–.334**	(.148)	–.159	(.122)	–.208	(.152)
Post-Soviet period	–.086**	(.021)	–.120**	(.027)	–.055**	(.019)	–.068**	(.024)
Parents' highest occupational status (ISEI)	.020**	(.001)	.014**	(.002)	.017**	(.001)	.010**	(.002)
Number of siblings[2]	–.181**	(.051)	–.147**	(.067)	–.126**	(.053)	–.132*	(.069)
Place of birth (ref: Village)								
Town	.091	(.060)	.431**	(.081)	.014	(.063)	.481**	(.083)
City	.197**	(.072)	.432**	(.095)	.049	(.075)	.383**	(.097)
Not available	.109	(.080)	.254**	(.104)	–.059	(.083)	.228**	(.106)
Intercept	–11.002	(10.839)	–30.724**	(14.267)	–.820	(11.141)	–16.793	(14.530)
R^2 between	.151		.113		.108		.092	
R^2 within	.256		.188		.203		.152	
R^2 overall	.172		.125		.122		.097	
ρ (ICC)	.619		.637		.681		.696	
Wald χ^2	15,106.9**		5,759.8**		10,806.2**		4,349.6**	
df	19		19		19		19	
N persons	3,185		1,896		3,073		1,838	
N person-years	45,648		25,814		44,123		25,089	

Notes: Estimates from GGS/EES data (EES subsample, cohorts born 1950─1987). Clustered standard errors in parentheses. [1] Marginal effects of age at given age intervals. [2] Number of siblings plus one, logged. * p<.10, ** p<.05

Table 3-9. Estimated logistic regression models of being drafted before age 27

Cohort size (in millions)	–1.604**	(.187)
Parents' highest occupational status (ISEI)	–.015**	(.003)
Number of siblings[1]	.033	(.106)
Place of birth (ref: Village)		
Town	–.352**	(.129)
City	–.425**	(.148)
Not available	–.451**	(.164)
Year of birth	–.116**	(.007)
Intercept	233.144**	(13.242)
Pseudo R^2	.181	
Likelihood ratio χ^2	526.5**	
df	7	
N	2,184	

Notes: Estimates from GGS/EES data (EES subsample, men, cohorts born 1950–1987). Standard errors in parentheses. [1] Number of siblings plus one, logged. * p<.10, ** p<.05

Table 3-10. Summary statistics for analyses using GGS

	Mean/Percent	SD	Min	Max	N valid
Dependent variables					
Years of schooling	12.7	2.35	0	21	9,104
Education (ISCED)					
ISCED 0	<.1%				9,104
ISCED 1	.7%				9,104
ISCED 2	10.0%				9,104
ISCED 3	28.9%				9,104
ISCED 4	17.4%				9,104
ISCED 5	42.3%				9,104
ISCED 6	.6%				9,104
Age when highest level of education was attained	21.3	4.89	6	61	6,982
Independent variable					
Cohort size (in millions)	2.51	.635	.961	4.23	9,104
Control variables					
Male	38.3%				9,104
Parents' highest occupational status (ISEI)	43.1	18.2	16	90	8,586
Place of birth					
Village	43.3%				7,589
Town	35.0%				7,589
City	21.7%				7,589
Number of siblings	1.91	1.82	0	17	9,104
Year of birth	1962	13.8	1937	1987	9,104
Born after 1979	14.2%				9,104

Notes: All summary statistics calculated from valid observations using GGS/EES data (cohorts born 1937–1987, individuals who reported their highest level of educational attainment).

Chapter 4. Cohort Size at Birth and Social Inequality in Educational Attainment in Soviet Russia

4.1. Introduction

In the previous chapter, I have shown how the demographic echo of war may have shaped intergenerational *inequality* in educational attainment. By generating enormous differences in the sizes of different birth cohorts it affected their fortunes in the Soviet (and later post-Soviet) educational system. The current chapter casts a slightly different perspective on the process of educational stratification: rather than treating the demographic context as a factor shaping individuals' attainment over their life course, I now shift the focus to the study of how the post-WW2 demographics affected the extent of social inequality in education. Specifically, I am interested in whether (and, if so, to what extent) the demographic context conditioned the extent to which one generation was able to pass its advantage (or disadvantage) on to another, in other words intergenerational *mobility*.

One way to stress the importance and relevance of such enquiry is to acknowledge the limitations of the classic studies that investigate the evolution of intergenerational social mobility in different countries over different historical periods (see Erikson and Goldthorpe 1992; Breen 2004). In this literature, the rate of intergenerational social mobility, interpreted as the ability of individuals to advance their own social positions with respect to that of their parents, is often approached as a macro-level measure of societal openness or the extent to which a society is capable of reducing unequal opportunities associated with growing up in advantaged and disadvantaged families. In turn, with the dominant assumption that it is the normative goal of national institutional arrangements and social policies to promote equality of opportunity (and the intuition that they are indeed partly responsible for mediating the link between parents' and children's attainments), the rate of intergenerational social mobility is often treated as a way of assessing the efficiency of these policies and arrangements. But what if a part of the association between social origins and social destinations is independently conditioned by the macro-demographic context? In that case, longer-term changes in the institutional or political context conditioning intergenerational social mobility could easily be dampened (or amplified) by longer-term demographic changes and neglecting the latter may lead to biased beliefs about the effect of institutional changes on fluctuations in inequality of opportunity. Hence, it is crucial to understand whether and to what extent the demographic change can be held responsible for the observed association between different generations' levels of attainment.

To a certain extent this study also revisits and complements the much earlier study of Gerber and Hout (1995), who have already investigated educational stratification in Soviet Russia. That study focused on the evolution of social inequality in educational transitions and attainment over six historical cohorts, with the latest born in the late 1960s. While not entirely motivated by the study of cohort size effects on social inequality, Gerber and Hout recognized the role of the demographic context as part of their broader research agenda, and it also partly informed their classification of cohorts. In sum, while their findings reveal certain variations in the effect of social origins on some educational transitions across the range of studied cohorts, their final conclusion is that the overall stratification in educational attainment remained pretty much invariant to changes in political, institutional and demographic contexts. They treat this as evidence of the famous Maximally Maintained Inequality (MMI) hypothesis (Raftery and Hout 1993). The current study attempts to revisit this conclusion by drawing on an alternative and higher quality source of data (details in Section 4.3), using more accurate age-specific[43] definition of educational attainment and extending the span of cohorts under investigation to those born in the late 1970s.

The chapter has a familiar structure. In the next section, I introduce and discuss some mainstream theoretical ideas potentially relating cohort size and social inequality in educational attainment and elaborate on the hypotheses that guide my empirical investigation. In Section 4.3, I present my data and analytical strategy. Section 4.4 engages with the results of analyses, and, finally, in Section 4.5, I elaborate on the conclusions to be drawn from the study.

[43] The virtue of EES retrospective data on educational biographies is that it allows determining the actual level of educational attainment by specific age. In previous studies that use cross-sectional data, in which typically only respondents' current educational level is reported, confounding age-specific effects with cohort-specific effects is a likely issue.

4.2. Theory

4.2.1. A note on relative and absolute social inequality in educational attainment

Following a well-established tradition in scholarship concerned with the study of intergenerational mobility (Erikson and Goldthorpe 1992; Breen 2004), I would like to draw an important distinction between *absolute* and *relative* social inequality. The distinction is sometimes neglected in social stratification literature, but it appears highly relevant to identifying two broader types of effects that cohort size may exert on observed social inequality.

Relative social inequality in educational attainment in studies of social stratification is often assumed by default and is defined as *margin-free* association between social background (e.g. parental education, occupational status or social class) and educational attainment. *Margin-free* simply means that the overall distribution of educational attainment, which can, for instance, (and most likely does) change over time (e.g. over cohorts) is excluded as a factor that may potentially confound the association between social background and educational attainment. Although rarely discussed explicitly, such margin-free association is assumed to relate to a specific set of mechanisms that produce social inequality in educational attainment in the first place. Although no conventional term exists,[44] I prefer defining those as *allocational mechanisms*, in the sense that these mechanisms are responsible for the unequal allocation opportunities between different social groups. Examples of such mechanisms could include unequal distribution of resources between social groups, different strategies and goals within these groups towards attaining specific levels of education and even the presence of discrimination on behalf of educational institutions that supply educational opportunities to individuals. In other words, these could be said to actually generate social differentials with regard to educational outcomes, regardless of the total amount of educational opportunities supplied to the individuals.

[44] Relative social inequality in educational attainment is also often implied when stratification scholars measure what they call *inequality of educational opportunity* – to be distinguished from *inequality of educational outcomes*, which presumably corresponds to absolute social inequality (e.g. Breen 2010b; Breen and Jonsson 2005). However, in my view, inequality of educational opportunity is a very confusing term, because one can understand it as both (1) unequal *structure* of educational opportunities (such as, for example, defined by the limited supply of places in tertiary education institutions), and (2) unequal *allocation* of educational opportunities. It is only in the latter case that inequality of educational opportunity would correspond to what is implied by the relative social inequality in educational attainment. This why I prefer referring specifically to *allocational* mechanisms.

In turn, *absolute social inequality* in educational attainment also corresponds to the association between social background and educational attainment, but, unlike relative social inequality, it does not take into account the possible changes or differences in the distribution of educational attainment. Absolute social inequality is related to relative social inequality in the sense that the former is always a result of the latter (i.e. no relative social inequality means no absolute social inequality). What is important, however, is that, in addition to the changes in relative social inequality (i.e. changes in the allocation of opportunities as discussed in the previous paragraph), absolute social inequality can be affected by an additional set of mechanisms, which I prefer to call structural in the sense that they have an effect on the structure of educational opportunities in general. The examples of such *structural mechanisms* could include any class-blind processes that affect the overall distribution of outcomes, such as (non-discriminatory) policies driving educational expansion (specifically policies targeting universal participation at a specific level of education and thus affecting the overall distribution of educational attainment), and/or business cycles and technological change potentially affecting unemployment and the general occupational structure (as would be relevant for career prospects and occupational attainment). Simply put, merely by increasing the scarcity (or abundance) of educational opportunities, these structural processes can affect the salience of social background with respect to education as measured by absolute social inequality in educational attainment.

The distinction between relative and absolute social inequality in educational attainment is relevant in this chapter for the following reason: cohort size can affect absolute social inequality *without* influencing relative social inequality, because (as was already shown in Chapter 3) it has an effect on the marginal distribution of educational attainment[45] in a cohort. On the other hand, cohort size can have an idiosyncratic effect on relative social inequality (and in that case cohort size would affect absolute social inequality both through its effect on the marginal distribution and the idiosyncratic effect on relative social inequality). To make this clear, in the following section I develop a formal framework, which, in a highly simplified setting, demonstrates how cohort size can affect both types of social inequality in educational attainment by having idiosyncratic effects on both structural and allocational mechanisms.

[45] More specifically, cohort size affects the average level and the variance of educational attainment in a cohort.

4.2.2. A formal model of social differentials in educational attainment

In the following, I develop a simple formal argument showing how changing cohort size can affect both absolute and relative social inequality in educational attainment through its effects on allocational and on structural mechanisms. This argument is inspired by the framework developed in the appendix of the famous paper by Breen and Goldthorpe (1997), and therefore shares many of the framework's original assumptions and components. Incidentally, I contributed similar ideas to a paper recently accepted for publication (Bernardi, Hertel, and Yastrebov 2018), in which we show how rising economic inequality and educational costs translate into rising social inequality in education in the USA context.

Assume a population divided into two groups each according to their origins – for example advantaged (A) and disadvantaged (D) – and destinations – for example higher educated and lower educated. We can then express absolute social inequality in educational attainment simply as:

$$\Delta\Phi = \Phi_A - \Phi_D \quad (4\text{-}1)$$

where Φ_A and Φ_D are the shares of highly educated individuals originating from classes A and D respectively. A positive value of (4-1) would indicate that inequality favours the advantaged, zero would correspond to no inequality, and a negative value would indicate that the inequality favours the disadvantaged.

Assume further that a very simple mechanism exists which determines whether an individual successfully attains higher education. The mechanism reveals the ability of individuals a_i and determines whether they perform better than some threshold k (e.g. the minimum pass grade), and if so entitles them to be higher educated. Importantly, the threshold k is assumed to be completely universal, thus it is the same for both the advantaged and the disadvantaged, meaning the implied educational system is completely meritocratic and allows no discrimination by class background.

In this setting, inequality in the rates of attainment (i.e. $\Delta\Phi \neq 0$) would result exclusively from unequal distribution of ability between the two classes. In Boudon's terms (1974) this is equivalent to saying that social inequality in educational attainment results exclusively from *primary effects* of social background, i.e. the effects of social origin on academic performance.[46] A convenient way to formalize these ideas is to assume that ability within each class follows a logistic distribution (the implications of assuming a different type of distribution are briefly discussed at the end of this section).

$$\Phi_c = \left(1 + e^{\frac{k-a_c}{\sigma_c}}\right)^{-1} \ \forall \, c \in \{A, D\} \quad (4\text{-}2)$$

where a_c is the distribution's location parameter equal to the mean of ability for class c, and σ_c is the distribution's scaling parameter that corresponds to within-class dispersion of ability.

To keep things parsimonious we will further assume that $\sigma_A \approx \sigma_D = \sigma$, but $a_A > a_D$ (the latter assumption is not just a reasonable one but a widely acknowledged fact (e.g. Jackson 2013; Marks 2013)). It then follows immediately that (4-1) would be positive (i.e. inequality in attainment favours the advantaged) because

$$\frac{d\Phi_c}{da_c} = \sigma^{-1} e^{\frac{k-a_c}{\sigma}} \left(1 + e^{\frac{k-a_c}{\sigma}}\right)^{-2} > 0 \ \forall \, \sigma > 0, c \in \{A, D\} \quad (4\text{-}3)$$

In other words, (4-3) summarizes the underlying social mechanism of inequality in educational attainment: while there is selection according to merit, offspring from advantaged families fare better simply because they are, on average, better prepared academically.

Let us now imagine what would happen to (4-1) if nothing changes to the mechanisms just described except for the shift in the structure of opportunities. Specifically, let us assume that k suddenly increased due to the inability (or retarded adjustment) of the educational system to accommodate excessive demand that could easily result from cohort overcrowding (e.g.

[46] In the original model, Breen and Goldthorpe (1997) particularly emphasize the salience of secondary social background effects, i.e. the effects that explain the existence of social class differentials in educational attainment in addition to (or, better say, independent of) any differences in the academic and economic endowments of children originating from different social classes. The presence of these effects (operationalized using parameter p in the original model) is explained using the theory of relative risk aversion claiming that the utility of different educational strategies in their ability to prevent status demotion is different for individuals coming from different social backgrounds. While this might indeed be a salient aspect of social inequality in educational decisions, one could also argue that its relevance depends on the institutional and socioeconomic context surrounding educational decisions. Compared to Western countries, where the risks of failing to achieve more rewarding educational strategies may have been (and continue to be) quite high (e.g. the risk of unemployment and earnings foregone), in Soviet Russia, this was less likely to be the case, given the low level of economic inequality in general, as well as the state's ideological commitments to maintain full employment and eliminate poverty (e.g. Matthews 1989; Hedlund 2011). Hence, I find it is correct to abstain from explicit modeling of secondary effects in my extension of the model, given the context at hand. Nevertheless, I also admit that the primary reason for not including them is the desire not to overcomplicate the model in order to convey the main points (that said the existence of secondary effects in educational decisions in Soviet Russia remains a matter for empirical investigation).

similar to the context explored in Chapter 3). As expected, the probability of attainment will have to decline in both classes because

$$\frac{d\Phi_c}{dk} = -\sigma^{-1}e^{\frac{k-a_C}{\sigma}}\left(1+e^{\frac{k-a_C}{\sigma}}\right)^{-2} > 0\ \forall\ \sigma > 0, c \in \{A, D\} \quad (4\text{-}4)$$

In other words, if educational opportunities shrink for everyone (i.e. there is an equal increase in k for both classes), the average level of attainment will also decrease for descendants of both classes.

Yet, perhaps somewhat counter-intuitively, absolute inequality (4-1) would also, most likely, be forced to change rather than remain constant. To see why this would be the case, consider the following expression, which follows from the same assumptions[47] that lead to (4-4):

$$\frac{d\Delta\Phi}{dk} = \sigma^{-1}(\Phi_D - \Phi_A)(1 - \Phi_A - \Phi_D) \quad (4\text{-}5)$$

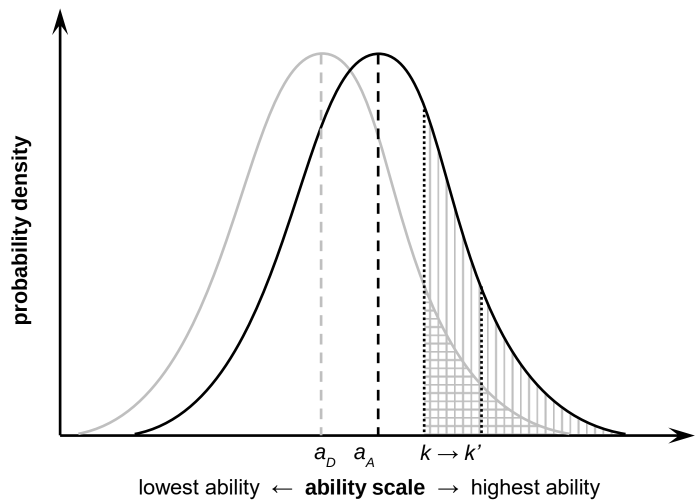
where Φ_A and Φ_D are the probabilities of attainment in a reference case, specifically the case with respect to which the effect of changing k is assessed. For (4-1) to be unaffected by the change in k, the expression (4-5) must be equal to zero, but this could only happen if $\Phi_A + \Phi_D = 1$ because neither σ^{-1} nor $\Phi_D - \Phi_A$ can be zeros (the latter follows from (4-3)). And while it is not entirely impossible that $\Phi_A + \Phi_D = 1$, it is far more likely that in most situations $\Phi_A + \Phi_D \neq 1$. It therefore follows that, in the setting described, a change in k (however small) *ceteris paribus* would also, in most situations, induce some change in the value of $\Delta\Phi$. In other words, *a shift in the structure of opportunities, even if completely blind with regard to social origins, would affect the magnitude of absolute social inequality*.

In fact, $\Phi_A + \Phi_D > 1$ and $\Phi_A + \Phi_D < 1$ are both possible, which means that the direction of change in $\Delta\Phi$ due to increasing k might be different depending on the values of probabilities Φ_A and Φ_D in the reference frame. To simplify, at smaller Φ's ($\Phi_A + \Phi_D < 1$) the effect of increasing k on $\Delta\Phi$ would always be negative, whereas at greater Φ's ($\Phi_A + \Phi_D > 1$), it would always be positive. In other words, the gap in $\Delta\Phi$ is subject to certain scaling, depending on the value of $\Phi's$ (when the latter approach their extremes the gap always gets

[47] The intermediate transformations leading to this expression utilize the fact that $\frac{d\Delta\Phi}{dk} = \frac{d\Phi_A}{dk} - \frac{d\Phi_D}{dk}$ and $\frac{d\Phi_c}{dk} = -\sigma^{-1}e^{\frac{k-a_C}{\sigma}}\left(1+e^{\frac{k-a_C}{\sigma}}\right)^{-2} = -\sigma^{-1}\Phi_c(1-\Phi_c)\ \ \forall\ \ c \in \{A, D\}$.

smaller). Figure 4-1 provides some graphic intuition behind this, specifically for the case when $\Phi_A + \Phi_D < 1$. It plots the densities of assumed ability distributions and the effect of k on Φ_A and Φ_D which correspond to shaded areas under each of the bell curves. As should be obvious from the picture, further increasing k (i.e. a shift from k to k') would always marginally decrease Φ_A to a much greater extent than it would marginally decrease Φ_D. In turn, this implies decreasing $\Delta\Phi$.

Figure 4-1. The effect of increasing selectivity on the probability of educational attainment in two classes with different distributions of ability



Let us now, instead, consider relative social inequality in educational attainment. One corresponding measure, which is often employed in intergenerational social mobility studies, is odds ratio, indicating the ratio relating the odds of a given outcome (or destination) between two groups defining social origins. For the setting described the odds ratio would be

$$OR = \frac{\Phi_A/(1-\Phi_A)}{\Phi_D/(1-\Phi_D)} \quad (4\text{-}6)$$

which, with a few simple transformations, translates into

$$OR = e^{\frac{a_A - a_D}{\sigma}} \quad (4\text{-}7)$$ [48]

[48] Breen and Goldthorpe, who use a similar logic, arrive at a different expression. In the notation used here, their result (Breen and Goldthorpe 1997:301 equation A4) would have been expressed as $e^{a_D - a_A}$. It is, however, erroneous.

and which is therefore invariant with respect to changes in k ($\frac{dOR}{dk} = 0$). In other words, a shift in the structure of opportunities has no effect on relative social inequality, unlike changes in the parameters governing the distribution of ability in each of the classes ($\frac{dOR}{da_A} > 0$, $\frac{dOR}{da_D} < 0$ and $\frac{dOR}{d\sigma} < 0$).

To summarize the results of the reasoning outlined above, by affecting only the structure of educational opportunities (which in this case was modelled as increasing selectivity of higher education institutions, i.e. the rise in parameter k), cohort size affects absolute social inequality in educational attainment, even if it has no effect on the relative social inequality. As such, I label this statement as the first general hypothesis to be tested in this study (*H1*). In other words, this hypothesis highlights that cohort size can exert an effect on (absolute) social inequality in educational attainment merely through its effect on the structure of educational opportunities to which a given cohort is exposed (the marginal distribution of educational attainment in that cohort).

As regards this point, I discussed the implications of changing cohort size for the structure of educational opportunities. The possible implications of changing cohort size for the allocation of educational opportunities (thereby affecting relative social inequality) will be discussed in the next section. However, here I would like to point out that the model introduced is also helpful to demonstrate more precisely how allocational mechanisms come into action. In this simplified setting a straightforward example of the change in allocational mechanisms is the change in the distribution of academic ability between the descendants of A and D. It should be clear that increasing inequality in the average academic ability between A and D would generally result in a definitive increase in relative social inequality:

$$\frac{dOR}{d(a_A - a_D)} = \sigma^{-1} e^{\frac{a_A - a_D}{\sigma}} > 0 \quad (4\text{-}8)$$

Such increasing inequality in academic ability could, for instance, reflect the result of differential investment in children's academic preparation undertaken by A relative to that of D. Another, less straightforward way to embed the idea of changing allocational mechanisms in this setting is to assume that selection starts to discriminate somehow between the descendants of different social origin, represented by $k_A \neq k_D$ instead of a single k. Embedding this idea would require rewriting (4-7) as:

$$OR = e^{\frac{(a_A - k_A)-(a_D - k_D)}{\sigma}} \quad (4\text{-}9)$$

It should then be obvious from the equation above that the introduction of affirmative action policies favouring D (i.e. decreasing k_D) would result in decreasing OR as well.

Finally, before proceeding to the next section, an important reservation has to be made with regard to the formal proof that the odds ratio, as a measure of relative inequality, can be used to control away the effect of structural change on the extent of inequality. The total invariance of the odds ratio with respect to k as in (4-7) results from the specific assumptions about the shape of ability distributions in both groups, namely that these distributions are logistic and that they have equal variances. Assuming different types of distribution would not necessarily yield $\frac{dOR}{dk} = 0$, even if variances remain equal.[49] A difference in variances would also render $\frac{dOR}{dk} \neq 0$.[50] Therefore it must be kept in mind that the odds ratio does not necessarily *completely* rule out the effect of changing structures of opportunities on inequality in attainment.

4.2.3. Cohort size and relative social inequality in educational attainment

This section engages with the theories which stipulate the effect of cohort size on allocational mechanisms, or, in other words, the effect of cohort size on relative social inequality in educational attainment. Intuitively, the level of competition provides an important context for thinking about the degree of educational inequality, because higher competition increases the pressure on educational institutions to select among students and therefore it also potentially increases the importance of traits (e.g. academic preparation) required for successful promotion from one stage of the educational system to another. In that context, families are additionally incentivized to invest in relevant traits and strategies that would help their offspring to stay on top of competition, and therefore it is reasonable to expect that those who would be more able

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[49] Such would be the case, for instance, even with a normal distribution, although the effect of k on OR would still be marginally small, because with appropriate scaling of the scaling parameter logistic distribution actually approximates normal (e.g. Savalei 2006) and therefore both distributions share many properties.

[50] Relaxing the assumption of equal variances for the model developed here yields a more general case $\frac{dOR}{dk} = (\sigma_A \sigma_D)^{-1}(\sigma_A - \sigma_D)e^{\frac{k-a_D}{\sigma_D} - \frac{k-a_A}{\sigma_A}}$. It follows then that $\frac{dOR}{dk} > 0 \;\forall\; \sigma_A > \sigma_D$, and $\frac{dOR}{dk} < 0 \;\forall\; \sigma_A < \sigma_D$. In other words, when within-class heterogeneity of ability is higher among the advantaged compared to the disadvantaged increasing k would increase OR, and decrease it when the heterogeneity is lower.

to exert such an advantage would be the more advantaged families. As a result, social inequality in educational attainment can be expected to increase as a result of increasing competition.

Indeed such a pattern has already been documented by Alon (2009) who studied changes in class differentials in educational attainment as a result of changing competition for higher education in the USA over a period between 1972 and 1992. Specifically, Alon conceptualizes the periods of rising competition as sharp increases in demand over the supply of 'slots' in the educational system produced, among other things, as a result of demographic changes and has shown that these periods were associated with higher social background inequality in educational attainment, whereas the periods when competition remained at a low level were associated with less inequality. Moreover, Alon has pointed out the underlying mechanism of changing inequality, which she called adaptation. As the relevance of academic excellence increases in periods of intensified competition and greater selectivity of higher education, the offspring of more advantaged families substantially improved their positions on the academic ladder with respect to their peers from less advantaged families. In other words, the offspring of advantaged families adapt to increasing competition by investing in the development of relevant academic skills, and thus reinforce their advantage in access to higher education. Going back to the formal framework introduced in the previous section, Alon's arguments and findings can be interpreted as a change in parameters defining the distribution of academic ability (specifically $a_A - a_D$).

The idea of compensatory advantage of social background (Bernardi 2014; Bernardi and Cebolla-Boado 2014; Bernardi and Grätz 2015) echoes more or less the same argument. According to this idea, when a group is exposed to disadvantage, inequality in that group will most likely increase, because individuals from more advantaged backgrounds tend to be better equipped to address difficulties. Since increasing competition for the educational opportunities due to demographic pressures can be considered a particular source of disadvantage, the idea of compensatory advantage also predicts that social inequality in educational attainment should be more pronounced in larger cohorts. For instance, one could expect that overcrowding in the educational system would generally dilute educational opportunities and resources, such as teachers, instructional time and other facilities. It could then also lead to higher incidence of grade retentions or failures to be promoted from one stage of the educational system to another. But while most families would be encouraged to seek how they can compensate for such failures, most likely the more advantaged families would be more equipped to do so successfully and therefore their children would gain relative advantage over their less advantaged peers. In other words, the theory of compensatory advantage predicts that children from advantaged families would be better shielded from the adverse effects of cohort overcrowding. In sum, the host of ideas above stipulates that:

> *H2.1*: Larger cohort size should be associated with higher relative social inequality in educational attainment.

In Appendix I (Section 0), I also show how the expectation above follows exactly from a formal argument attempting to accommodate similar ideas in a mathematical framework, which is different from the one introduced in Section 4.2.2.

Incidentally, the hypothesis above stands in some contradiction to the implications that can be drawn from the once influential (MMI) hypothesis developed by Raftery and Hout (1993). Originally developed as a generalization of the trends observed in the Irish educational system in the twentieth century, it specifically claimed that expanding educational opportunities might equalize educational outcomes, but it is unlikely to have any effect on the relative social inequality in educational attainment. In other words, MMI posits that the advantaged families always maintain the same relative advantage in education over the less advantaged regardless of changes in the distribution of educational outcomes. Accordingly, one could extend the logic of MMI and argue that, since the amount of educational opportunities is irrelevant to relative social inequality in educational attainment, this *inequality should also remain invariant to changes in cohort size. In other words, this sets a competing hypothesis, according to which:*

> *H2.2*: Larger cohort size should not be associated with any observed relative social inequality in educational attainment.

As previously mentioned in the introduction, this appears to be in line with the findings from the study of Gerber and Hout (1995), who indeed found little variation between cohorts as regards the extent of social inequality in attainment of higher education in Soviet Russia. However, while the empirical pattern posited by MMI was also observed in some other national educational systems (see Shavit and Blossfeld 1993), I find that the explanatory rationale behind it is not, and has not ever been, quite specific. Raftery and Hout provide some ad hoc theorization behind MMI based on rational choice arguments: in one of the subsequent papers, their reasoning was summarized as an assumption that '[p]arents in advantaged circumstances and students from advantaged backgrounds are more interested in furthering their own goals and aspirations than they are in blocking the advance of lower-class students. In other words, MMI assumes that their interest is in the substantive goal of maximizing their own education, not in the derivative goal of maintaining class differentials'. (Gerber and Hout 1995:614) And yet, this does not exactly explain why *constant* inequality should be commonly expected even when opportunities are expanding. In fact, certain interpretations of MMI suggest that relative inequality could also both increase[51] and decrease[52] as a result of expanding educational opportunities. Breen and Golthorpe, in their famous paper (1997), also attempt to formally reconcile MMI with theory, but in the end create more confusion as their argument also leads to ambiguous implications.[53] In sum, these inconsistencies together with more substantive criticisms (Lucas 2009) force me to consider MMI here more out of respect for the hypothesis than as a compelling theoretical argument.

4.3. Data and analytical strategy

4.3.1. Data

To evaluate my hypotheses, I re-employ the data from the Max Planck Education and Employment Survey (EES) for Russia which was used in Chapter 3. Accordingly, I refer the reader to Section 3.3.1 for more thorough data description. Here I only briefly highlight the features of the data which are novel and important in the context of the current study.

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[51] It is true to say that Raftery and Hout *did* suggest that inequality can *decrease* as a result of educational expansion, but only if the expansion is sufficient to saturate the demand of advantaged families for education. In fact, in a later (albeit less well known) paper, one of the authors of MMI more explicitly asserts that 'expanding educational facilities (or, equivalently, shrinking cohort size among school-aged or college-aged youth) reduce inequality of educational opportunity. Conversely, shrinking educational facilities (or, equivalently, rising cohort size among school- or college-aged youth) increase inequality of educational opportunity' (Hout 2006:238). Incidentally, in that case MMI (actually quite literally) aligns with *H2.1* above.

[52] Such, for instance, is the interpretation of Bar Haim and Shavit (2013), who attempted validating some of the propositions of MMI in a cross-national multi-cohort comparison. They draw on MMI to argue that '[t]he privileged are better endowed with the cultural and material resources that facilitate children's educational attainment and are better poised than the lower strata, to take advantage of new educational opportunities. Therefore, expansion may actually enhance inequality of access to education' (Bar Haim and Shavit 2013:29).

[53] The respective formal argument developed in the appendix of the paper (Breen and Goldthorpe 1997:300–302), but the key elements of the framework are also introduced in the core text. On one hand, Breen and Goldthorpe deduce that declining costs of education (the parameter c in their model) – one of the major drivers of educational expansion – should *ceteris paribus* reduce relative social inequality in educational attainment. On the other hand, they claim that this reduction could be offset by increasing importance of education, which would affect the decisions of both classes to opt for more schooling regardless of increasing affordability of education (which affects the parameters p_S and p_W in the model). As a result, the corresponding odds ratio measuring social inequality in educational attainment can indeed appear as if it remains constant. However, from the formal point of view this 'constancy' requires a very precise relationship between the marginal changes in parameters, which is highly unlikely to occur in practice.

First of all, as I have mentioned in the introduction, the EES is a substantial improvement with respect to the data that was employed in the study of Gerber and Hout (1995). Not only does EES feature a much larger effective sample size (5,973 vs 2,141), but the sample itself provides a better representation of the Russian population, because the surveys employed by Gerber and Hout were carried out only in the European part of the Russian Federation and two cities in the Komi Autonomous Republic. EES also features more detailed information regarding the educational careers of its respondents, such as distinguishing between full-time and part-time education and containing accurate information[54] on the timing of educational episodes.

4.3.2. Analytical strategy

In a regression framework, social inequality in educational attainment is typically measured by a regression coefficient picking up the association(s) between educational attainment and some measure(s) of social background. In turn, the effect of cohort size on social inequality in educational attainment implies some modification of the regression coefficient corresponding to the effect of social background, which can be estimated with an appropriate interaction term.

While including an interaction term in the growth-curve models in Chapter 3 is possible, I do not consider it appropriate here, because the models developed already feature a high degree of complexity.[55] Instead, I use the findings in Chapter 3 to optimize my modelling strategy. Previously I have found that the largest variation in educational attainment due to cohort size is found (1) in full-time education, and (2) when the highest level of educational attainment is measured roughly at the age of 25. Intuitively this suggests that any cohort-related differences in the effect of social background on educational attainment (if any) should also be most visible when attainment is defined as (1) and (2). Accordingly, I incorporate this information in my construction of the dependent variable, which allows me to opt for a smaller set of more parsimonious models. Specifically, I will consider two variables for educational attainment: (1) the continuous measure corresponding to the highest level of education measured in symbolic years of schooling (see Section 3.3.3), which an individual has attained

[54] See footnote 17 on p.47.

[55] In the framework of growth curve models in Chapter 3, incorporating the variability of social background effects by cohort size would require a three-way interaction with each of the five age splines (i.e. social background × cohort size × n^{th} age spline). This would render the models extremely complex and would also expend a high number of degrees of freedom creating problems for statistical inference.

in full-time education by age 25 and; (2) the binary measure indicating whether an individual has attained the most selective level of education, which is higher education, by age 25. Correspondingly, I use a simple OLS and a logistic regression framework to model the cross-sectional variation in those variables as a function of cohort size, social background and a set of controls. The models can be described with the following general expression:

$$EDU_i = \alpha_0 + \alpha_1 CS_i + \alpha_2 SB_i + \alpha_3 CS_i \times SB_i + \boldsymbol{\beta} \times \mathbb{Z}_i + \epsilon_i \quad (4\text{-}10)$$

where EDU_i is one of the dependent variables measuring educational attainment of individual i at age 25 (i.e. either years of schooling or log odds of attaining higher education), CS_i is individual's cohort size at birth in millions logged, SB_i is one of the variables measuring individuals' social background (see next section), $\mathbb{Z}$ is a vector of time-constant control variables (also next section), and, finally, ϵ_i is person-specific error term assumed to be uncorrelated with the covariates in the model and to have a zero mean. Accordingly, α-parameters and β-parameters are the parameters of the model to be estimated from the data.

In terms of equation (4-10), the parameter of primary theoretical interest is α_3, which measures by how much the effect of social background (SB) on a given measure of educational attainment (EDU), increases per one unit increase in cohort size at birth (CS).[56] However, whether α_3 picks up the effect of CS on *relative* or *absolute social inequality* in educational attainment would depend on the modelling set-up:

1) in the OLS models, in which EDU is entered as years of schooling, α_3 would tend to pick up changes in *absolute inequality*, because "regression coefficients [in linear models] depend mathematically on both the marginal schooling distribution and its association with background" (Mare 1981:83) (the former and the latter of which correspond to structural and allocational effects respectively as distinguished in Section 4.2.1);

2) in the logit models, in which EDU represents the log odds of attaining higher education, α_3 would correspond to changes in *relative inequality*, because "associations estimated under logistic response models are invariant under changes in the marginal distributions of the variables (Bishop, Fienberg, and Holland 1975:9–15)" (cited in Mare 1980:297) (and thus only pick up the allocational effects);

[56] Alternatively, one can translate it as an effect of a one-unit increase in SB on the effect of CS on EDU, which does not change the meaning.

3) in addition to the above, by calculating average marginal effects on the probability (i.e. in terms of percentage points) rather than the (log) odds scale, the logit models can also be used to express the effects in terms of *absolute inequality*.

I will use all three different approaches in my analyses.

4.3.3. Independent variables and controls

I use two types of variables to capture social background effects on educational attainment. The first is parents' highest occupational status measured on an ISEI scale – the variable which has already appeared in previous analyses in the form of control (see Section 0 for details). Since the ISEI scale itself is not entirely intuitive, I standardize the variable to provide a slightly more intuitive scale (i.e. effects in terms of one standard deviation increase). Alternatively, I use a binary variable indicating whether at least one of a respondent's parents has attained higher education. While my preferred measure is parents' highest occupational status,[57] I use the binary measure of parents' educational attainment (1) because it corresponds better to the formal argument developed in Section 4.2.2, and (2) because it was found to be a more salient characteristic of social background for educational attainment in the socialist and post-socialist context (Gugushvili 2017).

My measure of cohort size at birth is also the same as in Chapter 3: the total live births (in millions logged) in a respondent's year of birth according to the Russian data file in the Human Mortality Database.

As far as sources of potential confounding are concerned, as with my previous analyses, I reserve the possibility that the effect of social background on educational attainment can gradually change over time due to reasons unrelated to cohort size at birth. If that is indeed the case, the factual correlation between cohort birth year and cohort size at birth in the EES sample of cohorts[58] could be a problem, as it could impose a bias on the estimated effect of cohort size on social inequality in educational attainment. Indeed, some accounts suggest that the Soviet educational system grew more elitist from Khrushev's to Brezhnev's era, especially at the

[57] ISEI encompasses both educational and economic stratification of occupations (Ganzeboom et al. 1992). Besides, the scale itself provides more degrees of distinction (compared to education variables). Finally, and perhaps most importantly, in the EES information on parents' occupations features fewer missing cases than information on education (indeed recalling parents' education could be more difficult than recalling what parents did when respondents were children).

[58] See footnote 29 on p.54.

academic level (Matthews 1982; Кочетов 1994; Яковлев 2012). Further accounts suggest that origin-based inequality may have tightened even further from the late Soviet to the post-Soviet era as a result of market transition (Gerber 2000; Gerber and Hout 2004). All of this suggests that the link between social background and educational attainment may have grown stronger as a result of gradual changes in the institutional context. At the same time, more recent evidence does not corroborate this conclusion and speaks in favour of more stable origin-based inequalities (Yastrebov 2016; Jackson and Evans 2017; Gugushvili 2017). Thus, in the following, I will present and discuss the results from two types of models, one of which would additionally embed the assumption about gradual growth in the link between origins and destinations in the form of a stylized linear trend (i.e. an interaction of birth year with social background, in some of my models).

Rather than considering separate models for men and women, as I did in the Chapter 3, here I consider gender only as a separate control. I do so in order to increase the statistical power of my models and because my preliminary analyses revealed no substantial gender differences in the effects of social background on educational attainment.

Finally, in all of my models I include the controls for the area of respondents' residence at birth, the number of respondents' siblings, and the binary variable to distinguish between cohorts born before and after 1979. The rationale for including those variables was explained in Section 3.3.6, and therefore I will abstain from repeating it here. Summary statistics for all of the variables used in my analyses are provided in Table 4-6 in Appendix II (Section 4.7).

4.4. Results

As in the previous chapter, rather than presenting full models (see Appendix II (Section 4.7)), here I will only consider the most relevant output in the form of average marginal effects. Both for consistency and a meaningful comparison, I will also use the same two fictitious cohorts – the smaller one, corresponding to the cohort of 1965 with a size of roughly 2 million, and the larger one corresponding to the cohort of 1949 with a size of roughly 3 million. Accordingly, the 'effects' of cohort size at birth are estimated for a 50 per cent increase in its value.

Table 4-1 presents the estimates of social inequality in educational attainment measured in terms of the effects of two measures of social background on individuals' years of schooling (attained in full-time education by age 25). All the reported effects are positive and statistically significant indicating an intuitive result – people from advantaged families on average attain more schooling compared to people from less advantaged ones. For instance, depending on the model, the estimated advantage due to having at least one educated parent ranges from .37 to almost one full year of schooling. Accordingly, the effect of one standard deviation in occupational status of parents corresponds to .19 to .47 years of schooling.

Table 4-1. Average marginal effects of social background on the years of schooling attained in full-time education by age 25

	Social background effect in terms of			
	one standard deviation increase in parents' highest occupational status (ISEI)		**having at least one higher educated parent**	
	Without CE	*With CE*	*Without CE*	*With CE*
Small cohort (ln*CS* = 0.7)	.402** (.038)	.473** (.043)	.741** (.081)	.991** (.095)
Large cohort (ln*CS* = 1.1)	.293** (.049)	.192** (.057)	.580** (.130)	.369** (.136)
Effect ratio ($AME_{Large\ cohort}$ / $AME_{Small\ cohort}$)	.728	.407**	.782	.372**

Notes: Effect sizes (or AMEs, for average marginal effects) in years of schooling. Standard errors in parentheses. Abbreviations: CE – linear controls for cohort effects (i.e. interaction of cohort birth year and social background); ln*CS* – natural logarithm of cohort size at birth in millions. Estimates from GGS/EES data (EES subsample, cohorts born 1950–1987). For full model estimates refer to Table 4-7 in Appendix II (Section 4.7).
* p<.10, ** p<.05

Getting to the core question of this study − whether social inequality in education varies due to cohort size at birth − Table 4-1 provides some evidence of a negative association between the two. However, the extent of this association varies depending on whether the models control for the secular change in social inequality over time. When the controls are included, the effect is both well pronounced and statistically significant, indicating a decrease in the extent of social inequality by roughly 59−63 per cent. In comparison, when no controls for the secular trend are introduced, effect modification boils down to a modest 22−27 per cent (especially when judged against the intentionally large contrast between the cohorts compared in Table 4-1) and becomes statistically non-significant. It is, however, surprising that the interaction terms that pick up secular cohort effects in the former models, albeit statistically significant, are negative rather than positive (see Table 4-7 in Appendix II (Section 4.7)) as would follow from the rationale for their inclusion (Section 4.3.3). While this somewhat undermines the credibility of respective estimates of the effect of cohort size on social inequality in educational attainment, one could still have the impression that all of them, regardless of the model, consistently indicate a negative association: in large cohorts the effect of social background on educational attainment expressed in years of schooling tends to be depressed.

The estimates provided in Table 4-1 are only informative of changes in absolute social inequality in educational attainment. As was already suggested in Section 4.3.2, linear models do not effectively account for the changes in the marginal distribution of schooling, which may confound the extent of genuine association between social background and educational attainment (Mare 1980, 1981). Therefore, I will now consider the effects of cohort size on relative social inequality. Table 4-2 provides this opportunity by expressing the effect of social background on the odds of attaining higher education by age 25. The average marginal effects in the table are expressed in terms of odds ratios, that is, the order by which the odds of attaining higher education change due to a corresponding difference in social background. For instance, the table shows that people who have at least one higher educated parent are on average three to four times more likely to attain higher education by age 25 compared to people who have lower educated parents. Similarly, a one standard deviation increase in parents' occupational status roughly doubles this likelihood.

Table 4-2. Average marginal effects of social background on the *odds* of attaining full-time higher education by age 25

	Social background effect in terms of			
	one standard deviation increase in parents' highest occupational status (ISEI)		**having at least one higher educated parent**	
	Without CE	*With CE*	*Without CE*	*With CE*
Small cohort (ln*CS* = 0.7)	1.905** (.112)	1.922** (.128)	4.044** (.509)	4.370** (.614)
Large cohort (ln*CS* = 1.1)	1.877** (.152)	1.848** (.181)	3.730** (.695)	3.221** (.702)
Effect ratio ($AME_{\text{Large cohort}}$ / $AME_{\text{Small cohort}}$)	.985	.961	.923	.737

Notes: Effect sizes (or AMEs, for average marginal effects) as odds ratios. Standard errors in parentheses. Abbreviations: CE – linear controls for cohort effects (i.e. interaction of cohort birth year and social background); ln*CS* – natural logarithm of cohort size at birth in millions. Estimates from GGS/EES data (EES subsample, cohorts born 1950–1987). For full model estimates refer to Table 4-8 in Appendix II (Section 4.7).
* p<.10, ** p<.05

As far as the effect of cohort size on relative inequality is concerned, just as in Table 4-1, Table 4-2 consistently reveals a negative association. Depending on the model, the reduction is estimated at 1.5 to 4 per cent per 50 per cent increase in cohort size when social background is measured using parents' occupational status, or 8 to 26 per cent when social background is measured using parents' education. And yet, there is a notable difference from Table 4-1: for relative inequality the extent of inequality reduction due to a comparable change in cohort size is much smaller compared to absolute inequality, in fact, so small that it is statistically indistinguishable from zero. Although the lack of statistical power complicates judgment about the true size and direction of reported effects, the evidence in Table 4-2 is apparently inconsistent with *H2.1*, according to which a positive relationship between cohort size and relative social inequality was expected. If anything, the evidence is more consistent with the idea of immutable relative inequalities as stipulated by the MMI (*H2.2*).

Table 4-3. Average marginal effects of social background on the *probability* of attaining full-time higher education by age 25

	Social background effect in terms of			
	one standard deviation increase in parents' highest occupational status (ISEI)		having at least one higher educated parent	
	Without CE	*With CE*	*Without CE*	*With CE*
Small cohort (ln*CS* = 0.7)	.078** (.007)	.079** (.008)	.173** (.016)	.178** (.016)
Large cohort (ln*CS* = 1.1)	.056** (.008)	.054** (.009)	.120** (.020)	.108** (.021)
Effect ratio ($AME_{\text{Large cohort}}$ / $AME_{\text{Small cohort}}$)	.713*	.690	.692*	.607**

Notes: Effect sizes (or AMEs, for average marginal effects) in probability scale. Standard errors in parentheses. Abbreviations: CE – linear controls for cohort effects (i.e. interaction of cohort birth year and social background); ln*CS* – natural logarithm of cohort size at birth in millions. Estimates from GGS/EES data (EES subsample, cohorts born 1950–1987). For full model estimates refer to Table 4-8 in Appendix II (Section 4.7).
* p<.10, ** p<.05

Importantly, the models underpinning evidence in Table 4-2 can also be used to estimate the effect of cohort size at birth on absolute social inequality. This can be achieved by expressing the respective effects in terms of probability differences rather than odds ratios. If the intuition behind *H1* and the formal reasoning laid out in Section 4.2.2 is correct, we should expect a more substantive negative effect of cohort size at birth on absolute inequality measured in probability differences, regardless of the failure to identify its effect on the relative social inequality measured with respective odds ratios. The evidence in Table 4-3 is obviously consistent with this idea. Depending on the model, the table reports an estimated effect reduction of 29 to 39 per cent, and in three of the four models this reduction is statistically significant at a 10 per cent level. This clearly is in sharp contrast to the results in Table 4-2, which are based on completely the same set of models (Table 4-8 in Appendix II (Section 4.7)).

Where Table 4-2 has shown a very small and statistically non-significant decrease in relative social inequality, Table 4-3 reveals a more sizeable and statistically significant negative difference in the extent of absolute inequality between the small and the large cohorts. Thus, *H1* is completely confirmed.

4.5. Discussion and conclusions

My analyses in this chapter reveal that cohort size at birth affected social differentials in educational attainment between different generations of Russians, and that, in general, this inequality tended to be smaller in larger cohorts. However, the fact that this reduction only concerned inequality expressed in absolute rather than relative terms suggests that the effects of cohort size on social inequality in educational attainment operated almost exclusively through their effects on the structure of educational opportunities, and not the mechanisms by which these opportunities are allocated between individuals of different social backgrounds. Cohort size simply reduced the average proportion of people with higher educational attainment and therefore scaled downwards any differences that may have been due to social origins. Another way to understand this evidence is to recognize that the shortage of slots in the upper levels of the educational system can only substantially affect those who are initially more endowed and therefore predisposed for them, thus people from advantaged backgrounds. It is therefore completely natural that it is they who suffer most the consequences of cohort overcrowding, whereas it does not make such a difference to the less advantaged. Thus, one, albeit fairly general (and, in fact, conventional), implication of this finding is that evaluating changes in social inequality and intergenerational mobility over cohorts must always attend to the distinction between absolute and relative changes, especially when cohorts substantially differ in terms of their size.

Another important implication of the findings reported here, is that increasing competition in the educational system does not necessarily lead to substantial changes in strategies of social reproduction or, at least, does not make them more efficient. In contrast to the predictions from the theory of compensatory advantage and similar accounts (Alon 2009; Bernardi 2014; Bernardi and Cebolla-Boado 2014; Bernardi and Grätz 2015), my findings did not reveal that, in the context of higher competition (i.e. large cohort size), people from higher social backgrounds were able to protect their positional advantage any better than those from lower social backgrounds. Two factors convince me that this is a robust conclusion to draw from the findings reported in Section 4.4. The first is that failure to detect a statistically significant effect of cohort size on relative inequality in Soviet Russia[59] is almost certainly not an artefact of its generally low level of inequalities: in fact, the estimates of relative inequality provided here are not impressively smaller than those for the present-day USA – a fairly unequal country by most accounts.[60]

The second is that, however statistically non-significant, my estimates consistently indicate a decrease rather than increase in relative inequality. Yet if the estimates pointing to a negative relationship between cohort size and relative social inequality in education are true, this finding is peculiar in itself and compels speculation about its possible nature. A possible explanation is that the context of higher competition was actually more favourable for exercising meritocratic selection in educational institutions, thereby partly disarming advantaged families of their ability to employ 'nonmeritocratic resources to […] secure educational advantage for their children' (Bernardi 2014:85). However, this speculation is backed only indirectly and exclusively through anecdotal evidence, suggesting that war echo cohorts were largely responsible for the diminishing quality of the student body in Soviet higher education institutions in the late 1970s through to the mid-1980s (Кочетов 1994:146). Thus, one potentially interesting line of further enquiry is to test whether higher competition in Soviet educational institutions may have indeed reduced (relative) social inequality by emphasizing the role of merit.[61]

Incidentally, if the explanation suggested above is true, the evolution of inequality patterns in response to demographic pressures in Soviet Russia would exemplify a response which is quite different from the one documented in the USA. Although, according to Alon (2009), the effect of rising competition on admission standards in the USA appears to have been exactly the same as in Soviet Russia (i.e. higher completion bolstering tighter selection on merit), it additionally forced advantaged families in the USA to alter their strategies of social reproduction and specifically increase their relative advantage in academic training and testing

[59] I believe it is fair to generalize my findings to Soviet Russia, since educational careers of a majority of individuals in my analytical sample (>85%) were accomplished in the Soviet era.
[60] Rather conveniently Bernardi, Hertel, and Yastrebov (2018) report the odds ratio of attaining a college degree comparing first and non-first generation students, which can be compared to the odds ratios reported in Table 4-2. For the most recent cohorts in USA the authors above report odds ratios of ca. 5−6 (cf. the magnitudes of ca. 3−4 in Table 4-2).
[61] EES does not provide such an opportunity. More unfortunately, I am also unaware of any data that could shed light on this issue.

outcomes. This, presumably, did not happen in Soviet Russia, which therefore raises even further questions as to why this may have been the case. One specific hypothesis that comes to mind is that, in the USA, advantaged families enjoyed a free and rich market of extracurricular educational opportunities in addition to the state educational system. Such a market could not exist in Soviet Russia, at least openly, and therefore Russian families were much more constrained in their ability to convert their social and economic capital into their children's academic advantage. Thus, future research could also address the relationship between the institutional underpinnings of national educational systems and the extent to which competition in those systems affects intergenerational social mobility.

4.6. Appendix I

Section 4.2.2 presented a formal model exploring possible effects of cohort size on absolute and relative social inequality in educational attainment. The model developed in this appendix, serves the purpose of demonstrating possible effects of cohort size on relative social inequality in educational attainment based on a slightly different set of assumptions. In short, the model predicts a positive (margin-free) association between cohort size and inequality.

Let us again assume a population divided into two classes of origin – the advantaged and the disadvantaged – whose offspring compete for the single most rewarding level of education, generally considered to be higher education. The cohort of students is characterized by cohort size N, of which students from advantaged families constitute the share p and students from disadvantaged families the share $(1-p)$ respectively. Advantaged families are characterized by r, which translates as their rate of reproduction or merely the probability that their children will themselves attain higher education (in a simple mobility table this would correspond to the outflow percentage). The higher education system is characterized by the number of slots S assumed to be filled such that the offspring from advantaged families always get to fill them first and in numbers that let them fulfil their rate of reproduction r. Further S is assumed to be always less than Npr such that a certain fraction of children from disadvantaged families also get a chance to attain higher education. With this notation and the assumptions about the distribution of higher education slots we arrive at the following mobility table (see Table 4-4).

Table 4-4. Mobility table (cohort social composition assumed constant against the change in cohort size)

Children by social background	**Children by educational attainment**		
	Higher education	*Lower education*	**Row sums**
Advantaged	Npr	$Np(1-r)$	Np
Disadvantaged	$S-Npr$	$N(1-p)-(S-Npr)$	$N(1-p)$
Column sums	S	$N-S$	N

Using the information in Table 4-4, let us now express relative social inequality as an odds ratio comparing the odds of attaining higher education for children from advantaged backgrounds to the same odds for children from disadvantaged backgrounds:

$$OR = \frac{Npr}{S-Npr} \Big/ \frac{Np(1-r)}{N(1-p)-(S-Npr)} = \frac{r}{1-r}\left(\frac{N(1-p)}{S-Npr} - 1\right) \quad (4\text{-}11)$$

Now in order to show how the change in cohort size would affect social inequality in educational attainment we merely need to obtain the first derivative of OR with respect to N. The derivation yields

$$\frac{dOR}{dN} = \frac{Sr(1-p)}{(1-r)(S-Npr)^2} \quad (4\text{-}12)$$

It should be clear that (4-12) is always positive for all S, N, p and r such that $S > 0$ and $r, p < 1$, which are all true by their definitions. This implies that relative social inequality in educational attainment (as measured by OR) would always increase for any increase in cohort size.

It needs to be stressed, however, that the equation (4-12) rests on the implicit assumptions that $dS/dN = 0$, $dr/dN = 0$ and $dp/dN = 0$. In other words, it defines the effect of an infinitesimal increase in cohort size on relative inequality on a *ceteris paribus* condition, provided that neither the number of slots in the educational system, nor the reproduction rate of advantaged families, nor the proportion of their offspring in a cohort changes with the cohort's size.

How likely is it then that relaxing each of these assumptions would undermine the conclusion that social inequality in educational attainment positively depends on cohort size? The number of slots in the educational system could theoretically expand to accommodate the additional demand resulting from increasing cohort size, so that $dS/dN > 0$, and in this case, a part of the effect of increasing cohort size on inequality would then obviously be attenuated. On the other hand, one could also argue that in situations of particularly large and quick shifts in cohort size the response of the educational system is likely to be very limited (as the actual case in Soviet Russia appears to have been as shown in Chapter 3), which in the form of a stylized argument could also be assumed as $dS/dN = 0$.

As far as the rate of reproduction is concerned, drawing on the substantive arguments laid out in the beginning of Section 4.2.2, one could argue that the advantaged families would always be both more incentivized and more equipped to protect themselves from threats to their status maintenance. As a result, it seems unlikely that they would reduce their reproduction rate even in a situation of rising competition caused by increasing N.

The last assumption $dp/dN = 0$ implies merely that the social composition of a cohort does not depend on the cohort's size. This too is an unlikely case because it is inconsistent with the 'cohort overcrowding' idea, according to which larger cohorts are generally disadvantaged and should therefore typically feature a less advanced social composition. However, modifying this assumption to fit a more realistic case still yields a positive effect of cohort size on the odds ratio measuring inequality. To take an extreme case I will assume that the absolute number of children from advantaged families – A – always remains the same regardless of whether a cohort is large or small. But change is allowed, along with cohort size, in the number of children from disadvantaged families – D. Correspondingly, cohort size is the sum of A and D. In this configuration, while the number of descendants from advantaged families always remains constant, its relative share would always be smaller in a larger cohort and larger in a smaller cohort. The rest of the assumptions (particularly regarding S and r) remain as with the previous model. The resulting mobility table is presented in Table 4-5.

Table 4-5. Mobility table (cohort social composition assumed to change together with the change in cohort size)

	Children by educational attainment		
Children by social background	*Higher education*	*Lower education*	**Row sums**
Advantaged	Ar	$A(1-r)$	A
Disadvantaged	$S - Ar$	$D - (S - Ar)$	D
Column sums	S	$A + D - S$	$A + D$

Accordingly, the relative measure of social inequality in educational attainment is:

$$OR = \frac{Ar}{S-Ar} \Big/ \frac{A(1-r)}{D-(S-Ar)} = \frac{r}{1-r}\left(\frac{D}{S-Ar} - 1\right) \quad (4\text{-}13)$$

and the derivative with respect to the change in cohort size, which, assuming constant A, is synonymous to the change in D, yields:

$$\frac{dOR}{dD} = \frac{r}{(1-r)(S-Ar)} \quad (4\text{-}14)$$

Just like (4-12), the expression (4-14) is also always positive for all S, A and r such that $S > Ar$, $r < 1$, which again they satisfy by their definitions. Accordingly, the resulting expectation is that larger cohort size would be associated with greater relative social inequality in educational attainment, even if the average level of educational attainment in the parent cohort decreases as the size of their cohort increases.

4.7. Appendix II

Table 4-6. Summary statistics

	Mean/Percent	**SD**	**Min**	**Max**	**N valid**
Dependent variables					
Years of schooling by age 25[1]	12.3	1.83	6	19	5,127
Higher education by age 25[1]	13.5%				5,127
Independent variable					
Cohort size (in millions)	2.4	.362	1.82	2.96	5,967
Parents' highest occupational status (ISEI)	43.7	17.7	16	90	5,684
Higher educated parents	29.5%				5,390
Control variables					
Male	38.3%				5,967
Place of birth					
Village	41.8%				5,148
Town	36.2%				5,148
City	22.0%				5,148
Number of siblings	1.74	1.64	0	16	5,967
Year of birth	1966	10.5	1948	1987	5,967
Born after 1979	16.7%				5,967

Notes: All summary statistics calculated from valid observations using GGS/EES data (EES subsample, cohorts born 1950–1987).

Table 4-7. Estimated OLS models of years of schooling

	Without CEs				With CEs			
	(1)		(2)		(1)		(2)	
Parents' highest occupational status (ISEI)	.033**	(.008)			1.189**	(.345)		
Higher educated parents			1.024**	(.350)			69.879**	(13.449)
Cohort size (in millions logged)	–.779	(.482)	–1.375**	(.299)	.312	(.582)	–.895**	(.313)
Year of birth	–.009	(.006)	–.014**	(.006)	.018*	(.010)	–.002	(.006)
Cohort size ×								
Occupational status (ISEI)	–.015	(.010)			–.039**	(.012)		
Education (tertiary)			–.404	(.418)			–1.554**	(.473)
Year of birth ×								
Occupational status (ISEI)					–.001**	(.000)		
Education (tertiary)							–.034**	(.007)
Male	–.319**	(.052)	–.338**	(.054)	–.316**	(.052)	–.336**	(.054)
Number of siblings[1]	–.200**	(.054)	–.226**	(.056)	–.191**	(.054)	–.214**	(.056)
Place of birth (ref: Village)								
Town	.112*	(.064)	.116*	(.067)	.102	(.064)	.102	(.066)
City	.193**	(.076)	.219**	(.078)	.180**	(.076)	.201**	(.078)
Not available	–.008	(.084)	.031	(.086)	–.014	(.083)	.020	(.085)
Born after 1979	–.286**	(.121)	–.290**	(.125)	–.251**	(.122)	–.207	(.126)
Intercept	29.440**	(11.052)	40.518**	(11.548)	–23.273	(19.232)	17.886	(12.335)
R^2	.075		.068		.073		.063	
F	35.9**		31.0**		38.3**		31.3**	
df	11		11		10		10	
N	4,899		4,694		4,899		4,694	

Notes: Estimates from GGS/EES data (EES subsample, cohorts born 1950–1987). Standard errors in parentheses. CE – linear controls for cohort effects (i.e. interaction of cohort birth year and social background). [1] Number of siblings plus one, logged. * p<.10, ** p<.05

Table 4-8. Estimated logistic regression models of attaining higher education by age 25

	Without CEs				With CEs			
	(1)		(2)		(1)		(2)	
Parents' highest occupational status (ISEI)	.038**	(.013)			.211	(.607)		
Higher educated parents			1.538**	(.506)			31.747	(23.862)
Cohort size (in millions logged)	–1.114	(.895)	–1.113**	(.530)	–.928	(1.109)	–.765	(.600)
Year of birth	–.016*	(.009)	–.029**	(.009)	–.012	(.019)	–.021*	(.012)
Cohort size×								
Occupational status (ISEI)	–.002	(.015)			–.006	(.020)		
Education (tertiary)			–.202	(.596)			–.763	(.744)
Year of birth×								
Occupational status (ISEI)					–.000	(.000)		
Education (tertiary)							–.015	(.012)
Male	–.179*	(.091)	–.196**	(.093)	–.178*	(.092)	–.196**	(.093)
Number of siblings[1]	–.359**	(.097)	–.375**	(.097)	–.359**	(.097)	–.371**	(.097)
Place of birth (ref: Village)								
Town	.063	(.117)	.024	(.119)	.062	(.117)	.018	(.119)
City	.451**	(.125)	.421**	(.126)	.449**	(.125)	.414**	(.126)
Not available	.139	(.142)	.119	(.143)	.138	(.143)	.114	(.143)
Born after 1979	–.214	(.204)	–.180	(.207)	–.208	(.205)	–.140	(.209)
Intercept	29.850	(18.330)	55.987**	(18.871)	20.507	(37.542)	38.931*	(23.103)
Pseudo R^2	.087		.083		.087		.083	
Likelihood ratio χ^2	337.8**		311.5**		337.8**		313.1**	
df	10		10		11		11	
N	4,899		4,694		4,899		4,694	

Notes: Estimates from GGS/EES data (EES subsample, cohorts born 1950–1987). Standard errors in parentheses. CE – linear controls for cohort effects (i.e. interaction of cohort birth year and social background). [1] Number of siblings plus one, logged. * p<.10, ** p<.05

Chapter 5. The Demographic Echo of War and Career Mobility in Post-Soviet Russia

5.1. Introduction

Previous chapters dealt with the process of educational attainment – an important process, the outcomes of which determine to a great extent future career and labour market outcomes in modern societies (Kerckhoff 1993; Breen and Jonsson 2005). The current chapter takes this study one step further by focusing on careers and labour market outcomes and showing how these may also have been shaped by the changes in Russia's population age structure above and beyond its rather straightforward effect on education. Importantly, as will be shown in this chapter, the demographic (mis)fortunes associated with birth into a particular cohort may play out differently with regard to labour market outcomes than they do with regard to educational outcomes. In the latter case, relatively small cohorts may indeed experience consistent advantage because usually students from the same birth cohort compete with each other to be promoted to the next level of the educational system, and because the fewer they are the easier this is. However, the fortunes of small cohorts may turn out slightly (if not completely) different on the labour market, where these cohorts enter competition with larger cohorts for scarce positions in the occupational structure.

As with the studies of educational attainment in the context of baby booms and baby busts, a vast literature exists studying the effects of relative cohort size on labour market outcomes in Western countries (see Welch 1979; Freeman 1981; Ahlburg 1982; Berger 1989; Dooley 1986; Bloom et al. 1988; Ermisch 1988a; Murphy et al. 1988; Browne 1995; Macunovich 1999; Slack and Jensen 2008; Brunello 2010). Here too, the Russian case is unexplored and represents an important gap in this literature. In this chapter, the specific value of the Russian context is demonstrated by shifting the focus to the post-Soviet period, where the standard theory of relative cohort size (Easterlin 1980; Macunovich 2002) may face a challenge. Namely, one of the theory's core assumptions − regarding the imperfect substitutability between young and old workers − is potentially violated. In a new market economy, the older cohorts of Russians, who accumulated their skills and experience in a different historical context, may have lost some of their competitive advantage with respect to the younger cohorts due to the depreciation of human capital (Orazem and Vodopivec 1997; Svejnar 1999; Lehmann and Wadsworth 2000; Sorm and Terrell 2000; Sabirianova 2002). As a result, this may have bolstered inter-cohort competition for new labour market opportunities, and consequently rendered the effect of relative cohort size irrelevant. Thus, post-Soviet Russia provides an interesting case study to test such a possibility. Another important contribution of this chapter is that it also tries to look beyond the theory of relative cohort size and elaborates on other important effects by which changes in the labour market economy, as induced by the demographic echo of war, may affect individual careers.

This chapter shares the canonical structure of Chapters 3 and 4. In Section 5.2, I introduce theoretical ideas that link individual labour market outcomes to the changes in labour demography, and derive main hypotheses applicable to the post-Soviet Russian case. Section 5.3 introduces data and the analytical strategy. Section 5.4 presents and discusses empirical findings, and, finally, in Section 5.5, I present conclusions.

5.2. Theory

5.2.1. Labour market demography and individual careers

Existing studies of the effect of relative cohort size on individual welfare in general (Easterlin 1980; Pampel and Peters 1995; Pampel 2001), and on labour market outcomes in particular (Welch 1979; Freeman 1981; Ahlburg 1982; Berger 1989; Dooley 1986; Bloom et al. 1988; Ermisch 1988a; Murphy et al. 1988; Browne 1995; Macunovich 1999; Slack and Jensen 2008; Brunello 2010), generally assert that large cohorts experience numerous disadvantages. A thorough review of existing evidence in this regard is contained in Chapter 2, and therefore I will not discuss it here.

The dominant explanation for the negative relationship between (relative) cohort size and labour market outcomes derives from two basic and rather simple ideas. The first is the standard argument from neoclassical economics, according to which a larger supply of workers on the labour market tends to depress labour market returns, unless coupled with proportional changes in demand. The second argument supplements this by additionally assuming that younger and older workers are imperfect substitutes for each other, which simply asserts that competition between the two groups of workers is less likely than competition within those groups. The second assumption is particularly important, because tighter competition in one age group resulting from cohort overcrowding would essentially spill over into the other group rendering the relative (dis)advantage negligible. Henceforth, I will refer to this effect as 'cohort overcrowding effect'. Importantly, this argument recognizes that cohort size is a common characteristic of individuals born in a single year, in other words it is essentially determined at birth and therefore remains invariant throughout an individual's life course.

However, in this chapter, I would like to expand on this fundamental idea and argue that it does not fully recognize other mechanisms, by which disturbances in the population age structure, such as baby booms, baby busts and their echoes, may additionally impact individuals' labour market careers. I will again invoke Sørensen's ideas, which recognize the importance of structural factors in shaping the process of attainment and elaborate on how demographic processes may have a specific role in this regard.

Sørensen belonged to the camp of sociologists who defended structural origins of inequality on substantive grounds (Sørensen 1983), but he also deserves the credit for developing a formal theoretical model (Sørensen 1977), which describes how the process of individual attainment can be shaped without much effort by individuals. Below I briefly introduce the model and show how it can be used as a heuristic tool to reason out the effects of demographic change on labour market careers.

The model is based on strong assumptions regarding: 1) the structure of inequality; 2) the process by which opportunities emerge in this structure (the process of vacancy formation) and; 3) how the process of individual attainment takes place (i.e. the movement of people through the structure of inequality via structurally-induced vacancy chains). While many of these assumptions may appear as too simplistic, they are specifically designed to capture the most salient features of the process of attainment.

The structure of inequality in Sørensen's model is determined by the distribution of jobs or occupations, which can be differentiated according to a single parameter that describes their level of desirability. Although highly abstract, the notion of desirability (or 'goodness' in Sørensen's own term) can be tied to various specific aspects that people usually consider when evaluating their desire to attain a specific position (e.g. earnings, socioeconomic status or prestige). Formally this distribution is modelled by the following cumulative distribution function:

$$F(y) = \Pr(y \le y') = 1 - e^{\beta y'} \quad (5\text{-}1)$$

where y denotes a job's desirability, $F(y)$ denotes the proportion of jobs below the specific level of y, and β is a single (negative) parameter, which determines the structure of inequality (more specifically the extent to which jobs become scarcer for a unit increase in y). In brief, equation (5-1) determines a simple distribution, in which the proportion of jobs decreases as they become more desirable.

The mechanism by which opportunities emerge in Sørensen's model is described as follows: the process assumes a constant structure of inequality (i.e. constant β), meaning that there is no change in the distribution of jobs over time. The mechanism, by which opportunities are generated in this system, is simply individuals' movement from one job to another which leads to an 'opening' of positions in the structure. The model further assumes that: 1) positions can be filled by individuals from both inside and outside the structure; 2) individuals enter and exit the structure only once (i.e. temporary exits are ignored); 3) entries and exits are allowed at any level of the structure and; 4) only upward moves are allowed. With such assumptions the model can arrive at the key parameter determining career mobility, being the rate at which 'open slots' are created at each level of y. This parameter, h, further assumed to be constant for each level of y, defines the total amount of promotion opportunities $q(y)$, which an individual can enjoy given his or her current level of attainment y, and which is derived[62] within the model's framework as:

$$q(y) = -\frac{h}{\beta} \quad (5\text{-}2)$$

In other words, $q(y)$ can be shown to be positively related to the rate at which opportunities emerge in the structure (h), and negatively related to the degree of inequality (β, which takes only negative values).

[62] I omit the derivations for the sake of conciseness. The derivations require the above-mentioned assumptions to hold. Details are described in Sørensen's original paper (1977).

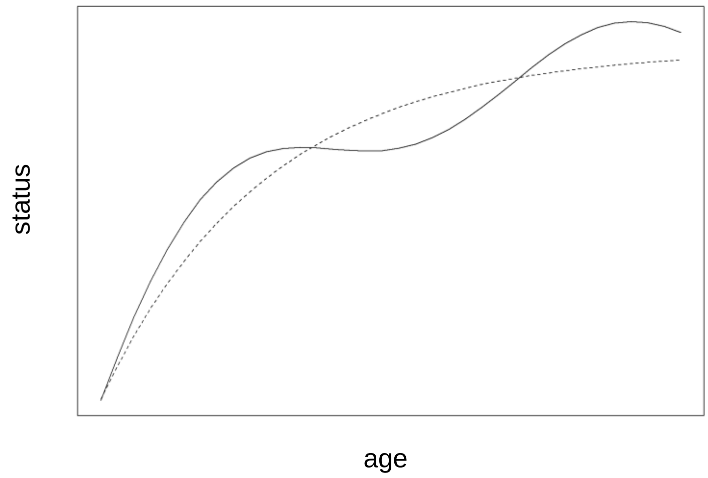
The equation for $q(y)$ is a necessary component to derive the model for the process of individual attainment, which is the goal of the modelling exercise. This process is derived as a separate function, which describes how fast an individual's career can grow per fraction of time (t) given his or her resources z (which can be human capital, parental resources, etc.), the degree of inequality in the structure (β), the rate at which vacancies are generated (h) and an individual's current level of attainment $y(t)$:

$$\frac{\mathrm{d}y(t)}{\mathrm{d}t} = z + \frac{\beta}{h} y(t) \quad (5\text{-}3)$$

This model describes a career process, in which careers naturally slow down with time because individuals become exposed to fewer opportunities for promotion; in the above equation this is determined by the fact that h and β are assumed constant, and because β only takes negative values. In other words, this defines a career growth curve that is concave to the time axis, the curve which is often observed in reality (Becker 1965; Mincer 1974; Sørensen 1977; Rosenfeld 1992). Importantly, the model determines this shape even assuming no change in individual resources or productivity – the key factors which are held responsible for the hump shape of careers according to the theory of human capital (Becker 1965; Mincer 1974).

Now that the model is outlined, I can use the framework to show how demography can affect the process of attainment. The key parameter of interest in this regard is h – the rate by which open slots are generated in the system. Sørensen only briefly mentioned that h might be driven by the demographic process but assumed this parameter to be constant in his modelling approach. However, in a population with uneven age structure and a relatively stable age at which individuals choose to leave the labour market (e.g. retirement age), this constant becomes a variable. Formula 5-3 shows that career dynamics would follow the dynamics of h. Whenever a small-sized cohort approaches its retirement age, career growth can be expected to slow down for all current job incumbents and, on the contrary, it can be expected to speed up when the retirement threshold is overcome by increasingly large cohorts. A stylized shape of the growth curve for an individual career in a population hypothetically affected by the demographic of war is illustrated in Figure 5-1. The figure shows how the fluctuation of retirement rates over time, as induced by the passage of baby boom cohorts might induce a wave-like pattern of mobility over an individual's life course. In other words, the size of a retiring cohort would act as a sort of a 'pulling' force, assisting the careers of those who remain on the labour market. Taking this analogy, I will henceforth refer to these effects as 'pull effects'.

Figure 5-1. Stylized individual career dynamics in populations with a stable and unstable age structure



Notes: solid line – unstable population age structure (*h* follows an arbitrary sine function of *t* to mimic the passage of baby booms and baby busts); dashed line – stable population age structure (*h* constant over *t*). *Source:* author, simulated parameters.

The second type of effect which I would like to elaborate here, can also be developed within the framework of Sørensen's model, as it is highly consonant with the model's structural arguments. However, embedding these effects formally would require relaxing additional assumptions (specifically, the independence of individual resources z from $y(t)$) and the model would therefore lose its mathematical elegance, hence I introduce these effects merely in the form of a stylized argument. Specifically, I would like to suggest that labour market demography can additionally affect one's promotion chances by affecting the supply of experienced prime-aged workers. An abundance of such cohorts on the labour market could be a force blocking promotion opportunities particularly young for workers, who would otherwise have a higher chance of benefiting from a potential shortcut in their careers. Moreover, it could also be the case that the abundance of experienced workers in their prime age could also have an impact on the promotion chances of senior workers, who, on the one hand, may still be below retirement age and competing for promotions, while, on the other hand, may perhaps be too old to win the competition against more energetic and productive middle-aged workers (Becker

1965; Mincer 1974). Finally, excess competition in the middle-age group itself, as caused by its relatively large size, might block its own chances of promotion. Henceforth, I will refer to this as 'block effects', because the corresponding cohorts can block everyone else's career dynamics.

5.2.2. Hypotheses

Summarizing the discussion of theoretical arguments in the previous section, the following set of three basic hypotheses can be put forward with regard to post-Soviet Russia:

> *H1*: Larger cohort size at birth should generally lead to greater disadvantage in career and labour market outcomes (the cohort overcrowding effect).
>
> *H2:* Higher retirement rates experienced over a life course should lead to greater advantage in career and labour market outcomes (the pull effect).
>
> *H3:* Greater size of prime-age cohorts experienced over a life course should lead to greater disadvantage in career and labour market outcomes (the block effect).

The standard cohort overcrowding argument maintains that large cohorts should experience disadvantage in their careers, and in most of the previous studies it has often been taken as a self-sufficient explanation for different cohorts' fortunes on the labour market (Welch 1979; Freeman 1981; Ahlburg 1982; Berger 1989; Dooley 1986; Bloom et al. 1988; Ermisch 1988a; Murphy et al. 1988; Slack and Jensen 2008; Brunello 2010). However, people born to a particular cohort and hence assigned to a specific cohort size can also be destined to experience a specific type of demographic dynamics on the labour market in their life time. For instance, large cohorts might be entering the labour market at a time when retirement rates are slow due to the passage of small retirement cohorts. In that case, part of the observed effect of individuals' cohort size would actually be due to a different mechanism (in this case, the pull effect). To test for such a possibility − that the observed effect of cohort overcrowding may simply be due to other aspects of the labour market demographic dynamics − I further introduce the following hypothesis:

> *H4:* The pull and the block effects can explain a part of the cohort overcrowding effect.

Finally, I would like to make the case for another nuance. The relative cohort size argument hinges on explicit assumption of imperfect substitutability between young and old workers. In fact, so does the block effect of the prime-aged cohorts, as it assumes that these cohorts should have a greater advantage in competing for more lucrative labour market opportunities, thus enabling them to block other labour market participants. However, the pull effect argument is different from both the cohort overcrowding argument and the block effect argument in that it does not require the same assumption to hold. This specific nuance might have an interesting implication in the context of post-Soviet Russia, where transition from socialist to market economy could have put more recent cohorts at a certain advantage with respect to older cohorts. Older cohorts accumulated their skills in a different historical context that may lose some of their relevance in a society and economy which is undergoing large-scale structural and institutional transformations. As such, their previous skills and experience may provide a smaller competitive advantage in a rapidly transforming labour market, compared to that typically expected in a more stable context. Previous research on post-Soviet Russia and other post-socialist countries provides some evidence in this regard (Orazem and Vodopivec 1997; Svejnar 1999; Lehmann and Wadsworth 2000; Sorm and Terrell 2000; Sabirianova 2002). On these grounds, the assumption regarding imperfect substitutability between young and old workers in post-Soviet Russia may be suspect, thereby possibly diminishing the relevance of the cohort overcrowding and the block effects. In that case, I would expect this to be corroborated by evidence of the following kind:

> *H5:* The cohort overcrowding and block effects should have weaker relevance for careers and labour market outcomes in post-Soviet Russia compared to the pull effect.

Essentially, I would expect the hypothesis *H5* to be consistent with the rejection or modest support for *H1*, but positive and robust support for *H2* and *H3*.

Besides, the pull and the block effects can be tailored to unearth this possibility from a slightly different perspective. Since both are conceptually wired to reflect supply-demand pressures in specific parts of the population age distribution (i.e. prime age and retirement age groups correspondingly), this should manifest in age-specific responses of individual labour careers to market outcomes:

> *H6:* The pull effect should not have a particularly large impact on the careers and labour market outcomes of workers at pre-retirement age but should be rather more evenly spread across the entire working age range.
>
> *H7:* The block effect should not have a particularly large impact on the careers and labour market outcomes of workers at prime age but should be rather more evenly spread across the entire working age range.

5.3. Data and analytical strategy

5.3.1. Data

To test my hypotheses, I utilize data from the Russian Longitudinal Monitoring Survey – Higher School of Economics (RLMS-HSE), which is a nationally representative household panel survey running in Russia since 1994.[63] The survey data features a variety of information on both household and individual levels; however, for the purposes of my current analyses I make use of the longitudinal information on the dynamics of individual labour market careers.

The survey follows the model of a repeated sample with a split panel. The 'repeated sample' refers, in fact, to a multistage[64] probability sample of roughly 4,000 dwellings, which

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[63] This is, in fact, the second phase of the RLMS project. The first phase, covering the period 1992–1994, was based on a slightly different sample design, and is therefore not employed in my analyses.

[64] The first stage consists of 98 primary sampling units (PSUs) drawn from 1,850 administrative-territorial districts organized into 38 strata based on geographical factors, levels of urbanization and, in some cases, ethnicity. Within PSUs, secondary sampling units (SSUs) were drawn from the lists defined by the boundaries of census

constitute the original sample frame, and it is therefore the households which reside in these dwellings at the time of data collection rounds that are repeatedly interviewed. The sample frame was replenished in 2001, 2003, 2006 and 2010[65] to account for the changing distribution of dwellings over time (e.g. due to construction of new housing). The 'split panel' approach consists of following households and individuals that leave the sample frame (e.g. due to divorce, relocation and other reasons).[66] The combination of these approaches thus makes RLMS-HSE a powerful tool for longitudinal analysis while preserving cross-sectional representation in each of its rounds.

The survey interviews are conducted on a face-to-face basis, and the interviewers are required to attempt interviews with households in selected dwellings up to three times, which helps to maintain relatively high wave-to-wave response rates ranging from 81 per cent to 88 per cent. However, as with virtually all longitudinal household surveys, imperfect response rates coupled with selective attrition somewhat undermine the potential of RLMS-HSE. The issue of attrition in RLMS-HSE in empirical applications (albeit in the area of health studies and only covering rounds 10 to 19) was thoroughly investigated, in particular by Gerry and Papadopoulos (2015). Yet, having found strong evidence for selective attrition, the authors did not arrive at either substantively or substantially different results between their adjusted and unadjusted analyses. Given their findings, I assume that sample attrition is unlikely to strongly bias my results and do not employ any specific strategies to account for it in my analyses, especially considering that such sensitivity checks require a substantial amount of labour and might even culminate in a separate study. At the same time, I recognize that such analyses could have been welcome for the sake of more precise and credible results and remain a desirable extension. Finally, I can only add that if any bias is to be expected it is likely to scale down the estimates of interest because socioeconomic characteristics would be positively correlated with the probability of remaining in the sample (Gerry and Papadopoulos 2015). Further detailed information about the survey was published in (Kozyreva, Kosolapov, and Popkin 2016), and is also available on-line (https://www.cpc.unc.edu/projects/rlms-hse, last visited April 1, 2019).

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enumeration districts (in urban areas) and villages (in rural areas). Within SSUs, subsets of dwellings were finally selected.

[65] In 2010, the sample size was additionally increased by 50%. In the analyses, this is accounted for by applying respectively discounted survey weights.

[66] In this case, however, households and individuals were followed only if they moved to live in the same SSU or into one of the PSUs of the original sample frame.

For my analyses I employ all rounds available to date (rounds 5 to 24, a total of 18 rounds) covering the period between 1994 and 2015 (i.e. spanning 21 years). My analytical sample is constrained to the working age respondents (between 16 and 60 years old) who participated in at least two rounds of RLMS-HSE, yielding a total of 35,037 individuals and 177,844 individual observations.

5.3.2. Dependent variables

RLMS-HSE contains data on several indicators which together comprehensively describe the position of individuals on the labour market. I focus my analysis on the following three indicators, which will be described in greater detail below: 1) occupational status; 2) earnings; and 3) the risk of unemployment. Each of these indicators will be considered separately in my analyses, although later I will try to generalize and interpret them in terms of a more cohesive process of career development.

Occupational status

Although several options exist for quantifying information about occupational status, my current choice is the International Socioeconomic Index (ISEI), which was developed by Ganzeboom, De Graaf and Treiman (1992; also Ganzeboom and Treiman 1996). (I also used this Index for encoding parents' occupational status in Chapters 3 and 4). ISEI ranks occupations on a scale from 16 to 90 and can be conceived as 'a measure of cultural and economic resources typical of the incumbents of a certain occupation'[67] with lowest and highest amounts of resources corresponding to 16 (e.g. janitors) and 90 (e.g. judges) respectively. This choice is driven by the following reasons: 1) ISEI is widely recognized in social stratification research for its ability to rank occupations in a sociologically meaningful way; 2) it is relatively easy to implement when the coding of reported occupations conforms to the International Standard Classification of Occupations (ISCO, specifically 1988 version), which is exactly the case with RLMS-HSE; 3) it is measured on an interval scale, which provides multiple methodological advantages over the use of categorical measures of occupational standing, particularly in terms of statistical modelling; and 4) it allows a certain strategy for reducing the

[67] Quoted from http://www.harryganzeboom.nl/isco08/qa-isei-08.htm, last visited April 1, 2019.

measurement error in the coding of occupations, which I describe shortly below. The downside of using ISEI, however, is that it does not necessarily account for the specifics of national occupational structures (since it was originally designed for comparative stratification research (Ganzeboom and Treiman 1996)). Nevertheless, previous research, in which ISEI has been employed with application to the Russian context, proves that it can be gainfully utilized as a relatively robust and meaningful measure of occupational status in Russia (Bessudnov 2012, 2016; Kosyakova and Yastrebov 2017).

ISEI appears in this study in two different forms. First, I perform a simple conversion of the original ISCO codes into ISEO for the current occupation reported by respondents in each wave of the RLMS-HSE survey.[68] However, some users of RLMS-HSE point out that the original ISCO coding of current occupations suffers from inconsistencies, because the codes depend on respondents' personal description of their occupations and the interpretation of this description by the coders (Sabirianova 2002). Therefore, the 4-digit ISCO coding of current occupation is likely to change from one survey year to another, even if, in reality, respondents did not change their occupation. For a survey containing thousands of observations like RLMS-HSE the revision and manual recoding of such cases is an extremely labour-intense task. A compromise strategy, which I adopt here in order to minimize such measurement error, takes the advantage of longitudinal observations in RLMS-HSE. More specifically, after converting ISCO codes for respondents' current occupations into ISEI scores, for each individual I calculate his or her current ISEI score as its average with the score reported in the subsequent wave.[69] While the procedure obviously leads to a slight reduction in the overall variation of ISEI scores, I believe this trade-off is compensated by a substantial reduction in the relative weight of potential outliers resulting from the inconsistent coding. Besides, I find that smoothing the data on individual occupational status dynamics using a moving average is

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[68] Specifically, I utilize Stata's user-written package *isko* developed by Hendrickx (2004). The package automatically transforms most 4-digit ISCO codes into corresponding ISEI scores using the original correspondence table established by ISEI's authors (Ganzeboom et al. 1992). Remaining untransformed ISCO codes included 3-, 2- and 1-digit codes, as well as several miscoded 4-digit codes, which I imputed manually. In the case of 4-digit codes, I used auxiliary information (usually data on an individual's occupation in preceding and/or following waves) to provide the best guess for the true value that could be matched to ISEI using *isko*. For 3-, 2- and 1-digit codes I imputed the mean of ISEI in the corresponding group of occupations in the original correspondence table.

[69] Missing values did not count towards the calculation of the moving average.

generally consistent with the idea of representing social mobility as a process that develops gradually, rather than sporadically, over the life course.

The second version of ISEI is the same smoothed variant described above, but it contains a slight modification. It is intended exclusively to detect the severity of sample selection bias that may result from neglecting missing observations. Missing information on current occupations can result from respondents' reluctance to disclose it, but the majority of missing cases in RLMS-HSE is synonymous with respondents' unemployment status. Had the unemployment status not been correlated with the occupational status, this would not be a problem for inference that uses data on employed population. However, it is well known that both are, in general, correlated because unemployment more often affects people at the bottom of the occupational hierarchy (Goldthorpe and McKnight 2006; Chan and Goldthorpe 2007). One way of dealing with this problem involves the use of techniques which correct for sample selection (Heckman 1979). Yet this approach provides a satisfactory solution only under the assumption of the joint normality of errors in both the selection equation and the equation of interest (which is often too strong and unverifiable) and requires a good instrument to model the selection. Moreover, this technique is difficult to implement with the specific class of statistical models which are employed in this study. Rather than modelling a selection, I suggest testing for the possibility of a resulting bias by using an augmented version of ISEI. The augmentation again utilizes the longitudinal aspect of RLMS-HSE and consists simply of imputing each subsequent piece of missing information about current occupation by the last occupation reported. This approach is deemed appropriate for the following reasons. On the one hand, it seems reasonable to assume that the spell of unemployment simply puts a career on hold, particularly if it is followed later by reinstatement in the same or a different job. In other words, the last reported occupational status is assumed to be unchanged before individuals exit unemployment and begin a new occupation. On the other hand, the imputed ISEI score for unemployed individuals can be conceived of as a possible counterfactual, that is, a position one *would* most likely occupy *had* one, in fact, been out of unemployment (especially given the personal characteristics that determined the previous occupational status). In sum, in the case of little divergence in findings between the models employing the augmented and the unaugmented version of ISEI, I would be inclined to refute the possibility of selection bias.

Earnings

The second variable I employ is individuals' monthly labour earnings, those associated with a specific position on the labour market. Other types of income, such as social and intergenerational transfers, rents and profits are excluded from this definition. Since earnings appear in RLMS-HSE in multiple forms, I take specific steps to merge this information into a single concept reflecting individuals' labour market position. Primary information for this variable is derived from the reported average monthly wage. However, this information was missing in many cases (even if respondents reported being employed), therefore, where available, I completed it with either the wage reported in the last 30 days (both monetary and in-kind) or the monthly estimate of the wages owed. This was particularly relevant for the observations dating back to the 1990s, since wage arrears and in-kind payments were quite common at that time in Russia due to the difficult economic situation following its market transition (Hartmut, Wadsworth, and Acquisti 1999; Gerber 2006). Nevertheless, I take these as appropriate substitutes for estimating the level of earnings associated with a given labour market position.

Similar to the ISEI score, the earnings variable appears in two versions to test for selection. Additionally, I transform these variables by deflating their current values to the value of the ruble in 1994,[70] and apply the log transformation, which is common in econometric applications.

The risk of unemployment

Finally, the third dependent variable in my analyses detects whether respondents are in unemployment or not. I do not count temporary absences from the work market towards unemployment status because my primary interest is in modelling whether individuals are in or out of the labour force. Also unemployment status as defined here refers to staying out of both formal and informal employment, which is an important distinction in the context of Russia's

[70] I applied region-specific deflators by identifying respondents' regions from their primary sampling units. The corresponding data on regional deflators up to 2002 were calculated using data from Russian Statistical Yearbooks (*Rossijskije statisticheskije ezhegodniki*) 1996 (section Regions) and 1999–2003 (section Prices and Tariffs); later data retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/tariffs/, last visited April 1, 2019.

relatively large informal sector (Kim 2002; Gimpel'son and Kapeljushnikov 2006; Kapeliushnikov, Kuznetsov, and Kuznetsova 2011).

5.3.3. Independent variables

My key independent variables of interest represent three different mechanisms (discussed in Section 4.2) by which the demographic echo of war can theoretically impact individual careers.

Cohort size at birth

The first variable is cohort size at birth and is the same as that employed in analyses in Chapter 3. It is intended to capture the effect of cohort overcrowding. The variable is constructed using Russian data from the Human Mortality Database with individual values assigned based on RLMS-HSE respondents' reported birth years.[71] Correspondingly, the variable has a fixed value throughout each individual's observational span.

Given that my sample consists of individuals aged 16−60 observed in the period 1994−2015, the range of birth years represented in this study spans from 1934 to 1999 (also see summary statistics in Table 5-4 in Appendix, Section 0). However, since accurate data on cohort size at birth for cohorts born before 1937 is not available, cohorts born 1934−1936 will, in fact, be dropped from my analyses following list-wise deletion. In any case, the remaining range – 1937−1999 – almost entirely encompasses three full cycles of demographic ups and downs and therefore captures a considerable amount of variation (see Figure 5-2 for an illustration).

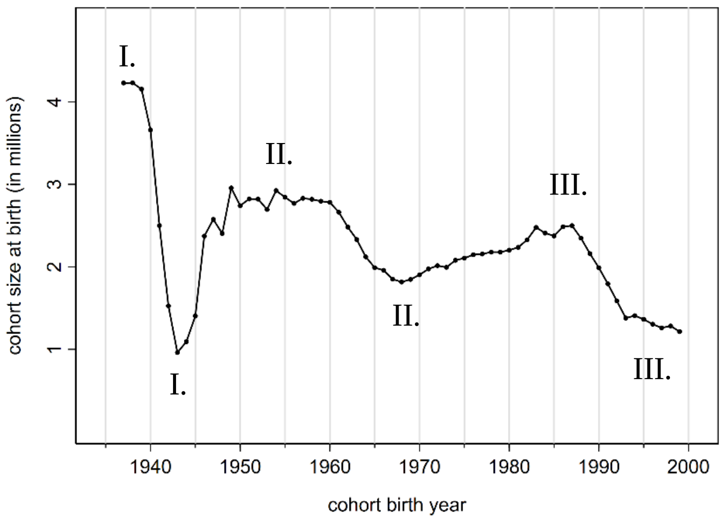
The size of retiring cohort as percent of current workforce

The second variable is the size of the currently retiring cohort as percent of current workforce, and it is intended to capture the essence of the 'pull effects'. Unlike the cohort size at birth, this may vary throughout individuals' observational spans reflecting the change in the current population age structure. I estimate the size of retiring cohort as the sum of female and male

[71] Knowing the precise birth year of respondents is highly important for my analyses, because it is the variable which determines the values of my theoretical independent variables. However, accuracy of reporting birth years in RLMS-HSE is not entirely perfect. To increase accuracy, I calculated the reported birth year for each individual in his or her entire observational span. A negligible amount of unresolved cases was coded as missing (unless the difference in modes in bimodal distributions did not exceed one year, in which case I calculated the mean and took the rounded value).

population entering their legal retiring ages of 55 and 60 years old respectively (according to Russia's retirement practices), and the size of the current workforce as the sum of female and male population between the legal working ages of 16−54 and 16−60 respectively. It should be made clear, however, that the ratio of these figures does not necessarily reflect the *true* size of the retiring population (i.e. population leaving the labour market) as the proportion of the *true* size of the working population (i.e. employed population). Rather the purpose of the measure is to proxy the *potential* effect of changing labour market demography as induced by the demographic echo of war.

Figure 5-2. Variation of cohort size at birth in the RLMS analytical sample



Notes: Cohort size at birth – total live births in cohort's birth year.
Source: Cohorts born 1959−1999 – Russian source data from Human Fertility Database (http://www.humanfertility.org, last visited April 1, 2019). Cohorts born 1937−1956 – Demoscope Weekly (http://www.demoscope.ru/weekly/ssp/rus_ed_1935.php, last visited April 1, 2019).

To calculate this variable I use data supplied by the Centre for Demographic Research at the New Economic School (Moscow).[72] Unlike the cohort size at birth, which I can employ only as a country-wide measure,[73] I utilize the opportunity to calculate the required proportions as region-specific in order to exploit additional cross-regional variation in addition to cross-

[68] The data can be retrieved here: http://demogr.nes.ru/index.php/en/demogr_indicat/data, last visited April 1, 2019
[73] Accurate region-specific data on the sizes of birth cohorts is only available starting from 1989, whereas my study encompasses cohorts born as early as in the 1930s.

temporal variation. This approach is deemed salient due to 1) the fact that the extent of the Russian demographic echo of war exhibits substantial cross-regional variety (Andreev et al. 2005) and that 2) Russia is notable for relatively low rates of inter-regional mobility (Andrienko and Guriev 2004; Mkrtchjan 2009) so that regional labour markets can be viewed as relatively independent from each other. Region- and year-specific data was matched to individual cases in RLMS-HSE based on the location of respondents' primary sampling units and the year of survey.

The size of prime-age cohorts as percent of current workforce

Finally, my third independent variable is a measure which relates to the 'the block effect'. The measure is the size of current prime-aged cohorts, those aged 30 to 45 years old, as percent of current workforce. The definition of the current workforce is the same as above. It should be noted, however, that the definition of prime age adopted here is a loose one and does not conform to any official definition. For instance, in the USA, prime-aged workers are often considered to be aged between 25 and 54 years (Macunovich 1999), while no such definition exists for Russia. In fact, common sense suggests that prime age can be defined differently depending on the context: for instance, prime age in sports careers would clearly be different from the prime age in academic careers. Whatever definition is adopted it is therefore likely to rest on shaky ground. Nevertheless, I derive my own definition from a simple and hopefully convincing idea: since the primary purpose of the underlying concept is to capture the relative size of the most competitive cohorts on the labour market, it makes sense to define them through those age groups in which average careers usually achieve their peak values. As later empirical analyses will reveal (e.g. Figure 5-3 to Figure 5-5) this definition is indeed blurred depending on the type of dependent variable employed, yet it could generally be inferred that the most successful span of careers falls within the age range of 30 to 45 years. Moreover, as supplementary analyses show, changing this definition does not affect the substantive results to be revealed later. Again, as with the previous variable, I calculate the size of prime-aged cohorts as percent of workforce population using region-specific data supplied by the Centre for Demographic Research in order to add cross-regional variation.

5.3.4. Modelling strategy

My choice for modelling the relationship between labour market outcomes and the demographic variables introduced above uses the correlated random effects (CRE) models (Wooldridge 2012:497–99). The advantage of these models over the more standard approaches for panel data analysis, which rely on fixed effects (FE) and random effects (RE) models, is that CRE provides a flexible synthesis of both FE and RE within a single modelling framework. It is well known that FE-estimation is preferred to RE-estimation in most cases (especially when the number of observational periods is large), because it is more effectively equipped to deal with the unobserved heterogeneity between the units of analysis. However, the downside of this virtue is that FE-estimation does not allow the inclusion of time invariant variables in the analysis. Yet one such variable, which is key to my analyses, is cohort size at birth. CRE effectively overcomes this problem by obtaining unbiased FE-estimators within the RE-framework. In CRE, FE-estimation is enabled by inclusion of unit-specific averages of all variables that are time-variant as separate regressors in what is essentially a RE-model. Including unit-specific averages in the model is largely equivalent to the time demeaning strategy in the FE-framework that cancels out the problematic time invariant component of the error term.

Specifically, the models of the kind to be estimated here have the following structure:

$$Y_{it} = \alpha_0 + \alpha_1 CS_i + \alpha_2 RC_{it} + \alpha_3 PC_{it} + \alpha_4 \overline{RC}_i + \alpha_5 \overline{PC}_i +$$

$$+ \boldsymbol{\gamma}\mathbf{x}_i + \boldsymbol{\lambda}\mathbf{z}_{it} + \boldsymbol{\theta}\bar{\mathbf{z}}_i + r_i + u_{it} \quad (5\text{-}4)$$

where Y_{it} denotes the outcome variable of interest (i.e. one of the dependent variables introduced above), CS is cohort size at birth, RC is the size of retiring cohort as percent of workforce population, PC is the size of prime-aged cohorts as percent of workforce population, $\overline{RC}$ and $\overline{PAC}$ are individual-specific averages of RC and PAC over individuals' entire observational span, $\boldsymbol{x}$ is the vector of time-constant observables, and $\boldsymbol{z}$ and $\bar{\mathbf{z}}$ are the vectors of time-variant observables and their corresponding individual-specific means. Subscript i denotes individuals and subscript t denotes time-specific observations (survey waves). The vectors of $\boldsymbol{\alpha}$, $\boldsymbol{\gamma}$, $\boldsymbol{\lambda}$ and $\boldsymbol{\theta}$ denote the corresponding regression coefficients to be estimated from the data. The error term is composed of the time invariant r_i and idiosyncratic components u_{it}, of which u_{it} is assumed to be uncorrelated with all of the regressors, while r_i is rendered uncorrelated with time-variant regressors by virtue of controlling for their individual-specific averages in the equation (5-4). The latter is exactly what renders α_2 and α_3 (and $\boldsymbol{\lambda}$) as FE-estimates, provided that all other standard assumptions of the FE-estimation apply. The usual limitations of the RE-estimation, on the other hand, apply to the estimates of α_1 (and $\boldsymbol{\gamma}$ correspondingly), since r_i may still be correlated with time invariant regressors, unless such correlation is sufficiently controlled away by the remaining parts of the equation. In sum, the coefficients α_1, α_2 and α_3 are the coefficients of primary interest, of which α_1 can be treated as RE-estimate, and α_2 and α_3 as FE-estimates correspondingly.

Equation (5-4) provides a general expression and does not allow for the possibility that the effects of demographic variables can manifest differently at different stages of individuals' careers. Since this is specifically required to test hypotheses *H6* and *H7*, where appropriate, I augment equation (5-4) into a curvilinear GCM, in which the variation of dependent variable over age (expressed as a quadratic specification) can change shape depending on the demographic variables of interest. The assumption of quadratic specification of age is standard in most econometric applications, and it usually allows a better approximation of the shape of a typical career profile over the life course compared to a simple linear specification. In more substantive terms, the assumption implies the slowing down of career growth with age and the possibility of career decline after the prime age consistent with both sociological (Sørensen 1977; Rosenfeld 1992) and economic theories of individual attainment over the life course (Becker 1965; Mincer 1974). To allow for the shape of the growth curves to be affected by the demographic variables, the latter are simply interacted with both terms of the quadratic age specification. Although this yields a cumbersome equation, the parameters of which may be difficult to interpret, a graphic interpretation of the marginal effects based on the estimated models should render this a relatively easy task.

5.3.5. Controls

Two time-invariant controls used in my analyses include respondents' gender and birth year. As was mentioned earlier, time-invariant factors do not pose a problem for the FE-estimates in the CRE regression, hence they are of primary relevance for reducing bias in the RE-estimate for the effect of cohort size at birth. The control for *gender* is included to deal with unequal representation of men and women in different age groups in the sample, which is a known fact in demography and which is particularly relevant for Russia (Shkolnikov et al. 1998; Shkolnikov and Cornia 2000). The control for *birth year* is included to account for the possibility of generational effects, in other words, the possibility that the careers of earlier generations may be different from the careers of more recent generations. The factors that can drive this difference may include the depreciation of skills accumulated in a different historical context and/or the historical upgrading of the occupational structure allowing more recent generations to start their careers afresh from an ever higher position (Smelser and Lipset 1966; Blossfeld 1986; Bell 2008). As already discussed in previous chapters, the incidental correlation of cohort size at birth with birth year is likely in finite samples,[74] in which case the generational effects of the kind just mentioned will most likely bias the estimate for the effect of cohort size. However, controlling for birth year can still be tricky when age is included in the model.[75] As long as the birth year enters equation (5-4) in a simple linear form, the non-linear specification of age partly solves this problem. On the other hand, the simple linear specification of birth year may not seem sufficient to appropriately model the generational effects: first, because it assumes that cohort effects affect only the level, but not the overall shape, of career dynamics and, second, because it assumes the same effect on that level per each year of change in cohort birth year. Unfortunately, these are the limitations for the kind of analyses to be undertaken here. It should be repeated that these limitations concern exclusively the effect of cohort size at birth, which falls prey to the strict RE-estimation assumptions.

Time-variant controls include respondents' education and the controls for current macroeconomic conditions. My primary rationale for including respondent's *education* as a separate control is to account for the fact that educational attainment can mediate part of the effect of demographic variables on career mobility. If educational attainment 'carries' a part of the effect of demographic variables[76] on career development, I would like to hold it constant, because it is not the part of the theory being tested here (cf. Chapter 3 and Chapter 4). In other

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[74] In fact, the corresponding correlation in the RLMS dataset amounts to a substantial –.556. Part of this correlation also picks up the fact of Russia's declining population, since cohort size at birth is defined here in absolute rather than relative terms.
[75] The exact correlation between age and birth year in the sample amounts to –.889.
[76] As was shown in Chapter 3, as well as by previous research (e.g. Wachter and Wascher 1984; Falaris and Peters 1991, 1992).

words, I am primarily interested in studying the direct (rather than total) effect of demographic variables on career mobility. Educational attainment enters equation (5-4) in years of schooling.[77]

The remaining controls include *current gross regional product (GRP)* and *current regional rate of unemployment*. They are intended to rule out the possibility that part of the temporal variation in career indicators may be driven by local macroeconomic conditions, as well as the concern that these may partly overlap with the demographic dynamics in Russia between 1994 and 2015. The regional data were obtained from the data supplied by Russia's Federal State Statistics Service[78] and matched to individual cases in RLMS-HSE using location of respondents' primary sampling units and the year of survey. Additionally, I transformed current GRP by deflating its current values to the value of the ruble in 1994[79] and applying the log transformation.

5.4. Results

In this section, I present and discuss the results of the CRE estimation for the models introduced in Section 5.3.4 using RLMS-HSE data. First, I present estimation results for the models specified with equation (5-4), with which I scrutinize the hypotheses *H1-H5*. This modelling exercise is also supplemented by the checks for selection bias using alternative specifications of dependent variables as discussed in Section 5.3.2. I then explore age-specific effects of demographic variables on labour market outcomes by using a more flexible specification of (5-4) allowing for these variables' age-specific effects, and thus address the hypotheses *H6-H7*.

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[77] I am very thankful to Dr. Yuliya Kosyakova for providing me with the Stata syntax for obtaining a refined measure of the total years of schooling from RLMS-HSE. The syntax was written as a part of her doctoral dissertation (Kosyakova 2016). This measure is highly accurate given Dr. Kosyakova's intimate knowledge of Russia's educational system and the changes it went through from the socialist to the post-socialist period.

[78] GRP data up to 1997 were retrieved from (Rossijskije statisticheskije ezhegodniki 1999), all following data were obtained from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/, last visited April 1, 2019. Unemployment data up to 1999 were retrieved from (Rossijskije statisticheskije ezhegodniki 2001), all following data were obtained from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/wages/labour_force/, last visited April 1, 2019.

[79] Regional deflators up to 2002 were calculated using data from Russian Statistical Yearbooks (*Rossijskije statisticheskije ezhegodniki*) 1996 (section Regions) and 1999–2003 (section Prices and Tariffs); later data retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/tariffs/, last visited April 1, 2019.

5.4.1. Age-constant effects

The results of the estimation are presented in Table 5-1. The table contains the estimates of the effects for each of the key independent variables introduced earlier. Of the three, the effect of cohort size at birth is equivalent to the RE-estimate and therefore has to be treated with greater caution, whereas the estimates for the effect of the relative size of retiring cohort (pull effects) and the relative size of prime-aged cohorts (block effects) are equivalent to FE-estimates that account for time-invariant unobserved heterogeneity. The pairs of nested models are presented to reveal whether the behaviour of the effect of cohort size at birth on different labour market outcomes changes with the introduction of pull and block effects as specified by hypothesis *H4*.

The first thing to notice is that the effect of cohort size at birth is statistically non-significant from zero in all the models, except for those predicting the probability of unemployment. Counter-intuitively, however, in the latter case the direction of the effect is the opposite of that implied with the standard ‘cohort overcrowding’ argument (cf. Easterlin 1980; Berger 1985; Zimmermann 1991; Macunovich 2002), according to which large cohort size is predicted to be associated with greater probability of unemployment. Specifically, the point estimate suggests a reduction in the probability of being unemployed by some 8 p.p. per a one million change in cohort size at birth (for a standard deviation of .4 million – see summary statistics in Table 5-4 in Appendix (Section 0) – this amounts to a 3.5 p.p. decrease per one standard deviation).

In establishing my theoretical arguments, I additionally maintained that being born to a large cohort should not necessarily be a misfortune, because it might be coupled with the fact that smaller surrounding cohorts might be releasing the pressure on the labour market. In that case, I would have expected a part of this ‘advantage’ to be explained by the remaining two variables, the pull and the block effects, that provide a more comprehensive definition of the surrounding demographic context, contained in my hypothesis *H4*. Table 5-1 reveals, however, that this is also not the case. The effect of cohort size at birth, if any, appears to be robustly irrelevant after accounting for the pull and block effects: it remains statistically non-significant from zero in the models for occupational status and earnings and does not change its statistical significance or magnitude in the model for unemployment. On these grounds, I am currently inclined to reject the hypotheses *H1* and, consequently, *H4*, although I will return to this issue again, when discussing the dynamics of the above-mentioned effects over the life course.

Table 5-1. Correlated random effect models for labour market outcomes

	(1) Occupation (original ISEI)	(2) Occupation (original ISEI)	(3) Unemployed	(4) Unemployed	(5) Average monthly wage (log)	(6) Average monthly wage (log)
Cohort size, in millions	.274 (.245)	.301 (.245)	–.084** (.005)	–.086** (.005)	.020 (.013)	.014 (.013)
Retiring workforce as percent of total		.505** (.188)		–.047** (.006)		.144** (.013)
Prime-aged workforce as percent of total		–.005 (.029)		.004** (.001)		–.035** (.002)
χ^2	6186.3**	6229.3**	27759.3**	28348.7**	30359.0**	31176.8**
df	12	16	12	16	12	16
$R^2_{overall}$	.287	.287	.214	.217	.349	.352
R^2_{within}	.011	.011	.101	.102	.242	.246
$R^2_{between}$	.322	.322	.303	.305	.358	.362
σ_u	11.422	11.418	.275	.274	.602	.601
σ_e	7.315	7.315	.309	.308	.622	.621
ρ	.709	.709	.442	.441	.484	.484
N_{total}	115,899	115,899	166,651	166,651	109,389	109,389
$N_{individuals}$	26,474	26,474	33,876	33,876	25,619	25,619

Notes: Dependent variables do not contain imputed values for missing data. All models include the following controls: 1) gender, 2) years of schooling, 3) cohort birth year, 4) age (incl. squared term), 5) current gross regional product (log), 6) current regional rate of unemployment. CRE models additionally control for within-person averages of all time-variant variables. All monetary variables are deflated to the rouble value of 1994. Clustered robust standard errors in parentheses. * p<.05, ** p<.01

Unlike the results for cohort size at birth, the estimates for the pulling effect of retiring cohorts prove more robust and rather in line with hypothesis *H2* across all the models. All point estimates suggest that an increase in the relative size of retiring cohorts indeed leads to a contemporaneous improvement in occupational status (by .5 points of scale per 1 p.p. increase in the corresponding value of the independent variable), a reduction in the probability of unemployment (by .05 p.p.), and an increase in earnings (by roughly 15 per cent, which is .14 units in the log scale). On the other hand, perhaps, except with respect to earnings, I find these effects largely modest given that one unit change in the relative size of retiring cohorts as it currently appears in the model is 2.5 times its single standard deviation in the sample (.4 p.p.).

Dividing the above-mentioned effects by the corresponding factor yields negligible differences, although for earnings it still yields a sizeable difference of 6 per cent.

Finally, Table 5-1 yields partial support for the blocking effects of prime-age cohorts (hypothesis *H3*). The corresponding effect is statistically significant and in line with predictions for the models explaining variation in the probability of unemployment and earnings. However, the magnitude of the effect for unemployment is somewhat negligible and amounts to roughly a one per cent increase in the corresponding probability per one standard deviation change in the relative size of retiring cohorts (one SD = 2.8 p.p.), whereas it appears to be more substantial for earnings yielding an average difference of about 10 per cent.

Table 5-2. Correlation matrix for the variables describing changes in the macroeconomic and demographic contexts in Russia between 1994 and 2015

	GRP capita (prices of 1994, log)	Unemployment rate	Retiring workforce as percent of total	Prime-aged workforce as percent of total
GRP capita (prices of 1994, log)	1			
Unemployment rate	–.668	1		
Retiring workforce as percent of total	.404	–.500	1	
Prime-aged workforce as percent of total	–.454	.283	–.372	1

Note: The correlations account for both between- and within-round covariances in the analytical sample.

Nevertheless, in spite of the fact that models in Table 5-1 feature relatively modest effects for the pull and block effects, I find it all the more remarkable that these effects remain statistically robust even with controls for the macroeconomic conditions. In Table 5-2, I provide a simple correlation matrix showing that the changes in the macroeconomic conditions and the demographic context in Russia have, in fact, been tightly related. Yet it should be clear that models in Table 5-1 pick up the idiosyncratic effects of the demographic variables by drawing on residual (and apparently scant) variation in labour market outcomes, which is stripped of the possible contemporaneous influence of the macroeconomic conditions.

In sum, the rejection of hypothesis *H1*, represented by the essentially null effect of cohort size at birth, against the positive robust evidence for hypotheses *H2* and *H3* (i.e. the pull and the block effects), is compliant with *H5*, which derived from possible violation of the imperfect substitutability argument in the context of a post-Soviet labour market.

Table 5-3. Correlated random effect models for labour market outcomes – non-imputed vs imputed dependent variables

	(1) Occupation (original ISEI)	(2) Occupation (imputed ISEI)	(3) Average monthly wage (log)	(4) Average monthly wage (log, imputed)
Cohort size, in millions	.301 (.245)	.462 (.254)	.014 (.013)	.027 (.015)
Retiring workforce as percent of total	.505** (.188)	.571** (.169)	.144** (.013)	.260** (.017)
Prime-aged workforce as percent of total	–.005 (.029)	.001 (.026)	–.035** (.002)	–.035** (.002)
χ^2	6229.3**	4312.9**	31176.8**	22293.1**
df	16	16	16	16
$R^2_{overall}$	.287	.250	.352	.312
R^2_{within}	.011	.017	.246	.187
$R^2_{between}$	.322	.269	.362	.348
σ_u	11.418	11.851	.601	.657
σ_e	7.315	5.794	.621	.677
ρ	.709	.807	.484	.485
N_{total}	115,899	133,283	109,389	129,674
$N_{individuals}$	26,474	26,481	25,619	25,625

Notes: Comparison models contain imputed values for missing data. All models include the following controls: 1) gender, 2) years of schooling, 3) cohort birth year, 4) age (incl. squared term), 5) current gross regional product (log), 6) current regional rate of unemployment. CRE models additionally control for within-person averages of all time-variant variables. All monetary variables deflated to the rouble value of 1994. Clustered robust standard errors in parentheses. * p<.05, ** p<.01

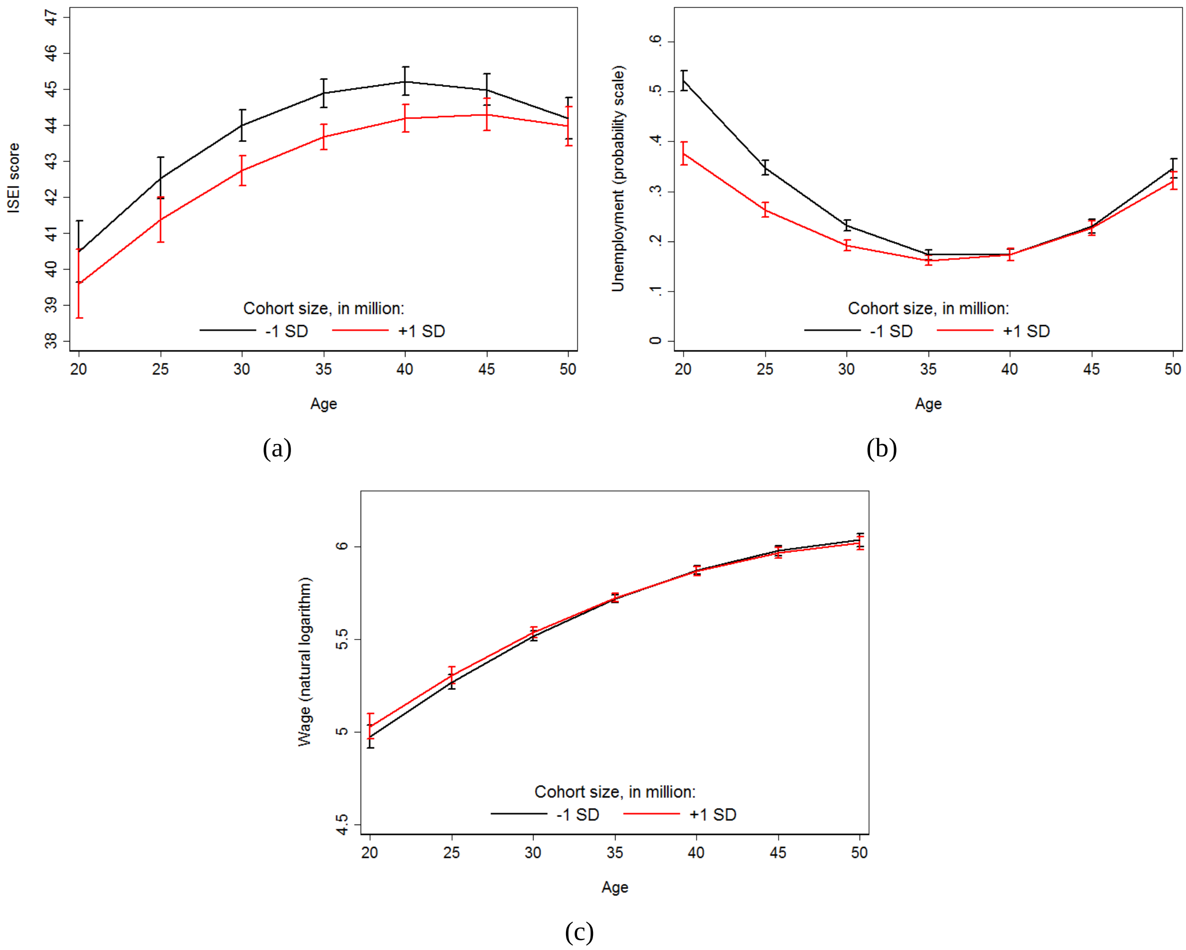
Finally, one further important suspicion about the robustness of the effects presented in Table 5-1 is that the models for occupational status and earnings might also be prone to sample selection bias. In Table 5-3, I present the comparison of models, in which corresponding dependent variables take their natural value (models 1 and 3) and the one imputed according to the procedures, which were already explained in Section 5.3.2 (models 2 and 4). However, all noted effects, as well as the corresponding tests for statistical significance, remain stable across the models. The only exception is the change in the coefficient for the pulling effect of retiring cohorts in the earnings equation (cf. model 3 and 4). The model using the augmented version of the dependent variable provides an estimate, which is almost double that estimated on a selected sample (11 per cent instead of the previously reported 6 per cent increase in earnings per one standard deviation change in the relative size of retiring cohorts). In any case, I conclude from this simple comparison that sample selection is unlikely to invalidate the substance of the findings presented above.

5.4.2. Age-specific effects

In this section, I explore the age-specific effects of the demographic variables on labour market outcomes. Estimated models are presented in Table 5-5 in Appendix, Section 0. However, since models of this kind are difficult to interpret due to multiple interaction terms that capture idiosyncratic age effects, here I will rely on their graphic interpretation. The figures presented in this section of analysis represent the average marginal effects estimated from the sample at specific values of demographic variables across the age span of 20 to 50 years old. To achieve a reasonable contrast, I simulate effects for the pairs of values of the corresponding demographic variables as if these values were set one standard deviation apart from their averages in the entire sample (and two standard deviations apart from each other).

Figure 5-3 illustrates the changes in the average marginal effect of cohort size at birth on different labour market outcomes. The first thing to notice is that the earlier truth about the statistically non-significant effect of cohort size on occupational status may not be entirely correct. Figure 5-3 (a) reveals that the difference can actually become large and statistically significant when comparing individuals' occupational attainment in the middle-age range (ages 30 to 40). Specifically, the direction of the effect is in line with what would be expected from the 'cohort overcrowding' thesis, according to which larger cohorts should be disadvantaged in terms of their promotion opportunities. As far as the probability of unemployment is concerned, in Figure 5-3 (b), I find the same counter-intuitive effect reported earlier, although, as can be seen, it appears to be shifted more towards a younger age group. Finally, Figure 5-3 (c) reveals no specific differences in the age-specific effect with regard to earnings.

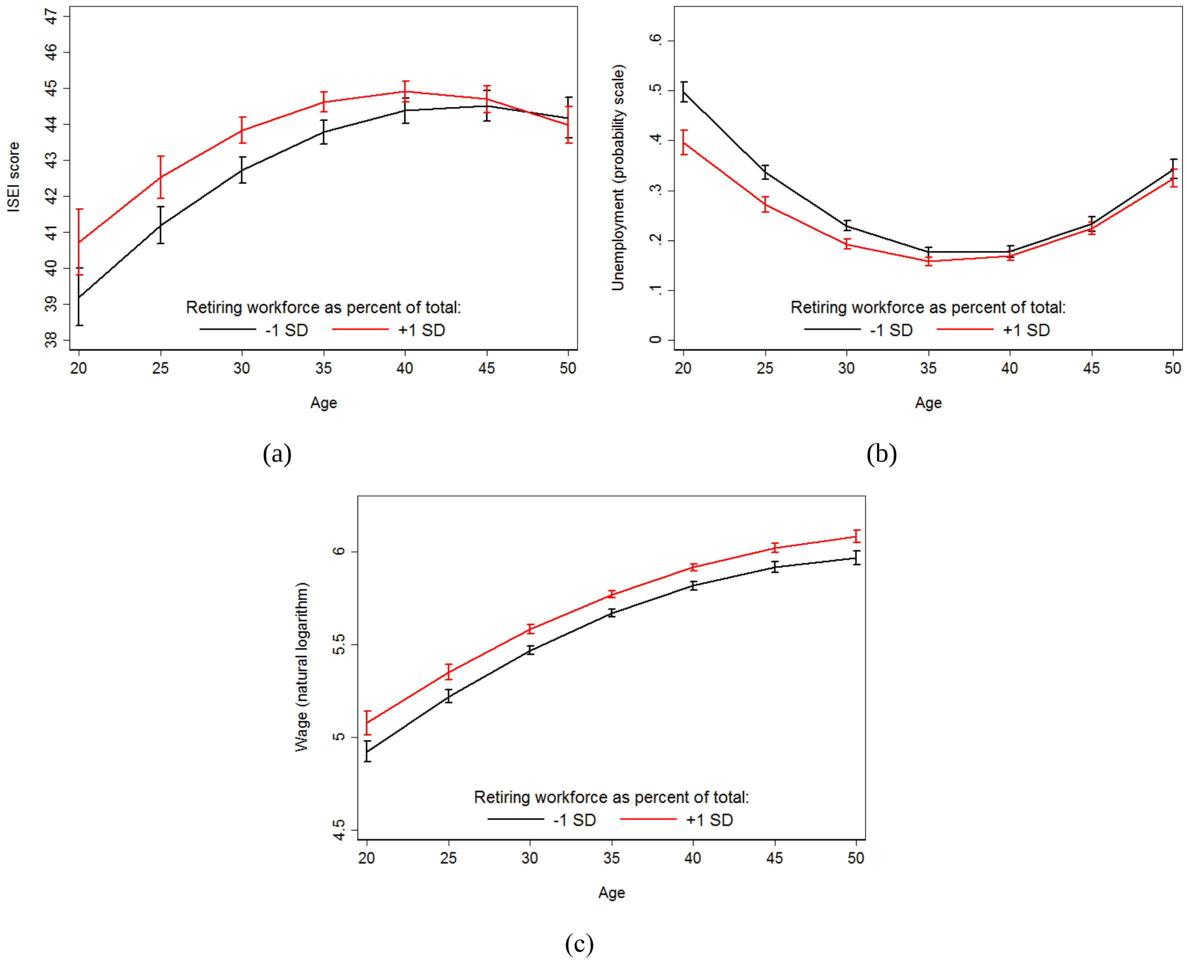
Figure 5-3. Average marginal effects of cohort size at birth over the life course



Note: Vertical spreads denote 95% confidence intervals. *Source:* Author's calculations using RLMS-HSE data (models in Table 5-5 in Appendix, Section 0).

To summarize, I find the patterns in Figure 5-3 somewhat confusing, especially given the contradictory directions of the reported effect with regard to occupational status and the probability of unemployment. Substantive interpretation of these findings is particularly complicated by the fact that the estimate in question is not entirely free from bias, as was discussed earlier, and may be picking up some unobserved effects incidentally aligned with the observed variation in cohort size. In a separate conjecture, I hypothesized that, in a particular situation, when a small cohort of young people enters the labour market it *can* be disadvantaged, *if* confronted by a large cohort of experienced prime-age workers and/or *if* their entry overlaps with a small retirement block (hypothesis *H4*). However, since my models explicitly control for this possibility, I find this contradiction difficult to reconcile.

Figure 5-4. Average marginal effects of the relative size of retiring cohorts over the life course



Note: Vertical spreads denote 95% confidence intervals. Source: Author's calculations using RLMS-HSE data (models in Table 5-5 in Appendix, Section 0).

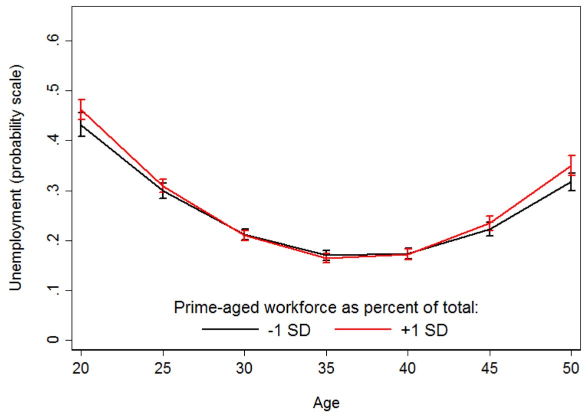
Figure 5-4 illustrates the life course dynamics of the pulling effect of the retiring cohorts. Again, I find a generally positive influence of a large retirement rate on individuals' careers, consistent with what was reported in the previous section. However, the figure additionally reveals that this advantage tends to wane for older individuals with regard to their occupational status (Figure 5-4 (a)) and the probability of unemployment (Figure 5-4 (b)). Three explanations are possible. First, with regard to the occupational status, this could possibly reflect a simple ceiling effect, given that most careers have a specific zenith point after which changes in the occupational status are unlikely until retirement. Second, older workers may simply be too old and lose competitivity in promotion opportunities to younger workers when a large cohort reaches retirement. Finally, retirement in the upper positions of the occupational structure might be less affected by demographic pressures, because older incumbents of such positions might actually be more incentivized to remain in them, regardless of approaching retirement age (i.e. due to higher opportunity costs). In that case, the pull effect of retiring cohorts would unevenly affect occupational structure by freeing a disproportionally smaller number of upper-level positions, and correspondingly a disproportionally larger number of lower-level positions, which would then be more likely to be filled by younger and less experienced people. In particular, the latter would explain the expanding effect of the relative size of a retiring cohort on the probability of unemployment among younger people. In any case, however, the patterns in Figure 5-4 (a) and (b) do not contradict hypothesis *H6*, according to which the contradicting evidence implies particularly large effects in the pre-retirement age groups.

On the other hand, Figure 5-4 (c) reveals no age-specific effects of the relative size of the retiring cohort on earnings: they appear as relatively stable across the entire age range. This too potentially counters the argument of imperfect substitutability between young and old workers and is therefore in line with hypothesis *H6*. In the contrary case, the removal of a large number of retired workers from the labour market should have had a smaller effect on the wages of younger workers, and a larger one on the wages of prime-aged and older workers. Yet the findings do not point towards such a relationship, since all age groups benefit equally from the reduction in the aggregate supply of workers.

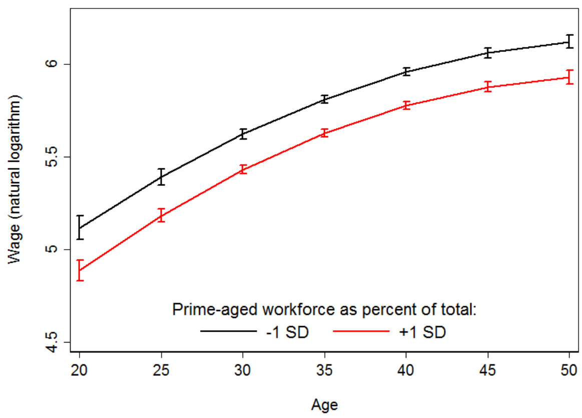
Finally, Figure 5-5 corroborates the previously reported results that the relative size of prime-aged cohorts has no bearing on occupational status and the probability of unemployment, and reveals that this holds for the entire age range. The effect is present only with regard to earnings, and it also remains stable regardless of age similar to the effect of the relative size of the retiring cohort. Again this is not consistent with the imperfect substitutability argument, because in that case a reasonable prediction would be that an oversupply of prime-aged workers would compress the earnings of such workers more than it would compress the earnings of younger and older workers. On the other hand, if young and old workers are instead good substitutes for each other, this would be totally consistent with the fact that cohort size at birth has turned out to have practically no effect on earnings. I therefore conclude that the patterns observed in Figure 5-3 (c), Figure 5-4 (c) and Figure 5-5 (c) corroborate hypothesis *H7*.

Figure 5-5. Average marginal effects of the relative size of prime-aged cohorts over the life course

(a)



(b)



(c)

Note: Vertical spreads denote 95% confidence intervals. *Source:* Author's calculations using RLMS-HSE data (models in Table 5-5 in Appendix, Section 0).

5.5. Discussion and conclusions

The theory of relative cohort size (Easterlin 1980; Macunovich 2002) generally maintains that large cohorts can be relatively disadvantaged on the labour market due to the excess competition they face in contrast to small cohorts. However, my analyses with RLMS-HSE data show that this is not exactly how the demographic (mis)fortunes have played out for different cohorts in the context of Russia's post-Soviet labour market. Cohort size at birth *per se* seems to have had little if any effect on the labour market careers of post-Soviet Russians, and the supplementary evidence produced in this chapter reinforces a possible explanation for this fact. In order for the cohort size effect to reveal itself with particular strength with respect to labour market outcomes, workers of different ages must be imperfect substitutes for each other. Yet the older cohorts of Russians may have lost some of their competitive advantage with respect to the younger cohorts in a rapidly transforming labour market, because of the major depreciation of skills and experience accumulated in a different historical context (Orazem and Vodopivec 1997; Svejnar 1999; Lehmann and Wadsworth 2000; Sorm and Terrell 2000; Sabirianova 2002). Essentially this means that different cohorts were competing for positions in the new labour market structure on a par with each other, and in this context whether an individual was born into a large or small cohort had no impact on relative advantage or disadvantage due to the relatively high *inter*-cohort, rather than *intra*-cohort competition. Besides, the case for high inter-cohort competition in post-Soviet Russia can further be enhanced by the fact that a perceived characteristic of the country is a highly flexible labour market (Bluhm 2010; Kapeliushnikov et al. 2011), while in addition the flexibility of national labour markets has already been shown to relax the effect of relative cohort size on labour market outcomes (Brunello 2010). Clearly, this is quite different from the processes which commonly take place in an educational system, where *intra*-cohort dominates over *inter*-cohort competition as a result of the system's specific institutional arrangement (see Chapter 3).

However, stating that cohort size had practically no effect on labour market fortunes in post-Soviet Russia does not mean that the demographic echo of war, which greatly affected (and continues to affect) Russia's population age structure, did not have a stake in shaping the process of individual career mobility. In this chapter, I introduced two additional mechanisms, by which demographic processes may have affected individual labour market outcomes.

The first mechanism, referred to as the pull effect, stipulated that the demographic echo of war affects the rate of retirement, which in turn affects the structure of opportunities for those who are currently on the labour market. More specifically, a smaller retiring cohort can contemporaneously suspend the process of career mobility by creating a bottleneck in the labour market. A larger retiring cohort, on the other hand, can boost this process by creating new employment opportunities, thereby pulling a part of the potential workforce out of unemployment and/or dragging the incumbents of current labour market positions up the career ladder through vacancy chains (Sørensen 1974, 1975, 1977). Empirical evidence presented in this chapter is fully consistent with these ideas. Moreover, the indications of this effect in my data appear to be quite robust, even accounting for the potentially confounding influence of changes in macroeconomic conditions that have largely mirrored the changes in the labour market demography.

The second mechanism introduced in this chapter, referred to as the block effect, stipulated that labour market careers can be affected by the relative size of prime-aged cohorts, because the latter can most effectively seize the opportunities of employment and promotion thanks to their experience on the labour market and highly productive age, thereby blocking these opportunities for other cohorts. This argument, however, is prone to the same kind of assumption, − the weak substitutability of workers belonging to different age groups – as that is required for the effect of relative cohort size to have a bearing on labour market outcomes. Indeed, analyses in this chapter provide no evidence of the block effect for occupational status and probability of unemployment. On the other hand, robust positive evidence for such an effect was found with regard to earnings showing that the bulge of prime-aged workers on the labour market has generally a depressing effect on wages. However, this evidence is also reconciled with the idea of high *inter*-cohort competition in Russia's post-Soviet labour market, since the bulge has a depressing effect on earnings across the entire age range, rather than specifically affecting workers in their prime age.

To summarize, the chapter has shown that Russia's demographic echo of war has a lasting effect on the social mobility of Russians. Apart from affecting their process of educational attainment described in Chapter 3 (and 4), it has an idiosyncratic effect on their career mobility in the post-Soviet era, albeit this effect was driven not so much by the mechanisms of cohort overcrowding and intra-cohort competition (Easterlin 1980; Macunovich 2002), as it was by contemporaneous changes in Russia's labour market demography. And although these changes played out differently in the life time of different cohorts, they remained largely invariant to cohorts' size at birth suggesting that the (dis)advantages of being born to a small (large) cohort did not necessarily migrate into cohorts' lives beyond their (mis)fortunes in the educational system. However, it is still possible that the effect of relative cohort size will gain more relevance in the coming years, as it may well become the case that the skills and experience of different cohorts would become less interchangeable in Russia's slowly stabilizing social, occupational and institutional structure. This would be a particularly likely scenario, unless counteracted by migration and other demographic policies designed to release the burden of the demographic echo of war, and/or any other radical changes in Russia's social structure of the kind it has experienced since the 1990s. In any case, this remains a matter for potentially interesting research in the near future.

5.6. Appendix

Table 5-4. Summary statistics

Variables	Mean	SD	Min	Max	N valid
Occupation (original ISEI)	43.6	16.6	16	90	116,232
Occupation (imputed ISEI)	42.8	16.0	16	90	141,672
Average monthly wage (log)	5.72	1.01	–1.14	9.47	116,793
Average monthly wage (log, imputed)	5.55	1.17	–1.44	9.47	138,640
Unemployed	.30	.46	0	1	177,738
Cohort size, in millions	2.29	.41	.96	4.23	177,539
Retiring workforce as percent of total	1.98	.40	.97	2.84	167,341
Prime-aged workforce as percent of total	26.7	2.81	22.2	33.9	167,341
Gender (male)	.48	.50	0	1	177,844
Years of education (original)	12.9	2.48	0	19	177,541
Year of birth	197.8	13.2	1934	1999	177,844
Unemployment rate	7.43	3.70	.80	24.9	177,844
GRP capita (prices of 1994, log)	8.69	.64	6.93	1.1	167,341

Table 5-5. Correlated random effect models for labour market outcomes – age-varying effects of demographic variables

	(1) Occupation (original ISEI)	(2) Unemployed	(3) Average monthly wage (log)
1. Cohort size, in millions	1.882 (2.391)	$-.675^{**}$ (.040)	.199 (.151)
2. Retiring workforce as percent of total	2.334 (2.054)	$-.432^{**}$ (.044)	$.412^{**}$ (.126)
3. Prime-aged workforce as percent of total	–.108 (.274)	$.035^{**}$ (.006)	$-.067^{**}$ (.018)
Age	1.262^{*} (.558)	$-.133^{**}$ (.011)	$.100^{**}$ (.037)
Age^2 / 100	-1.713^{*} (.012)	$.158^{**}$ (.000)	–.088 (.000)
1. x Age	–.220 (.125)	$.033^{**}$ (.002)	–.008 (.008)
2. x Age	–.001 (.108)	$.020^{**}$ (.002)	$-.015^{*}$ (.007)
3. x Age	.003 (.015)	$-.002^{**}$ (.000)	.002 (.001)
1. x Age^2 / 100	$.353^{*}$ (.001)	$-.040^{**}$ (.000)	.007 (.000)
2. x Age^2 / 100	–.102 (.000)	$-.023^{**}$ (.000)	$.018^{*}$ (.000)
3. x Age^2 / 100	.005 (.000)	$.003^{**}$ (.000)	–.002 (.000)
χ^2	16568.9^{**}	33739.1^{**}	31932.0^{**}
df	23	23	23
$R^2_{overall}$	.361	.219	.357
R^2_{within}	.017	.104	.248
$R^2_{between}$	.375	.310	.366
σ_u	11.341	.272	.600
σ_e	7.313	.307	.620
ρ	.706	.439	.483
N_{total}	115,899	166,651	109,389
$N_{individuals}$	26,474	33,876	25,619

Notes: Dependent variables do not contain imputed values for missing data. All models include the following controls: 1) gender, 2) years of schooling, 3) cohort birth year, 4) current gross regional product (log), 5) current regional rate of unemployment. CRE models additionally control for within-person averages of all time-varying variables. All monetary variables deflated to the ruble value of 1994. Clustered robust standard errors in parentheses. * p<.05, ** p<.01

Chapter 6. Conclusion

6.1. Introduction

I introduced this thesis with the question of whether Russia's peculiar demographic dynamics, manifested in what Russian demographers term the demographic echo of war, impacted on intragenerational and intergenerational social mobility. The findings of my study suggest that this is indeed the case although the more specific implications turned out more nuanced and complex than they appeared at the beginning. In this concluding chapter, first I provide a short summary of my findings (Section 6.2), highlight what they contribute to the existing literatures (Section 6.3), discuss substantive and methodological limitations of my analyses and outline possible directions for future research (Section 6.4).

6.2. Summary of results

In my first substantive chapter, I provided a critical summary of existing scholarship that explored the effects of ruptured age structures on individual attainment processes. In this review, I identified several important gaps that guided my own analyses and may also prove useful in developing a further research agenda. The most important gaps include: 1) the fact that most empirical evidence in this regard comes primarily from the USA context with just a handful of other Western nations (which justifies the focus on the Russian case with its highly pronounced demographic aftermath of WW2, as well as its distinct institutional trajectory); 2) the lack of a dynamic (life course) perspective on the individual attainment process (which justifies the use of both retrospective and longitudinal data on educational and occupational careers in my own investigation); and 3) the lack of a sociological focus in analysing the effects of population age structure on the social stratification process due to the fact that to date the field has been primarily dominated by demographers and economists.

The first of the empirical chapters (Chapter 3) investigated whether cohort size at birth had an effect on the educational attainment process of Russians whose educational careers unfolded primarily during the Soviet era. My main theoretical argument was based on the common-sense expectation that individuals born to larger cohorts should be more disadvantaged in the educational system due to greater competition and the relatively smaller availability of educational opportunities. By analysing retrospective data from the Max Planck Education and Employment Survey (EES), I found that larger cohort size at birth was indeed associated with a certain disadvantage in the educational attainment process, although for men it was partly compensated by their liability to service in the Soviet army (which, due to larger numbers, they were more likely to avoid). Importantly, my findings also show that the disadvantage due to cohort size was not irreversible. While it was particularly pronounced at the most dynamic phase of young people's educational careers – i.e. their mid-20s – the intergenerational inequality tended to decline slightly over time revealing that people were able to make up for the initial disadvantage by postponing and/or retreating to part-time forms of education that facilitated combined studies and work.

In my second empirical chapter (Chapter 4), I explored more specifically whether the disadvantage of being born into large cohorts in Soviet Russia, was unequally distributed between the descendants of different social origin. Building on the theory of compensatory advantage of social background (e.g. Bernardi 2014; Bernardi and Cebolla-Boado 2014; Bernardi and Grätz 2015) and similar ideas (Alon 2009), I anticipated that children from more advantaged families would be more able to circumvent disadvantages associated with cohort size compared to children from less advantaged families. However, re-analysing EES data, I did not find any evidence in support of this view. What I found was, in fact, quite the opposite: the shortage of slots in the upper levels of the educational system more strongly affected children from more advantaged families, thereby reducing the gap in average levels of educational attainment. At the same time, larger cohort size (and hence greater competition for educational opportunities) did not have an effect on the latter families' positional advantage. In other words, increases in cohort size at birth were not associated with any sizeable shifts in relative social inequality in educational attainment (thus corroborating a well-known empirical generalization implied with the Maximally Maintained Inequality hypothesis (Raftery and Hout 1993)).

In my final empirical chapter (Chapter 5), I focused on how the changes in Russia's population age structure affected by WW2 impacted on the careers and labour market outcomes of post-Soviet Russians. By reassessing the theory of relative cohort size in the post-Soviet context I predicted that cohort size at birth should have only weak relevance to career success. Russia's market transition depreciated much of the older generations' human capital (Sabirianova 2002), and forced them to compete with younger workers in what one may conceptualize as a single (i.e. not segmented by age) labour market. However, I hypothesized that Russia's demographic echo of war would still affect individual labour market careers by having a profound effect on the dynamics of labour market demography experienced over one's life course. Specifically, building on the insights from organizational demography (Sørensen 1974, 1975, 1977; Kalleberg and Sorensen 1979; Stewman 1988; Rosenfeld 1992), I hypothesized that faster rates of retirement experienced over one's career would have a boosting effect on career mobility, whereas a larger supply of workers in their prime age would block many opportunities for employment and fast promotion. Using the Russian Longitudinal Monitoring Survey (covering the period from 1994 to 2016), I show that cohort size at birth was indeed irrelevant to career outcomes in post-Soviet Russia. And although the relative size of prime-aged cohorts proved largely irrelevant for career outcomes, my findings reveal a consistent (albeit small) positive effect of faster retirement rates on career mobility.

Taken together, the findings of my study suggest that Russia's demographic echo of war affected individual mobility patterns of Russians in many intricate ways, not limited to the size of one's own generation.

6.3. Summary of contributions

In my opinion, this study and the findings above make several important contributions to the literature. First of all, and rather generally, they overcome, to some extent, the deficit of knowledge about how population age structure development and individual attainment process are related in a country that represents both a socialist and a post-socialist context. To my knowledge, to date no similar research has been carried out with respect to any other post-socialist country, whereas most of what we know about similar issues is based on extensive research carried out in Western developed nations. Yet, as will be shown below, this distinctive context underpins much of the more specific contributions (and implications) of this study.

1. This is the first study to use micro-level evidence and life-course data to back earlier speculative accounts suggesting that, in Russia, 'small generations [enjoyed] an easy social life […] less populated […] kindergartens and schools [and] less competition in access to higher education institutions'[80] (Вишневский 2006:491 translated from Russian). A few previous estimates that claimed to substantiate such generalizations at best made use of aggregate official statistics (e.g. Горшков and Шереги 2010; Чередниченко 2016), which obviously do not provide a good grasp of educational careers. In fact, the same is true for multiple earlier studies carried out in several other countries (Ahlburg et al. 1981; Wachter and Wascher 1984; Dooley 1986; Flinn 1993; Bound and Turner 2007; Saavedra 2012). And yet, to expand on this point further, my study has also shown that neglecting the life course perspective when considering the effects of cohort size on the educational attainment process can underestimate the role played by the demographic forces. Particularly exemplary in this respect are the findings regarding the development of the educational careers of different cohorts over time, and the salience of the mediating effects of military conscription (for men) and part-time education.

2. By explicitly investigating the effect of intracohort competition on intergenerational social mobility in the Soviet context this study contributes to the growing literature on the compensatory advantage of social background (Bernardi 2014; Bernardi and Cebolla-Boado 2014; Bernardi and Grätz 2015). In contrast to the predictions from this theory, my findings did not reveal that, in the context of higher competition (i.e. large cohort size), people from higher social backgrounds were able to protect their positional advantage any better than those from lower social backgrounds. My tentative explanation to this fact suggests that the Soviet educational system and the institutional context surrounding it simply did not provide any effective means by which social advantage of parents could be converted into additional educational advantage of their children. To highlight this point I relate my findings to those of Alon (2009) by studying the impact of rising competition on social inequalities in higher education in the USA. She shows that American upper-class families responded to increasing competition by increasing investment in their children' academic preparation. Whereas American families could enjoy a free and rich market of extracurricular educational opportunities in addition to the state educational system, such a market could not exist in Soviet

[80] See p.3 for a more complete citation.

Russia, at least openly, and therefore Russian families were much more constrained in their ability to convert their social and economic capital into their children's academic advantage. This juxtaposition potentially sheds light on some of the possible mechanisms underpinning the phenomenon of compensatory advantage in educational stratification – a point definitely worthy of examination in future research.

3. My study contributes to the literature on the effects or relative cohort size on labour market outcomes by contextualizing the theory and its implications in the post-Soviet context. Specifically, by recognizing the well-established fact that market transition was associated with severe human capital depreciation (Orazem and Vodopivec 1997; Svejnar 1999; Lehmann and Wadsworth 2000; Sorm and Terrell 2000; Sabirianova 2002) and showing empirically that cohort size at birth did not have a consistent effect on labour market outcomes in post-Soviet Russia, my investigation in Chapter 5 makes the case for the likely irrelevance of cohort overcrowding in post-socialist countries.

4. Finally, I contribute to the literature on relative cohort size and labour market outcomes in one more important respect. Previous studies have mainly focused on the effects of (relative) cohort size alone (Wachter and Kim 1979; Welch 1979; Freeman 1981; Ahlburg 1982; Anderson 1982; Tan and Ward 1985; Berger 1984, 1985, 1989; Dooley 1986; Ben-Porath 1988; Bloom et al. 1988; Ermisch 1988a, 1988b; Martin and Ogawa 1988; Murphy et al. 1988; Riboud 1988; Zimmermann 1991; Browne 1995; Korenman and Neumark 2000; Slack and Jensen 2008; Brunello 2010; Garloff et al. 2013) and did not consider the dynamic changes in labour market demography which, together with one's cohort size, are largely determined at birth. My study expands on this by bringing these effects into the picture and showing they too prove relevant for how one fares in his or her career over the life course. Needless to say, and especially in conjunction with the contribution highlighted in point 2 above, this highlights the importance of approaching issues of social mobility from a life-course perspective, providing a much richer and comprehensive account of the process in question.

6.4. Limitations and venues of future research

Just like any other study, the current work is not free from limitations. In the following, I highlight the issues that temper the scope, the validity and the implications of my findings, but also point to fruitful directions for future research.

1. First, while this study *does* introduce the Russian case to the literature, that has so far featured mainly Western developed countries, it is limiting in that it focuses so *exclusively* on the Russian context. The key challenge is that this context may be too specific to extrapolate findings to other post-socialist countries. In addition to its rather unique demographic history (highlighted in the Introduction – Section 1.2.1, and Chapter 2 – Section 2.3.3), Russia represents a highly specific cultural and socio-historic context, especially if one acknowledges the idiosyncrasies of its structural and institutional arrangements during both the socialist and the post-socialist eras (Hedlund 2000, 2011; Lane and Myant 2006; Bluhm 2010). Thus, it would be fruitful to expand this research by revisiting some of its theoretical arguments and empirical findings in other post-socialist countries.

In fact, addressing similar issues in a wider comparative context might be even more pertinent, given that some of the findings tentatively suggest that some contextual factors might moderate the relationship between population age structure and social mobility, for example: the role of part-time education in reducing the disadvantage associated with cohort size in full-time education as discussed in Chapter 3; the role of markets for extracurricular training and education in translating social background advantage into social mobility advantage as discussed in Chapter 4; and the role of human capital depreciation in rendering the effect of cohort size irrelevant in post-socialist labour market contexts as discussed in Chapter 5. Given that all of these are merely tentative theoretical arguments informed by empirical findings in this study, their plausibility remains a matter for future empirical investigation.

2. It is also disappointing that data constraints did not allow me to engage in a meaningful comparison of the processes in question between the Soviet and the post-Soviet context. First of all, I regret not being able to extend the analyses in Chapter 5 and to look into career mobility during the Soviet period. Such an enquiry could have highlighted how the relationship between changes in population age structure and social mobility is moderated by particular welfare state arrangements and, particularly, whether the advantages of small (vs

large) cohorts may have indeed been eroded by large scale economic restructuring in the post-Soviet era and the resulting depreciation of Soviet generations' human capital.[81] Second, I regret not being able to compare the differences in the effect of generational overcrowding on social inequality in educational attainment (i.e. the analysis initiated in Chapter 3). However, unlike the issue with career mobility, the primary reason for not engaging in such a comparison is the considerable investment required to make intergenerational RLMS data compatible with EES data.[82]

3. Following some established conventions (e.g. Blau and Duncan 1978; Kerckhoff 1995; Breen and Jonsson 2005), this study conceptualizes social mobility exclusively through educational and occupational attainment (or labour market outcomes). It is also fair to say, however, that this conceptualization was additionally driven by limited data availability about other domains of social mobility. While there is no doubt that both educational and occupational attainment correspond to the crucial dimensions of social stratification in modern societies (Kerckhoff 1993; Breen and Jonsson 2005; Elo 2009) including both socialist and post-socialist countries (Yanowitch and Fisher 1973; Teckenberg 1981; Teckenberg and Vale 1989; Gerber and Hout 1995), clearly they do not exhaust the definition of social mobility. Perhaps even more importantly, they do not exhaust the list of determinants of individual well-being or life chances

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[81] This is not to say that I have not attempted this. EES contains some information from which respondents' occupations can be inferred more or less precisely. This includes (1) a list of 15 crude authentic occupational categories (cf. "qualified workers who use complex mechanisms and machinery", professionals with secondary education in medicine, teaching and natural sciences" and "top managers"), (2) a list of 18 industries (e.g. "mining" and "manufacturing") and (3) a list of 19 'positions' with rather confusing items mixing together occupational titles and organizational ranks (e.g. "unqualified worker", "self-employed lawyer, doctor or notary with employees" and "leader with a significant managerial authority"). As part of my effort in recovering this occupational information, I have written a Stata routine which identifies the most plausible set of ISCO codes corresponding to each combination of items from the three lists above, of which one code is then selected randomly to fill each of the slots in respondents' biographies. Single ISCO codes are further translated into ISEI codes using the standard available routine (Hendrickx 2004) to obtain a measure of the 'most likely' occupational status. Applying this procedure to the modeling of occupational careers generally yields meaningful results (e.g. the concave shape of career pattern over age, social origin differences and others). However, since by construction this measure is endowed with a large degree of uncertainty, it poses serious challenges to statistical inference and leads to extremely noisy estimates. This is why I decided to abstain from using this measure in my analyses and abandoned the idea of tracing occupational careers from the Soviet to the post-Soviet period. The transformation routine is available upon request.

[82] Particularly disturbing is the poor quality of RLMS data on individuals' educational attainment (my exploratory analyses have revealed that respondent's educational attainment is highly inaccurate). Besides, extracting the data on respondents' parents' occupation and/or education in RLMS is not entirely straightforward. While such data was collected only in 2006 and (partly cross-verified in) 2011 (as per respondents' age 15), it features a high rate of non-response (as well as inconsistencies between the reports in 2006 and 2011). The missing information can partly be reconstructed from household rosters, but this links back to the problem above (i.e. inaccuracy of individuals' educational attainment measures).

broadly construed. For example, following the arguments developed in this study, some previous research (Easterlin 1980; Pampel and Peters 1995; Pampel 2001; Macunovich and Easterlin 2008), one could also envisage generational overcrowding effects with regard to such outcomes as physical and psychological well-being, specific aspects of life quality (e.g. housing conditions) and life satisfaction in general.

4. Although highlighted in the critical review of prior literature (Chapter 2) as a potentially rewarding area of investigation, this study did not explore systematically the implications of generational overcrowding for the *trade-off* between *demographic behaviour* and *social mobility*. In other words, instead of treating both demographic behaviour and social mobility decisions as intricately intertwined, this study implicitly assumes that the effect of generational overcrowding on individual social mobility is, in a way, partly mediated by adjustments in individual demographic behaviour (e.g. by forcing individuals to postpone marriage and having children as suggested by Easterlin (1980)). What might be an interesting further angle, however, is to consider to what extent exactly the demographic behaviour of individuals is affected by their location in the population age structure, i.e. whether the effects of generational overcrowding indeed spill over in the form of individual demographic outcomes. Another possible perspective is to understand to what extent the link between location in the population age structure and social mobility is indeed mediated by demographic outcomes. Obviously, this is a methodologically challenging task as well, given that social mobility can itself be conceptualized as both affecting and being affected by demographic outcomes.[83]

5. Another pertinent issue (also solicited in the review in Chapter 2) which remained completely unaddressed in this study is the possible heterogeneity of the effects of cohort size at birth and changing labour market demography on career outcomes (i.e. issues raised in Chapter 5) *conditional* on individuals' educational attainment. Although subject to the previously mentioned data constraints (see footnote 82 on p.143), this issue is potentially an interesting line of further enquiry.

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[83] The assumption that social mobility aspirations are prioritized over demographic decisions has a long historical tradition going back to Arsène Dumont's reflections on the social causes of depopulation in Europe and his "law of capillary action" (Dumont 1890). However, one could easily argue that sacrificing mobility prospects for the sake of family formation is also not unusual (and can, for instance, vary across cultural and social contexts). As such, this might indeed pose a serious challenge to causal and mediation analysis.

6. Finally, and perhaps most importantly, I would like to highlight once again an important methodological limitation common to all three empirical chapters in this dissertation. Although some theoretical attention has been paid to the potential sources of bias in identifying the effects of changing population age structure on social mobility and inequality, it may be the case that these sources of bias are not very effectively addressed in the methodological sense. While there is little doubt that the nature of large-scale changes in population age structure, is almost entirely exogenous (i.e. by the event of WW2), the biggest challenge is the fact that these changes unfold very slowly thus making it likely that they coincide with some other important cohort or period effects potentially having an effect on educational and occupational structure.[84] Were it the case that the sample of cohorts was sufficiently large to ensure that systematic variation in cohort size due to demographic war echoes remains completely uncorrelated with such contemporaneous changes, this would not have been a problem. However, this is far from being the case in each of the chapters, with cohort size variation ranging between 1.5 and 3 full cycles of demographic peaks and troughs. To the extent possible, I have tried to deal with this problem by explaining my assumptions about the possible sources of such contemporaneous confounding (e.g. the secular trend of educational expansion in Chapter 3, the alleged growing elitism of access to upper levels of education in the late Soviet period in Chapter 4, and the concurrent changes in the macroeconomic context post-transitional Russia in Chapter 5), with the implication that trust in my findings is highly contingent on the plausibility of these identification assumptions.

6.5. Final remarks

Perhaps few would disagree that the most intriguing aspect of this enquiry has to do with the implicit idea that our life chances could partly be determined at birth. In fact, Richard Easterlin, who can be said to have pioneered work on similar issues, made this intuition explicit by titling

[84] Although, strictly speaking, the specific contemporaneous changes in educational and occupational structure invoked through policy measures in response to demographic shifts are not a concern as long as the research interest remains in identifying the *total* (rather than direct) impact of changes in population age structure on individual educational/occupational outcomes (i.e. in that sense finding a zero effect of these population changes on individual attainment would indicate that such policies were effective).

his seminal book *Birth and Fortune: The Impact of Numbers on Personal Welfare* (1980). In turn, if our life chances are indeed influenced by something that is beyond our control – in this case, the timing of birth associated with different demographic contexts experienced over the life course, just as it is the case with many other ascriptive characteristics like social class, gender or ethnicity, this inevitably raises the issue of social (in)justice.

Nevertheless, from the sum of empirical arguments produced in this study I am tempted to conclude that my findings do not seem to warrant the concern of such intergenerational injustice. First and foremost, this is suggested by the fact that the effects of macro-demographic variables, such as cohort size at birth or the rate of displacement of retiring cohorts, did not appear to be substantively significant, especially if compared to other, more conventional determinants of social mobility (such as, for instance, gender or social origin). Moreover, these effects appear miniscule when judged against the tremendous variation in the sizes of generations themselves. This, as well as some complementary evidence (such as the narrowing of the educational disadvantage over the life course as found in Chapter 3) optimistically suggests that there is still enough room for agency for members of different cohorts to compensate for the (dis)advantage associated with their demographic (mis)fortunes (provided of course that they are sufficiently backed by institutional opportunities, as was, for instance, the case with part-time education during the Soviet era).

To end on a high note, I would like to epitomize this idea with the following scene from Lev Tolstoy's opus magnum *War and Peace* which I recently came across when re-reading the classic. To provide some context, the scene takes place before the epic battle of Borodino, in which the Russian and the Napoleonic armies were about to clash in what will be called the bloodiest battle of the whole nineteenth century and which would become the turning point, putting an end to the victorious Napoleonic campaign. Contemplating the possible outcome of the anticipated battle, two of the novel's main characters, Prince Andrew and Pierre (Count Pyotr), hold an argument regarding the role of tactics, troop numbers and troop morale for securing a victory:

> *Prince Andrew:* "[I]n war a battalion is sometimes stronger than a division and sometimes weaker than a company. The relative strength of bodies of troops can never be known to anyone […]. Success never

> depends, and never will depend, on position, or equipment, or even on numbers, and least of all on position."
>
> *Pierre:* "But on what then?"
>
> *Prince Andrew:* "On the feeling that is in me and in him," he pointed to Timokhin [the Prince's battalion commander], "and in each soldier." […] "A battle is won by those who firmly resolve to win it!" (Tolstoy, L. *War and Peace.* Book X. Chapter 25.)

Although still debated by historians as the single true cause of the Russians' success in driving the French back, the patriotic uprising of Russians and their superior morale remains a popular account of their ability to withstand the Napoleonic onslaught. Nevertheless, as debatable as it is, the moral of agency embedded in such accounts, certainly seems to deserve some merit with respect to the human fortunes scrutinized in my research.

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