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The Gap that Survived the Transition:

The Gender Wage Gap over Three Decades in Estonia

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The Gender Wage Gap over Three Decades in Estonia

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Abstract

This paper looks at the gender wage gap throughout the transition from communism to capitalism and throughout a time of rapid economic convergence. The case of Estonia is used, and micro data from the Labour Force Survey from 1989 to 2020 are employed. The communist regimes had highly regulated wage setting and high levels of educational attainment and labour market participation for women. Although the regime was formally egalitarian, the gender attitudes were conservative and the raw gender wage gap was as large as 41% at the end of the communist period in Estonia. The large gender wage gap under communist rule narrowed quickly during the first years of economic transition, but the further decline in the gap has been slow. The paper has two main messages. The first is that there is strong inertia in the gender wage gap persisting through the communist period and economic convergence. None of the known long-run cultural drivers of gender attitudes can explain this. The second is that the decline in the gap is related to the overall decline in wage inequality, the rise in minimum wages, and more egalitarian gender attitudes. The gender attitudes are responsible for a smaller effect than wage inequality is.

Keywords: gender wage gap, wage distribution, decomposition, post-communist economies, wage inequality, minimum wages, gender attitudes

JEL classification: J31, J71, P23

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1. Introduction

The gender gap in educational attainment and labour market participation has narrowed fast since the 1980s, helping to reduce the gender wage gap (Blau and Kahn 2017, Gallen et al. 2019). However, the decline in the gender wage gap has slowed down, especially at the top of the wage distribution (Blau and Kahn 2017, Fortin et al. 2017). New factors such as the dispersion of productivity within firms (Bruns 2019), the different segregation of men and women between firms (Cardoso et al. 2016, Gallen et al. 2019), and labour market institutions (Bruns 2019, Bargain et al. 2019) have gained importance as alternative explanations.

The aim of this paper is to understand the long-run determinants of the gender wage gap. We contribute to the literature on long-run determinants of the gender wage gap by studying a country with a communist past. The paper calculates and analyses the origins of the gender wage gap in Estonia from the end of communist times in 1989 until 2020. The individual-level data from the Estonian Labour Force Survey are used to derive the long time-series of the unconditional and conditional wage gaps. In addition to conditioning on conventional factors such as demographics, education, labour market experience, firm-level factors, occupation and industry, the role of various country-level factors is also analysed. Wage inequality, labour market institutions and gender attitudes usually see only limited variation over time, which makes it difficult to analyse the role of these factors in a time-series setting. The natural experiment of switching from communism to capitalism led to large variation in institutional variables, allowing for more plausible within country analysis in a time-series setting.

The paper is linked to three lines of literature: the recent literature on the long-run determinants of the gender wage gap, the role of the communist past in the gender wage gap, and the role of gender attitudes in the gender wage gap.

The first line of literature comprises papers on the long-run drivers of the gender wage gap that use data from North American or Western European countries. The findings are that the gap between the educational attainment of men and that of women has closed since the 1980s and the role of education in explaining the gender wage gap has declined (Blau and Kahn 2017, Gallen et al. 2019). It has also been shown that the role of occupational segregation in the gender wage gap has declined (Brynin and Perales 2016) and that the role of segregation between firms has increased (Cardoso et al. 2016, Gallen et al. 2019). The segregation between firms has become important in explaining the gender wage gap among the top wage earners (Cardoso et al. 2016, Bruns 2019, Masso et al. 2020), and this overlaps with the increase in between-firm productivity dispersion and the rise of superstar firms (Van Reenen 2018, Autor et al. 2020). It has been shown that labour market institutions such as union density and minimum wages have an important effect on wage dispersion (Fortin et al. 2018). The weakening of unions has slowed down the convergence of the wages of men and women (Bruns 2019), while rising minimum wages have helped reduce the gap at the bottom of the distribution if compliance is ensured (Bargain et al. 2019, Ferraro et al. 2018).

The second research line addresses the role of the communist past in the gender wage gap. There is no consensus in the literature on how the communist past has contributed to gender wage gaps in post-communist economies. Some research has found that gender wage gaps increased during the transition process from communism to capitalism (e.g. Pastore and Verashchagina 2011, Trapido 2007), while there are other studies that find gender wage gaps narrowing throughout the transition process (Brainerd 2000, Jolliffe and Campos 2005, Kecmanovic and Barrett 2011, Newell and Reilly 2001, Heyns 2005). One of the conclusions of this literature is that while women gained from the transition in the majority of the former communist countries, there were exceptions like Russia and Ukraine where women lost from the transition because the wage distribution widened and women ended up at the lower end of the distribution (Brainerd 2000). Minimum wages have had a key role in this. It has also been discussed that the low quality of data or the non-comparability of the data from before and after the transition may explain the inconclusive results on whether women won or lost from the transition (Jolliffe and Campos 2005). Education and labour market participation cannot explain the gender income gaps in post-communist economies, because the education level and labour market participation of women were high in communist economies (Semykina and Linz 2010). There is though some evidence that men were more successful than women in moving up to better paid jobs during the transition process (Trapido 2007).

The paper closest to ours is one by Jolliffe and Campos (2005), who study the longer time-series of the gender wage gap from the time of the communist area. However, even in their study, the timespan covers the first decade in transition, and the implications of further decades are unstudied. The same data as in our study are used by Orazem and Vodopivec (2000), but only to study the very first effects of the economic transition on the gender wage gap in 1989–1994. To the best of our knowledge, the long-run implications of the communist past on the gender wage gap have not been analysed before. We aim to contribute to the literature by studying a timespan of three decades. The value added from our study is that we derive a long time-series of a comparable *conditional* gender wage gap and estimate the additional role of institutional variables such as wage inequality, minimum wages and gender attitudes.

In the third stream, looking at the role of gender attitudes in the gender wage gap, the literature usually focuses on long-lasting cultural factors such as the role of agriculture (Hansen et al. 2015) or the type of agriculture (Alesina et al. 2013), language (Gay et al. 2013, Shoham and Lee 2018), or religion (summarised by Giuliano 2017) in gender attitudes. Another approach has been to show the persistence of gender attitudes by estimating the effect of shocks decades or centuries ago such as gender-biased demographic shocks on gender attitudes today (Acemoglu et al. 2004, Goldin and Olivetti 2013, Grosjean and Khattar 2019, Teso 2019). These papers mostly exploit cross-sectional data to reveal whether various historical episodes explain the current variation in gender attitudes. A similar setting has also been used to show the effect of the communist political regime on more egalitarian gender attitudes (Bauernschuster and Reiner 2012, Campa and Serafinelli 2019) and household behaviour and structure (Lippmann et al. 2020), and even on the smaller gender gap in maths (Lippman and Senik 2018). However, much less is known about the interchange of gender attitudes and the gender wage gap in a time-series setting. Our empirical data provide a good opportunity to remedy that. We have reasonably long time-series stretching over three decades on the conditional gender wage gap and gender attitudes.

The paper demonstrates that the raw gender wage gap for full-time workers was as large as 41% during the communist times in 1989. The raw gender wage gap diminished quickly after the market economy was introduced, mainly because distortions in the labour market such as low returns to education became eroded. The gap closed much more slowly afterwards. The unexplained gender wage gap has

been highly persistent at around 25–30% for most of the timespan, and has only declined in recent years. Women have definitely won from the transition from the communist economy to a market one, as their education is rewarded more highly by the labour market and they have much better education than men nowadays. Women have accessed better jobs as the role of occupational segregation in explaining the gender wage gap has diminished. The only factor that has a similar effect in enlarging the gender wage gap in 1989 and in 2020 is sectoral segregation, as there are still many more women employed in low wage sectors such as education and services. These trends have also been observed in other developed countries that do not have a communist past.

We show that despite the rapid and liberal economic reforms and the successful economic convergence, the gender wage gap has been resistant to decline. Estonia had the largest gender wage gap among the communist countries in 1989 (Brainerd 2000, Orazem and Vodopivec 2000) and the largest gender wage gap in the EU in 2018 (Eutostat series TESEM180). None of the long-run cultural factors that have been found to shape gender attitudes can explain the wide gap. However, we demonstrate that country-level factors such as wage inequality, minimum wages and gender attitudes have helped narrow the gap. The strongest effect comes from wage inequality, and the decline in wage inequality can explain 6.5pp of the 15pp reduction in the unexplained gap. The gradual increase in minimum wages accounts for more than half of this effect. More egalitarian gender attitudes have also contributed to the closing of the gender wage gap, though this effect is probably responsible for a smaller part of the change than wage inequality is.

The paper is organised as follows. The next section provides a review of the related literature, focusing on the long-run determinants of the gender wage gap. This section also presents the economic and institutional background of our sample country, Estonia. The third section describes the data and methods. The fourth section provides results on the unconditional and conditional gender wage gaps over three decades. The fifth section analyses the roles of wage inequality, minimum wages and gender attitudes in the gap. The last section summarises the findings.

2. Related literature and the background to the study

2.1. LONG-RUN DETERMINANTS OF GENDER ATTITUDES AND THE WAGE GAP

As cultural norms and attitudes are taken to be highly persistent over time, the determinants of the gender wage gap today may date back hundreds of years. The most common dependent variable in the studies on the persistence of cultural norms and attitudes towards gender is female labour force participation. In this subsection, we use this variable to compare the economic size of the effect of various historical episodes researched in different papers. The studies take female labour force participation as a proxy for cultural norms and gender attitudes. The effect of long-run determinants such as gender attitudes on the gender wage gap is much less frequently studied, but we will also cover these few studies.

Alesina et al. (2013) demonstrate that ethnicities that practiced plough agriculture have less egalitarian gender attitudes, and women from them nowadays exhibit lower labour market participation, and less entrepreneurial and political activity. They compare plough agriculture to shifting hoe cultivation. Men had an advantage in operating the physically demanding plough, and this led to a division of labour where men were working in the fields and women were engaged in work at home. Shifting hoe cultivation in contrast was labour intensive and engaged both men and women in the fields. They introduce a large set of historical, contemporary and geographical controls and show that the use of the traditional plough before industrialisation implies less egalitarian gender norms today. Their estimates using instrumental variables show that plough use has a large effect on female labour force participation rates of -11 percentage points.

There is also evidence that engagement in agriculture in itself implies that gender attitudes today will be less egalitarian than following engagement in hunting and gathering. Hansen et al. (2015) show that women in societies where the Neolithic Revolution, which saw the switch from hunter-gatherer societies to agricultural societies, happened earlier have lower labour force participation and weaker political engagement of women today. They argue that switching to agriculture enforced the masculine culture, while women had more children because they did not have to carry them around and could focus on work at home. This led to a stricter division of labour where women worked on food processing and raising children at home while men produced food in the fields. In a society of hunting and gathering, women produced more than half of the family’s calorific intake, were more independent of men, and presumably had higher bargaining power within the family. The study finds that a switch to agriculture a thousand years earlier implies a female labour force participation rate that is around four percentage points lower. This effect is robust to controls for historical plough use, showing that it is not just the use of the plough, but agriculture itself that had an effect on gender attitudes becoming less egalitarian.

There are many insightful variables that have a long-run impact on gender attitudes or carry information on gender attitudes. Countries with gender neutral languages for example have a higher female labour force participation rate and more active participation by women in politics (Gay et al. 2013). Gay et al.

(2013) distinguish four indexes based on gender-related features of languages and show that gender neutral languages have more egalitarian gender attitudes, even after controlling for a large set of controls, such as geography, climate, colonisation, continent, religion and even plough use. Languages like Finnish or Estonian that have the lowest aggregate gender intensity index score of zero have a conditional labour force participation rate for women that is 20 percentage points higher than that for languages like Spanish or Arabic that have the highest score of four. Shoham and Lee (2018) show that the same gender intensity index also has an effect on the gender wage gap. An increase of one unit in the gender intensity score of the language increases the gender wage gap by 1.3 percentage points; from our sample country Estonia to Spain there is a four-unit difference in the index, which corresponds to a 5.2 percentage point difference in the gender wage gap. The size of the effect is large and the authors claim that grammatical gender marking performs better in explaining the variation in the gender wage gap than survey-based cultural variables such as Hofstede's masculinity. The grammatical structures of languages are stable over time, capturing underlying deep cultural factors better than survey-based measures that are affected by current socio-economic factors.

Religion is also closely related to gender attitudes. As summarised by Giuliano (2017), Protestants educate women better, and less frequently have the traditional breadwinner family model than Catholics, Orthodox Christians or Muslims. The mechanism behind this difference comes from the reformist idea that women should be able to read the bible in order to get to heaven. However, religious individuals from whatever religion have less egalitarian gender attitudes than unreligious people or those who do not go to church (Giuliano 2017).

Drastic gender-biased demographic shocks can also have a long-lasting effect on gender attitudes and the labour market participation of women. Grosjean and Khattar (2019) demonstrate that Australian districts that had extremely high male-female ratios back in the 18th century and in the beginning of the 19th, because male convicts were sent from Britain to Australia, today have less egalitarian gender attitudes, lower labour market participation for women and fewer women in highly ranked positions. The temporary excess number of men in the society led to a higher marriage rate for women and greater engagement of women in life at home rather than in professional life, and this had a persistent effect on gender attitudes even after the gender bias in demographics disappeared. They do not find a statistically significant effect on the female labour force participation rate, but confirm the statistically significant sizeable negative relationship for hours worked.

Similarly, female-biased demographic shocks can have the opposite effect. Teso (2019) shows that the transatlantic slave trade had a persistent impact in terms of greater labour market participation by women and lower fertility rates in the districts of Sub-Saharan Africa where slaves were mainly traded. The transatlantic slave trade mostly exported male slaves from Africa, leaving behind ethnic groups where the ratio of men to women dropped dramatically.[1] As a result, women took up traditionally male jobs. The majority of the slave trade took place in the 18th century, though it lasted for a longer period from the 15th to the 19th, and the authors show that this shock had an impact on gender attitudes towards working women, though not necessarily towards the engagement of women in political life, that

[1] To put the size of the shock into perspective, the male convicts shock in Australia led to a male-female ratio of four to one (Grosjean and Khattar 2019), while the transatlantic slave trade shock resulted in a female-male ratio of two to one in some regions (Teso 2019).

still persists today. The slave trade shock increased the female labour force participation rate by five percentage points in ethnic groups that were exposed to the trade.

A well-studied female-biased demographic shock is the effect of World War II on the labour market activity of women in the US. Goldin and Olivetti (2013) show that this effect persisted until the 1960s. Women took up the jobs of men during the war and stayed in the labour force even decades later, long after the men had returned from the front. Goldin and Olivetti (2013) use state-level data on mobilisation rates and find that the employment rate for women from states with high mobilisation rates was 5–6 percentage points higher than that for women from states with low mobilisation rates. The shock was especially persistent for women who entered white-collar jobs at the time when the shock appeared. This supply shock also had implications for wages. Acemoglu et al. (2004) show that the wages of women declined more due to this shock than the wages of men did, implying that the gender wage gap increased for those employed. So the positive effects found for female labour force participation do not necessarily imply that the gender wage gap was reduced, at least not in the short run.[2]

2.2. THE EFFECT OF A COMMUNIST PAST

The natural experiment of communism is widely used to understand how a political regime affects gender attitudes. The example of the division and reunification of Germany is the most popular empirical ground for these studies, but there are other empirical settings where Eastern Europe with its communist past can be compared to Western Europe. Bauernschuster and Reiner (2012) show that former East Germans hold much more egalitarian gender attitudes than former West Germans do. They find that there has not been any convergence between the gender attitudes in East and West after reunification. This indicates how gender attitudes persist, unlike other attitudes, such as those towards redistribution, that have shown convergence. Similarly, Campa and Serafinelli (2019) demonstrate that women from former East Germany had more egalitarian gender attitudes and higher employment than women from former West Germany shortly after the reunification. This difference was still as large almost 25 years after reunification, confirming again the strong persistence of gender attitudes. They use an alternative empirical setting by comparing US immigrants from European countries with and without a communist past and confirm the same finding that immigrants from communist countries have more egalitarian gender attitudes.

The model of the male breadwinner in the family has been rooted much more deeply in Western Germany than in Eastern Germany. Lippmann et al. (2020) show that household behaviour and structure were influenced by the period of communism. If a woman starts to earn more than a man in a household, the woman in Western Germany starts to compensate by increasing her hours of housework, while the woman in Eastern Germany reduces her hours of housework. In addition, the risk of divorce increases if a woman starts to earn more than her husband, but the risk increases only in Western Germany and not in Eastern Germany. Similarly, if a woman starts to earn more than a man or can potentially earn more than a man, the risk increases of her withdrawing from the labour market in Western Germany, but not in Eastern Germany. The study also shows that the positive effect of communism on women’s employment carries on to the second generation, from mothers to daughters.

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[2] We refrain from discussing the role of psychological attributes or personal traits in this paper (see e.g. Bertrand 2011). However, these notions are intertwined with gender attitudes, may be elements of them or can be affected by them. There is evidence that gender differences in personality traits vary by language or culture (Pulver et al. 1995).

Communism also affected the educational attainment of women, not only by encouraging them into higher education, but also allowing them to become better at maths. Lippman and Senik (2018) show that the gender gap in student maths scores is lower in Eastern Germany than it is in Western Germany. They demonstrate that the same holds for a larger group of European countries, as the conditional gender gap in student maths scores in Eastern Europe is half that in Western Europe. They assign this difference to long-lasting gender attitudes. The communist regime saw men and women as equal in the labour market and encouraged women to take jobs in industries where maths was needed, and this had an effect on the maths performance of girls even decades after the fall of the Berlin Wall.

Some authors are critical of the treatment of communism in East Germany as a natural experiment. Becker et al. (2020) argue that there were already remarkable differences in gender attitudes between Eastern and Western Germany before World War II. The protestant East already had a higher female labour force participation rate before the war. There was also a lot of migration from the East to the West before the Berlin Wall was built to stop it, as approximately one fifth of East Germans emigrated to the West and the emigration was probably selective, so that those who had less egalitarian gender attitudes, or who were less prone to redistribution for example, may have left. They conclude that some of the studies may have overestimated the effect of communism on gender attitudes and female labour force participation, but they do not dispute that the effect of communism was and is there.

The effect of communism on the labour force participation of women is also confirmed in a wider set of countries using a sample of 150 countries from all over the world by Alesina et al. (2013). Their study does not aim to estimate how political regimes affect the labour force participation of women, but it uses the communist past as an additional control variable in a study of the effect of plough use on gender attitudes. They use cross-sectional data, but as the set of control variables is very rich, the effect has a causal flavour. Female labour force participation in countries with a communist past was 7–8 percentage points higher in 2000.[3] This is a sizeable effect, given that the average female labour force participation rate was 51%.

Less is known about the dynamics of gender attitudes in the Soviet Union. Nakachi (2011) notes that although gender norms returned to pre-war norms in the West during the 1950s, this was not the case in the Soviet Union. Women stayed in the workforce because the economy needed them and because many men did not return from the front. While the liberation movement in the West in the 1970s was demanding greater economic activity for women, women in the Soviet Union were already more than 50% of the labour force. Despite the high labour force participation rate of women in the Soviet Union, they were also responsible for the majority of work within the household (Brainerd 2000, Nakachi 2011).

Alongside the studies of how communism affected gender attitudes and the labour force participation of women are a large number of studies analysing the dynamics of the gender wage gap before and after the changeover from communism to capitalism. Unlike the studies on attitudes, this literature takes a short-run perspective, often comparing a single observation point before and after the transition. The exception is the study by Jolliffe and Campos (2005), which analyses the gender gap in Hungary over 12 years. The research question in these studies is whether women gained or lost from the transition, and for the majority of European countries, it has been shown that women gained (Brainerd 2000, Giddings 2002). However, there have also been countries where women lost from the transition, such as Russia or Ukraine (Brainerd

[3] Please see the online appendix in Alesina et al. (2013).

2000), where the gender wage gap increased because the wage distribution widened. The steep decline in minimum wages is a plausible explanation of these dynamics in Russia and Ukraine (Brainerd 2000). The main explanation for why women won from the transition has been that women started to enrol in better education and the returns to their education increased, while from the demand perspective, the economy went through a structural change that moved it more towards services, which was a female-dominated field (Orazem and Vodopivec 2000, Brainerd 2000, Giddings 2002).

To the best of our knowledge, none of the gender gap studies have analysed the long-run implication of a communist past on the gender wage gap. We aim to contribute to this discussion by studying the dynamics of the gender wage gap over a long timespan of three decades, and we seek to reveal the longer-run implications of a communist past for the gender wage gap.

2.3. THE EMPIRICAL BACKGROUND: ESTONIA AND OTHER COUNTRIES WITH A COMMUNIST PAST

This subsection provides a comparative view of how our sample country, Estonia, fares compared to other former communist countries and the developed world. The formerly centrally planned economies took different paths of reform. Estonia was a big bang reformer taking a very liberal route, as prices and wages were liberalised quickly and privatisation was fast. The economic reforms in the Baltics resembled those of Central European countries and were less like those of other countries from the former Soviet Union. Even so, the Estonian reforms were probably the most liberal in the region and the degree of economic freedom is more comparable to that in the US than to those of other countries with a communist past.[4] In Estonia, the labour market institutions induced a rapid restructuring with low firing costs for employers and low unemployment benefits for workers who were laid off (Orazem and Vodopivec 2000). While Ukraine and Russia experienced an explosion in the wage distribution with minimum wages becoming extremely low and not binding, the Central European countries and the Baltic countries took a more moderate route where the ratio of minimum wages to average wages did not decline to such an extreme extent (Brainerd 2000).

The dissolution of the existing system of production and the wide-ranging liberal reforms led to economic decline in all the CEE countries during the mid-1990s. The Estonian economy shrank by 38% in real terms between 1989 and 1994, which was less than the declines experienced in the other Baltic states and in Ukraine, but more than was seen in the Central European countries. The year 1989 can be taken as the last year under traditional communist rule, as the switch towards an independent and market-oriented economy started in 1990. Estonia regained independence in 1991 and experienced a period of hyperinflation before its monetary reform in 1992 (Kukk 2014). The years after this revealed convergence with the high-income world, see Figure 1. Economic growth has been above the average for the group of countries with a communist past.[5]

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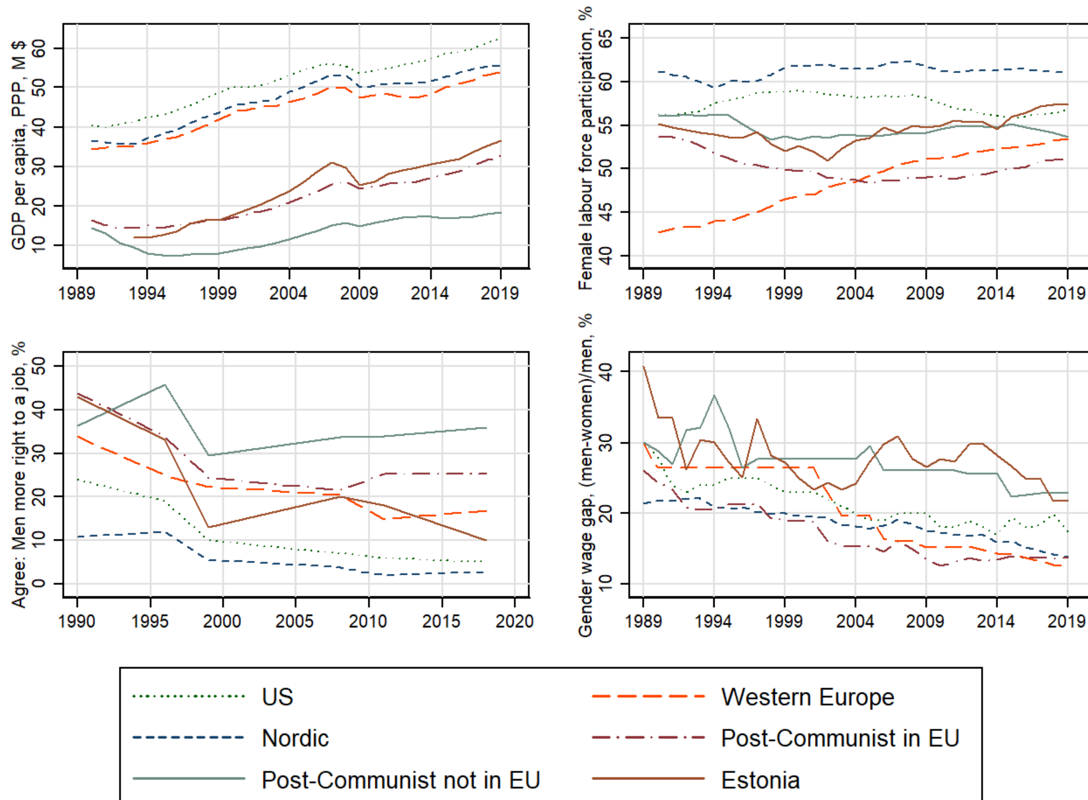
[4] Please see the *Index of economic freedom*, overall score: Heritage.org/index

[5] GDP per capita adjusted for purchasing power parity reached 84% of the EU27 average in 2019 (Eurostat series SDG_10_10).

Figure 1 / Economic performance, gender attitudes and the gender wage gap in post-communist countries and the developed world



Notes: US refers to the United States. Western Europe all EU28 members and Switzerland, excluding Nordic and post-communist countries. Nordic countries are Denmark, Finland, Iceland, Norway and Sweden. Post-Communist countries in the EU cover Bulgaria, Croatia, Czechia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Slovakia. The former Soviet Union covers Belarus, Georgia, Russia and Ukraine. The group of the Former Soviet Union covers only Russia and Ukraine for the gender wage gap. As our data sources do not allow a regional split we cannot disentangle the Eastern communist part from Western Germany and Germany is treated as a Western European country.
Sources: GDP per capita, PPP (constant 2017 international US dollars): World Bank, World Development Indicators database. Female labour force participation rate, age 15 plus: World Bank, World Development Indicators database.
Men more right to a job: "Men should have more right to a job than women" proportion agreeing: World Value Survey and European Value Survey data collected by the online Analysis tool of the World Value Survey.
Gender wage gap: (i) US: since 2015 US Bureau of Labour Statistics usual weekly earning of wage and salary workers and Blau and Kahn (2017); (ii) EU: since 2002 Eurostat series SDG_05_20, Gallen et al (2019), Brainerd (2000), Statistics Sweden (2000, 2006, 2008, 2018), Petersen et al. (2014), Statistics Norway (2006), Statistics Finland (2004, 2006), Arnarson and Mitra (2010), Newell and Reilly (2001), Jolliffe and Campos (2005), Trapido (2007), and our study data for Estonia; (iii) Russia: ILO since 2015, Ogloblin (1999), Semykina and Linz (2010); (iv) Ukraine: ILO since 2012, Brainerd (2000).

The indicators of gender attitudes also show vivid dynamics. It may be remembered that there were no differences between men and women in years of schooling at the end of the communist period (Brainerd 2000). The two most popular indicators of gender attitudes are female labour force participation and agreement or disagreement with the statement that if jobs are scarce, men should have more right to a job than women. Fortin (2005) shows that this question has the strongest correlation with gender gaps in employment and wages. This question is also widely available over waves and countries in the World Value Survey and the European Value Survey. Most of the countries in Figure 1 have moved gradually towards more egalitarian gender attitudes in recent decades, as the female labour force participation

rate has been increasing and agreement with the statement that men should have priority for a job has declined. Similarly, gender wage gaps have been declining.

Communist countries had a high female labour force participation rate. Country-level data from Figure 1 shows that the female labour force participation rate in communist countries was on average 7pp higher than that in Western countries in 1990 (see online data appendix). The rate is even higher if the income level of the country is controlled for. The differences in the female participation rates between these country groups had disappeared by 2019 and the rate was even 3pp lower on average in post-communist countries than in Western ones, but there is no difference after controlling for the income level. The views on jobs show that despite the active participation of women in the labour market, the communist countries had highly conservative gender attitudes. The agreement in communist countries with the idea of male priority for jobs was on average 18pp higher than in the Western countries in 1990. The difference between country groups gets smaller and statistically insignificant after controlling for income level, but it remains large. The more conservative views of communist countries were preserved until 2018. There was a 17pp gap in support for male priority for jobs between ex-communist and Western countries in 2018, but a large part of it can be explained by differences in income. Our country-level descriptives provide a different picture to that from studies comparing Eastern and Western Germany (Bauernschuster and Reiner 2012, Campa and Serafinelli 2019), as we do not find that communism made gender attitudes more egalitarian. Our findings may be a result of using different questions to measure gender attitudes and a different empirical setting in comparing countries rather than comparing regions within a country.

Another surprising regularity from the communist era is that the high labour force participation rate of women and the highly regulated wages did not imply a small gender wage gap. The gender wage gap under communism was quite high and was comparable to that in the US at that time (Brainerd 2000). Our country-level data show that the gender wage gap in the communist bloc was slightly wider than that in Western countries by 3pp, but the difference was statistically insignificant. There is a similar difference of 4pp in the gender wage gap between the country groups thirty years later, in 2019[6]. The income level of the countries does not play a role here.

Comparative studies on the gender wage gap in post-communist European countries show that our sample country Estonia had the largest gender wage gap at the end of the communist period (Orazem and Vodopivec 2000, Brainerd 2000, Newell Reilly 2001). This path has continued as Estonia has had the largest gender wage gap in the EU since 2006.[7] This contrasts with the high level of economic activity among women and the egalitarian gender attitudes that are characteristic of our sample country. Given the long-run cultural determinants discussed in the previous subsection, Estonia possesses factors that mainly contribute to a more egalitarian gender attitude[8]. Historically Estonia has been a plough using country, but the more egalitarian attitudes are supported by the relatively recent transition

[6] The difference between the gender wage gap in Eastern and Western Europe becomes larger when conditioning on conventional explanatory factors. As Eastern European women often have better education and occupations than men, the unexplained gap can become larger than the raw gap (Leythienne and Ronkowski 2018).

[7] The comparative time-series are available in the Eurostat series SDG_05_20 starting from 2006.

[8] The Hofstede cultural dimension of masculinity also puts Estonia in the group of feminine countries with a score of 30, while the EU28 average showed higher masculinity, a score of 46 in 2015 (https://geerthofstede.com/research-and-vsm/dimension-data-matrix/). We do not use this variable in this paper because in addition to differences between men and women in social roles, the dimension also captures much wider elements of culture such as overall focus on career, ambition, and admiration of strength (Hofstede 2011).

to an agricultural society, some 2000-3000 years later than in Central and Southern Europe (Kriiska et al 2020, p100). The linguistic system of the Estonian language has high gender neutrality, scoring the lowest across all four features of the gender intensity index together with Finnish and Hungarian. Similarly, the Protestant background and low degree of attachment to religion should support more egalitarian gender attitudes.[9] The female-biased demographic shock at the end of World War II was probably of similar size in all the countries in the region. Many of the long-run cultural determinants of gender attitudes are the same in Estonia as in its closest neighbours, which makes it hard to argue that these long-run determinants explain the wide gender wage gap in Estonia.

These stylised facts suggest that communism had diverse effects on women in the labour market. It raised the labour force participation rate of women, but it sustained conservative gender attitudes and in terms of wages did not make women relatively better off than in Western countries. Our sample country Estonia provides a representative case for post-communist countries in many ways, except the persistently wide gender wage gap.

[9] Church attendance is related to less egalitarian gender attitudes (summarised by Fortin 2005 and Giuliano 2017). The communist block was strongly atheist and it was forbidden to go to church. The fall of the Berlin Wall and restoration of human rights in the communist bloc allowed people to go to church again and many formerly communist countries have returned to highly religious patterns nowadays. The most prominent examples are Orthodox Christian Russia and Ukraine, and Catholic Poland.

3. Data and methods

3.1. DATA

This paper uses the Estonian Labour Force Survey (LFS) from 1989 to 2020, which follows the ILO methodology and is the official source of labour market statistics for labour market activity in Estonia. Statistics Estonia collects the data from the resident population using face-to-face or telephone interviews.[10] The first years of the data, 1989–1994, were collected retrospectively in 1995. Retrospective collection of the data continued until 2000, as the data for 1995–1996 were collected in 1997, the data for 1997 in 1998, the data for 1998 in 1999, and the data for 1999 in 2000. The reference period for wages was always the autumn of the survey year or October for this period. Since 2000, the data have been collected throughout the year and the reference period is the last week before the survey. This implies that for the period 1989–1999 the data on wages represent wages in autumn and for the period 2000–2020 the data on wages represent the average wage of the whole year.

The Labour Force Survey collects representative data for the age group 15–74. Table 1 presents the number of observations and the share of missing observations for wages. The sample size varies over the years and has been increasing over time, and the item non-response for wages has also been increasing over time. Since 2018, only the imputed wages have been provided for data users. Both unimputed and imputed wages are provided for 2016 and 2017, and these years allow us to estimate the potential role of item non-response in the wage gap estimates of the LFS. The estimates show that there is no difference between the gender gaps based on unimputed and imputed data, as the difference between the two is -0.4 percentage points in 2016 and 0.4 percentage points in 2017. This raises confidence that men and women do not misreport wages systematically differently in the LFS.

The wages in net terms are used throughout this paper because net wages are available for most of the sample years.[11] The wage gap is defined as the wages of men minus the wages of women, divided by the wages of men. Table 1 also shows the average wage collected by the labour force survey and that of the official statistics on wages. The LFS shows systematically lower wages than the official statistics do. This gap may emerge from the different unit responding. The official statistics on wages are collected from firms and not from individuals, unlike the LFS. The LFS data are collected from individuals and aim to capture the shadow economy as well, which is not covered by firm-level surveys. So the most plausible explanation for the deviation from the official average wages is that the LFS also covers the wages of unofficially hired workers or unreported employment. It has been shown that quite marginalised or low wage workers participate in the shadow economy in Estonia (Kriz et al. 2007), which may explain why the average wages are lower in the LFS than in the official wage statistics.

[10] For the methodology, please see: https://www.stat.ee/en/find-statistics/methodology-and-quality/esms-metadata/40701#18-Statistical-processing-17

[11] It was not explicitly stated whether wages should be reported in net or gross terms in the questionnaire covering the first four years.

Table 1 / Number of observations for wages and descriptive statistics compared to the official reference source

	Calculations from labour force survey (LFS)				Official estimates	
	Item non-response of wages of full-time workers	No of observations of wages of full-time workers	Average net wage of full-time workers [a]	Gender gap in net wages of full-time workers	Average net wage [a]	Gender wage gap in gross terms
1989[a]	2.6	5624	353	40.8		
1992	2.6	5444	43	26.2		
1993	2.2	5191	72	30.4		
1994	1.2	5245	105	30.1		28.9
1995[b]	0.9	2515	138	27.3		26.7
1996[b]	0.6	2525	162	25.1		27.4
1997	1.5	5785	161	33.4		28.0
1998	2.0	5313	179	28.3		25.8
1999	0.1	2905	195	27.2		26.5
2000	0.2	2959	217	24.9	246	24.6
2001	0.0	6093	230	23.3	277	24.3
2002	0.0	5710	250	24.3	305	24.1
2003	2.2	5504	266	23.3	331	24.2
2004	2.1	5286	298	24.2	363	23.5
2005	5.3	5577	346	27.3	411	25.4
2006	9.6	7342	415	28.7	484	27.8*
2007	11.0	8454	509	31.5	583	28.7*
2008	13.1	8171	602	30.6	670	25.6*
2009	15.5	6106	587	27.5	637	
2010	19.8	5630	588	28.5	637	24.1*
2011	23.1	6244	637	26.0	672	22.9
2012	26.2	7049	652	29.3	706	24.6
2013	25.0	7260	708	29.0	757	24.8
2014	22.3	7612	763	27.0	799	23.5
2015	24.4	7591	806	29.2	859	22.2
2016	28.7	6793	897	27.6	924	20.9
2017	29.9	7880	940	24.5	986	20.9
2018	NA	11388	1068	20.4		18.0
2019	NA	11375	1152	21.1		17.1
2020[c]	NA	8789	1190	20.4		

Notes: [a] The wages in 1989 are shown in roubles, for the rest of the years the wages are shown in euros. For the years before the changeover to the euro in 2011, the kroon is transformed to the euro using the exchange rate during the changeover. The exchange rate of the Estonian kroon was fixed to the German mark in 1992–2001 and to the euro in 2002–2010.
[b] These wages are provided only in gross terms, the rest of the wages are shown in net terms.
[c] The year 2020 only covers the data from the first three quarters.
Sources: Authors' calculations from the LFS and Statistics Estonia (net wages – table PA5331, gender wage gap – tables PA604, PA701, PA621 and PA5335). * refers to the gender wage gap calculated from the Structure of Earnings Survey. The rest of the gender wage gaps are from official wage statistics based on hourly wages or on full-time workers.

The gender wage gap was very wide in communist times at 41% in 1989, but it quickly dropped below 30% in 1992 after the introduction of market reforms and the dissolution of the Soviet Union. There are no official estimates of the gender wage gap from before 1994, and the LFS provides the only estimates for this period. The gender wage gaps in the LFS and in the official estimates were quite close from 1994 to 2007, which raises confidence about the LFS estimates from before 1994. However, Jolliffe and Campos (2005) are critical of the retrospective collection of data back to communist times, as the early years of data are likely to be subject to recall bias and attrition bias. An alternative source of wage data is from Klesment and Sakkeus (2010), who digitalised the microdata of Estonian household income surveys collected during the communist period. We use their estimates of the raw gender wage gap to validate our estimates. Their microdata-based estimates of the gender wage gap point to a smaller, but still wide, gender wage gap during the communist period of 36.8% in 1958, 34.4% in 1975, and 33.5% in 1981. Their wage data were not self-reported, but were collected from the employers of the respondents, so they may underestimate the gap because of the shadow economy.

The LFS estimates of the gap became systematically larger than those based on official estimates in 2007–2017, but the difference declined again in subsequent years. Eurostat provides another measurement of the gender wage gap that is based on the Structure of Earnings Survey methodology. This methodology excludes workers from enterprises with fewer than 10 employees and workers in the agricultural and public sectors. These statistics show Estonia has the largest gender wage gap in Europe. The Eurostat methodology gives a wider gender wage gap than that of the estimates of Statistics Estonia because the gender wage gap in the public sector is usually very small. However, all the statistical sources show that the gender wage gap in Estonia has been declining (see Figure A 1 in Appendix 1). The dynamics of the gap in the LFS follow the estimates of Statistics Estonia and that of Eurostat, which is most important given our aim of understanding the long-run determinants of the gap.

3.2. METHODS

The raw gender wage gap is decomposed into explained and unexplained parts using the Oaxaca-Blinder decomposition:

$$\overline{w}_{M,\tau} - \overline{w}_{F,\tau} = (\bar{X}_M - \bar{X}_F)a_{M,\tau} + \bar{X}_F(a_{M,\tau} - a_{F,\tau}) \quad (1)$$

where $\overline{w}_{M,\tau}$ denotes the log wage for men and $\overline{w}_{F,\tau}$ the log wage for women. The decomposition is undertaken for the gap in mean wages for men and women, and over the distribution of wages. The subscript τ denotes whether the decomposition is performed for the mean or for a particular quantile of the distribution. A simple OLS regression is used for the decomposition of the gender gap in the mean and unconditional quantile regressions by Firpo et al. (2009) for the decomposition of the gender gap in quantiles. The separate wage equations are estimated for men and women, where from the characteristics or endowment values of the explanatory variables, $\bar{X}_M$ and $\bar{X}_W$ are obtained together with the estimated coefficients $a_{M,\tau}$ and $a_{F,\tau}$. The first term on the right hand side captures the part of the gender wage gap that is explained by characteristics (using the male coefficients as a base), and the second term captures the unexplained part or the difference in coefficients (using the female characteristics as a base).

The following observables are used to explain the gender wage gap. The main criterion for choosing them was their comparative availability throughout all the waves of the data. The variables have been grouped into five major categories:

› Demographics: age, age squared, ethnicity

› Education: level (tertiary, secondary, primary) and field of education (nine groups)

› Employer-side factors: size (seven groups), tenure at employer, foreign ownership dummy

› Occupation: nine main ISCO groups

› Sector: 15 NACE groups

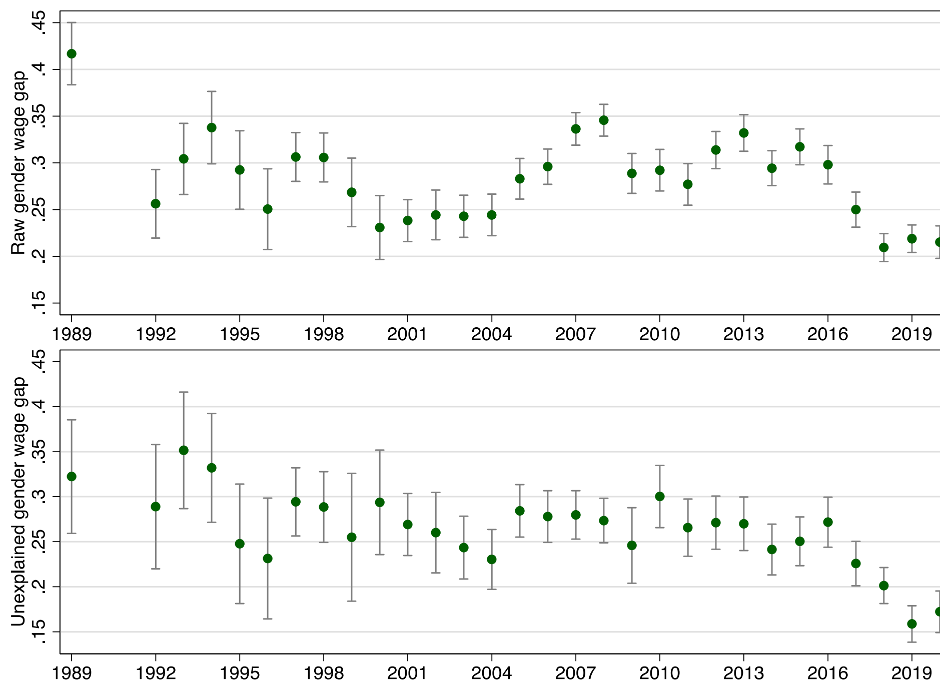
The results of the mean wage regressions and the mean values of explanatory variables in 1989, 1992 and 2020 are shown in Appendix 2. These have been used to derive the explained and unexplained parts for the mean gap using equation (1). Only the most crucial years are shown, to save space. The estimates for the unconditional quantile regression have not been presented. All the omitted intermediate estimates are available from the authors upon request.

4. Results

4.1. GENDER WAGE GAP AT THE MEAN

The results of the decomposition are presented in Figure 2. The raw gender wage gap was the largest in 1989 at 42 log points, and it shrank quickly after the market reforms were introduced. The gap was around 25 to 30 log points throughout the rest of the timespan. The unexplained gender wage gap has been even more stable over the whole sample period because a larger part of the gap was explained in the earlier years. Only the last three years of the sample have shown some reduction in the gap, as the unexplained gender wage gap has dropped below 20 log points.

Figure 2 / Raw and unexplained gender wage gap, in log points, 1989–2020



Notes: The gaps on the vertical scale are in log points. The point estimates are reported with 90% confidence intervals.
Source: Authors' calculations from the LFS.

We discuss the role of the explanatory variables first. The contribution of each group of explanatory variables is shown in Appendix 3. The role of demographics is negligible as expected, as the male and female survey participants have on average the same age and ethnic background. The role of education was positive in 1989, meaning men had a better education than women, but by 1992 this effect had become negative, showing that women had a better education than men. This is similar to trends in other Western countries like the US or Denmark, where the educational gap started to close in the 1980s and has by now reversed in favour of women (Blau and Kahn 2017, Gallen et al. 2019). The educational attainment of women has increased substantially in the last three decades and the share of women with higher education increased from 16% to 45%, while the share of men with higher education

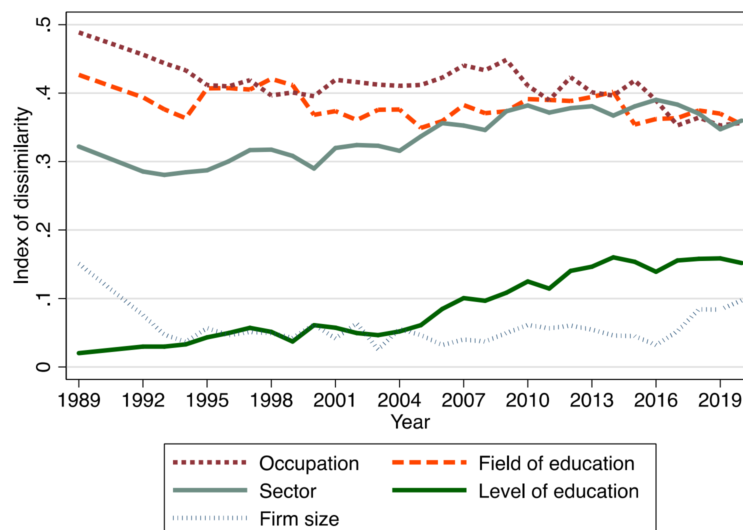
increased from 15% to 30% (see Appendix 2 Table A 2). These developments can be explained by the entry of private universities into the educational market and also by a rise in the number of students in public universities.

The effects of employer-side characteristics have been the same for men and women throughout the timespan. It does not appear that men and women have different wages because they work for companies of different size, have different tenure at the company, or work for companies with a different ownership structure. The role of occupation in the gender wage gap was similar to that of education, as initially women had a somewhat worse occupational structure than men, but this reversed and women had better occupations in most of the years in our sample period. By better occupations we mean that women are more likely to be employed in high wage occupations than men are. Again, these trends are similar to developments in Western Europe (Brynin and Perales 2016).

The most important explanatory factors of the gender wage gap originate from sectoral segregation, as more men than women are employed in sectors where wages are high. The sectoral segregation explains 5–10 log points throughout the sample. These developments, with the decreasing or even negative role of education and occupation and the constant role of sector segregation, are similar to those found in the US and Western Europe (Blau and Kahn 2017, Gallen et al. 2019).

Given that sectoral segregation plays a large role, we take a more detailed look at it by deriving the indexes of segregation for men and women for all the groups of explanatory variables. This approach is inspired by Gallen et al. (2019). The sectoral segregation of men and women was high and even increasing over the years (see Figure 3). Segregation has also increased for the level of education as women have obtained tertiary education more frequently than men have in recent decades, whereas the educational levels of men and women were more or less the same during communist times (see also Appendix 2 Table A 2). The segregation of men and women has declined for occupation, field of education and firm size. These dynamics are surprisingly similar in Denmark, as shown by Gallen et al. (2019).

Figure 3 / Dissimilarity of the characteristics of men and women, 1989–2020



Notes: Duncan and Duncan (1955) segregation index derived as the sum of absolute differences in a category and divided by two.
Source: Authors' calculations from the LFS.

The unexplained part, or the differences in coefficients, has undergone remarkable change over three decades (please see Appendix 2 Table A 1). The most important change took place in returns to education, especially for women. While there was no return for men from higher education during the communist era and the returns for women were low, these returns were quickly established and were sizeable by 1992. As in other countries with a communist past, the returns to education increased substantially. Women also gained from increasing returns to education in the social sciences, and this captures the demand effect as there was strong structural change towards a market style economy.

Important changes occurred on the employer's side. While the returns to working in larger companies were negative in the communist era, these have since increased, and they had turned positive by 2020. It seems that the communist wage structure did not capture the main features of economics such as the scale effect, whereby larger firms are usually more productive and provide wage premiums over smaller firms. The opposite held in the communist era, when the smaller the firm was, the larger the wages were, ceteris paribus. Similarly, foreign-owned firms usually pay higher wages than domestically-owned firms (Hijzen et al 2013). The strong returns to working for a foreign-owned company emerged in the 1990s, especially for men, but these returns had declined by 2020.

The regulated wage system also favoured working in agriculture and penalised working in services such as healthcare. Skilled female agricultural workers earned on average much more than managers or skilled white-collar workers did for example. These distortions in the wage structure had already disappeared by 1992. As there were relatively more women working in services and fewer in agriculture, the structural shift that increased the role of services favoured women.

In sum, our results confirm the main findings from other countries that women won from the transition from communism to capitalism and mainly because of the increased returns to education, increased enrolment in education, and structural change towards the female-dominated services-based economy. The benefits to women materialised quickly through the decline in the raw wage gap, whereas the unexplained gap is more resistant to decline.

4.2. GENDER WAGE GAP OVER THE DISTRIBUTION OF WAGES

This subsection takes a more detailed look at the wage distribution behind the mean dynamics discussed in the previous sub-section. Figure 4 plots the raw and unexplained gender wage gaps over the whole distribution of wages. Two regularities can be identified. First, the gap widens at the top at the beginning of the sample during the communist era, but this effect declines over time and has disappeared three decades later. Most of the research into the gender wage gap before and after the transition has focused on the gender wage gap at the mean. Only Newell and Reilly (2001) have highlighted this widening top.

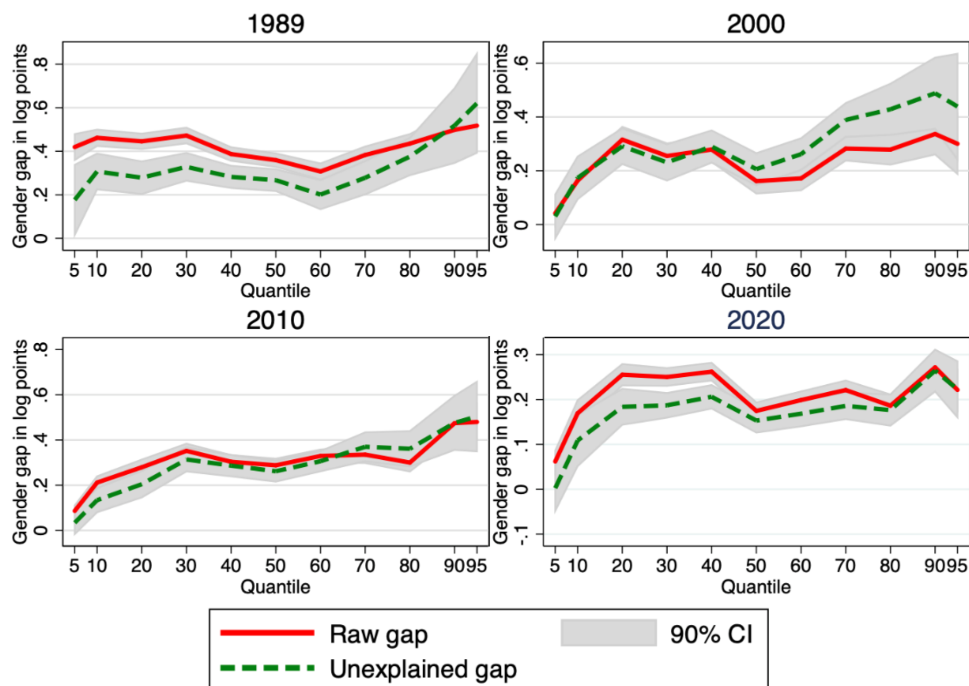
The discrimination literature calls this effect the glass ceiling. The possible mechanism behind the glass ceiling effect in communist times could be that fewer women were members of the Communist Party[12],

[12] The European Bank for Reconstruction and Development's Life in Transition Survey asks about Communist Party membership. In 2006, 6% of respondents in Estonia reported that their mother was a member of the Communist Party and 12% said their father was a member. The membership in other post-communist countries is higher, at 9% for mothers and 18% for fathers. The data are available at https://www.ebrd.com/what-we-do/economic-research-and-data/data/lits.html.

while making progress in a career and climbing to the top jobs required membership of the Communist Party. It is surprising that the glass ceiling effect survived so long in the wage structure even though political entry barriers to the top jobs were removed quickly. Given that the glass ceiling effect was present in many post-communist countries (Newell and Reilly 2001), it can be argued that it was inherited from communist times. It is shown that Communist Party membership gave a head start in becoming an entrepreneur in post-communist countries (Ivlevs et al. 2020) and that party networks had a long-lasting effects for business culture (Ivlevs and Hinks 2018).

Another regularity is that the gender wage gap at the bottom of the wage distribution is as large as that throughout most of the distribution in the communist era. This is an indication that minimum wages were not binding for the gender wage gap. This regularity in the wage gap disappeared in the mid-1990s and the gap disappeared for low wage earners. The minimum wages were substantially increased in the second half of the 1990s (Hinnosaar and Rõõm 2003) and this is the most plausible explanation for this changing pattern of the wage gap at the bottom of the wage distribution (Brainerd 2000).

Figure 4 / Distribution of the gender wage gap in 1989, 2000, 2010 and 2020



Notes: CI denotes confidence intervals.
Source: Authors' calculations from the LFS.

5. What could explain the aggregate dynamics of the gap?

In this subsection we ask whether country-level institutional factors can explain the unexplained gender gap in mean wages and over the distribution of wages. We test the role of three institutional factors, looking at overall wage inequality measured by the wage Gini, the ratio of the minimum wage to the average wage, and agreement with the statement that if jobs are scarce men should have priority in getting them.[13] The country-level institutional variables have rich variation, as the wage Gini dropped 15 percentage points, the ratio of minimum wages to the average wage ranged between 19% and 40%, and the gender attitudes changed from highly conservative to more egalitarian than in Western Europe. To control for the persistence in the gap, we run a regression where the unexplained gender wage gap is explained with its lagged term plus the institutional factor. The following specification is estimated by adding one institutional factor at a time:

$$UnexplGap_t = \alpha UnexplGap_{t-1} + \beta Institution_t \quad (2)$$

Table 2 presents the results. The relationship between wage inequality and the gender wage gap is positive and statistically significant. Every percentage point decline in the Gini is related to a decline of 0.44 in the unexplained gender wage gap. Given the total decline in the Gini of 15 percentage points, this corresponds to a decline in the unexplained gender wage gap of 6.5 percentage points. The importance of wage inequality for the gender wage gap has risen in importance lately (Fortin et al. 2017) because the skewness of wages has increased and this has mostly benefited men, as the top wage earners are predominantly men (Fortin 2019). The conventional drivers of increasing wage inequality were skill-biased technological change and more lenient labour market institutions (Fortin et al. 2020). While our data show the opposite trend in wage inequality and labour market institutions, there is evidence that technological change has contributed to the gender wage gap becoming larger in our sample country (Masso and Vahter 2020). We study the role of minimum wages next.

Labour market institutions such as minimum wages compress the wage distribution at the lower end of the distribution and can reduce the gender wage gap there (Bargain et al. 2019, Ferraro et al. 2018). The ratio of minimum wages to the average wage declined in Estonia in the mid-1990s and started to increase substantially in 1996 (Hinnosaar and Rõõm 2003). The ratio was also high in 1992, but the enforcement may have been low then. So the decline in the gender wage gap at the bottom of the wage distribution coincides with a period when minimum wages became more binding. There is a negative but statistically insignificant effect from minimum wages on the unexplained gender wage gap as shown in

[13] Another important set of institutions that shape the wage distribution and the gender wage gap is trade unions (Bruns 2019). Membership of trade unions was de facto 100% during the communist era in 1989, and then it declined sharply in Estonia (Kallaste and Woolfson 2009). Kallaste and Woolfson (2009) discuss that the role of trade unions was not to empower wage negotiations during the communist era, but to enforce party politics and to deliver social benefits. They argue that as the reputation of unions was low in the Baltics and that unions were directly related to the foreign occupying regime, the union density declined faster in the Baltics than it did in other Central and Eastern European countries. As there is no meaningful relationship between the gender gap and union density in Estonia, we omit this labour market institution from our analysis.

Table 2. However, the effect is statistically significant at the lower end of the wage distribution around quantiles 20–60. Given the total increase in the minimum wage ratio from 19% to 40%, this corresponds to 3.4pp of the decline in the unexplained gender wage gap.[14] This means more than half of the wage inequality effect can be related to rises in the minimum wage.

Table 2 / The role of country-level factors in the unexplained gender wage gap, 1989-2020

Dependent: unexplained gender wage gap	**Gap at mean**	**Gap at mean**	**Gap at 20th quantile**	**Gap at 40th quantile**	**Gap at 60th quantile**	**Gap at 80th quantile**	**Gap at mean**	**Gap at mean, ethnicity fixed effects**
Lagged dependent	0.467**	0.543***	-0.129	-0.152	0.214	0.283	0.884**	0.334
	(0.181)	(0.195)	(0.203)	(0.167)	(0.257)	(0.238)	(0.139)	(0.183)
Wage Gini	0.435**							
	(0.205)							
Minimum wages		-0.162	-0.314	-0.508***	-0.577**	-0.174		
		(0.199)	(0.221)	(0.167)	(0.270)	(0.238)		
Agree with male priority for jobs							0.062	0.063
							(0.036)	(0.014)
N	28	28	28	28	28	28	5	10
adj. R^2	0.436	0.351	0.039	0.177	0.323	0.037	0.770	NA
No of groups								2
Within group R^2								0.190

Notes: Ethnicity split refers to the panel estimates for two ethnicity groups, Estonians and Russians, in Estonia. Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Sources: The unexplained gender wage gap and wage Gini: authors' calculations from the LFS. Minimum wages: Eurostat series TPS00155 and Hinnosaar and Rõõm (2003). Agree with male priority for jobs: World Values Survey and European Values Study.

Lastly, we test the role of gender attitudes in the unexplained gender wage gap. It has been shown that gender attitudes towards jobs can explain some part of the unexplained gender wage gap in OECD countries (Fortin 2005). Agreement with the statement "If jobs are scarce: Men should have more right to a job than women" dropped by more than three quarters between 1990 and 2018 in Estonia (see Figure 1). This implies that gender attitudes have become much more egalitarian in Estonia. We use this variation in gender attitudes to explain the unexplained gender wage gap. The variable for gender attitudes is defined as the proportion of respondents agreeing with this statement. The relationship between gender attitudes and the unexplained gender wage gap is statistically insignificant. The point estimate of the effect is not small, however, there are only five observation points of data available. More egalitarian gender attitudes correspond to a decline of two percentage points in the unexplained gender wage gap.

There are many challenges in deriving the role of gender attitudes in the gender wage gap. The attitudes are endogenous to the outcome variable such as the female labour force participation rate (Fortin 2015) or the gender wage gap. The simplest way to address reverse causality is to include lagged gender attitudes on the right-hand side. Our data show that the correlations become slightly higher when gender attitudes are included with a lag, but the small size of the sample means that we do not derive any

[14] The positive effect of minimum wages on the wages of women is not reached at the cost of employment detachment, as there is no evidence of rises in the minimum wage having a negative effect on the employment of women in Estonia (Ferraro et al 2018).

conclusive evidence from it. To provide some robustness for the role of gender attitudes in the gender wage gap we split the sample by ethnicity. As the number of observations is critical for the variable on gender attitudes, this allows us to double the sample size. A quarter of the population in Estonia has non-Estonian ethnicity, being mostly Russian, and the two population groups operate like two parallel societies in many ways. While the gender attitudes of Estonians and Russians in Soviet Estonia were the same, the attitudes of Estonians have since converged quickly with those of Scandinavia, while the attitudes of Russians in Estonia are still much more conservative and resemble those found in the Russian Federation; see Appendix 4. We derive the conditional gender wage gap as in equation (1) for the two ethnic groups in Estonia and explain these by the gender attitudes of the same ethnic groups by using ethnicity fixed effects. The results are presented in the last column of Table 2 and confirm our baseline findings that more egalitarian gender attitudes are related to a smaller gender wage gap. This also demonstrates that having a larger number of observations in a panel setting allows us to obtain more precise estimates for the effect of gender attitudes.

6. Summary

The aim of this paper is to understand the long-run determinants of the gender wage gap. The gender wage gap in Estonia was at its largest during the communist era at 41%, and it was also the highest in the region and among the countries with a communist past. The gender wage gap in Estonia was still the largest in the region and in the EU in 2018. The unexplained gender wage gap has been highly persistent, and it declined only slowly, from 30% to 25%, before shrinking further during the past three years. Women in Estonia gained from the transition from communism to capitalism. The mechanism behind their gains is similar to those in other formerly centrally planned economies, as the education of women is even better now, they are employed in better occupations, and their returns to education are higher.

We provide descriptive country-level evidence about gender-related indicators in post-communist countries. Communist countries had higher female labour force participation rates and more conservative gender attitudes towards jobs, while the gender wage gap did not differ much from those in Western countries. The lead of communist countries in the female labour force participation rate vanished in the 30 years after the transition, but gender attitudes are still more conservative than in Western countries. These country-level estimates provide a different picture to that from studies comparing Eastern and Western Germany. A persistently higher activity rate for women and more egalitarian gender attitudes in Eastern Germany were attributed to the communist past. While women won in wage terms from the transition to capitalism in most of the ex-communist countries, this overlaps with a declining trend in the gender wage gap in the developed world. We cannot find evidence of any communist heritage in the gender wage gap, but if there is any, the effect is much smaller than that in gender attitudes.

Like with communist heritage, we cannot assign the persistently high gender wage gap in Estonia to any of the known long-run cultural determinants of gender attitudes. However, the gap seems to respond to wage inequality and minimum wages. The decline in the gender wage gap is related to the decline in wage inequality, and minimum wages have also contributed to this. The decline in wage inequality can explain up to 6.5 percentage points of the 15pp decline in the unexplained gender wage gap. Gender attitudes are also important in explaining the decline in the gender wage gap, but their relation to the gender wage gap is weaker than the role of wage inequality. The gender attitudes have become much more egalitarian in Estonia, and as it takes time for attitudes to materialise in the gender wage gap, it can be expected that the gender wage gap will continue to narrow in Estonia.

Our results provide an empirical contribution to country-level studies using a panel data setting. There seems to be a lot of variation in the gender wage gap that can be explained by within country dynamics in variables such as wage inequality, labour market institutions and gender attitudes, and there also appears to be a lot of information in time-invariant fixed effects. The country fixed effects have much more potential for capturing long-run cultural features than there is in using just one observation year in a cross-sectional study. As comparative data on the gender wage gap are becoming available for a wider set of countries and over a longer timespan, this approach is becoming more and more feasible.

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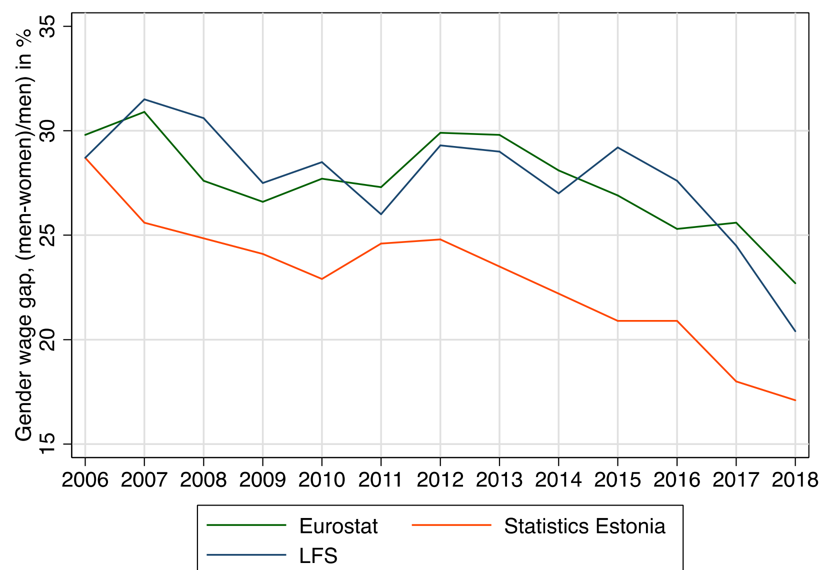
Appendix

APPENDIX 1. GENDER WAGE GAP FROM VARIOUS SOURCES

Figure A 1 / Gender wage gap from various sources, 2016–2018



Sources: Please see Table 1 for details about sources.

APPENDIX 2. WAGE REGRESSIONS FOR MEAN WAGES AND THE MEAN VALUES OF EXPLANATORY VARIABLES IN 1989, 1992 AND 2020

Table A 1 / Wage regressions for the mean wages of men and women in 1989, 1992 and 2020

	1989		1992		2020	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Estonian (base not)	0.077**	0.052*	0.049	0.037	0.143***	0.122***
Age	0.017**	0.036***	0.011	-0.006	0.046***	0.016***
Age^2	-0.025	-0.041***	-0.015	0.009	-0.057***	-0.020***
Secondary education, base primary	0.051	0.077*	0.078*	0.152***	0.074***	-0.001
Tertiary education, base primary	0.053	0.112*	0.184***	0.340***	0.181***	0.153***
Field of education, base general						
Teachers	0.029	-0.133	0.212	-0.030	-0.277***	-0.023
Humanitarians	0.539***	0.102	0.010	0.316**	-0.137***	0.015
Social sciences	-0.062	-0.039	0.271**	0.109**	0.014	0.026
Natural sciences	-0.251	-0.343*	0.454*	0.029	0.025	0.037
Medicine	-0.071	-0.060	0.377	0.228*	-0.028	-0.047**
Engineers	0.002	-0.034	0.102**	0.086*	-0.048	-0.096***
Agriculture	0.019	0.054	-0.043	-0.020	0.107	0.091***
Services	0.035	-0.059	0.056	0.085	0.028	-0.047*
Size of enterprise, base <=10						
11-19 employees	-0.214	-0.204*	-0.044	-0.030	0.116***	0.027
20-49 employees	-0.229*	-0.152*	-0.086	-0.044	0.125***	0.072***
50-99 employees	-0.365***	-0.108	-0.062	0.056	0.203***	0.103***
100-199 employees	-0.359***	-0.138	-0.132*	0.073	0.171***	0.120***
200-499 employees	-0.335***	-0.151*	-0.221***	-0.047	0.184***	0.205***
500 and more employees	-0.243**	-0.108	-0.023	-0.082	0.200***	0.247***
Tenure in enterprise	0.005***	-0.002	-0.001	-0.001	0.002*	0.001
Foreign owned, base domestically	0.082	0.140	0.531***	0.229***	0.146***	0.064***
Occupation, base elementary						
Managers	0.300***	0.411***	0.311***	0.398***	0.497***	0.603***
Top specialists	0.095	0.401***	0.186**	0.364***	0.416***	0.449***
Specialists	0.190*	0.195***	0.370***	0.243***	0.283***	0.331***
Clerks	0.119	0.078	0.119	0.201***	0.100**	0.193***
Sales workers	-0.093	0.163**	0.279**	0.220***	0.094**	0.140***
Agricultural skilled	0.201**	0.562***	0.074	0.321***	0.030	0.323***
Craft workers	0.146**	0.370***	0.168***	0.082	0.196***	0.183***
Machine operators	0.160**	0.302***	0.142**	0.196**	0.097***	0.134***
Sector, base public						
Agriculture	-0.022	0.069	-0.071	-0.472***	0.017	-0.139**
Fishery	0.338**	0.111	0.390**	-0.209	NA	NA
Mining	0.103	0.103	0.359*	-0.346	0.193***	0.156
Manufacturing	0.051	0.117	0.188	-0.228	-0.067**	-0.112***
Electricity	0.076	0.060	0.237	-0.152	0.029	0.045
Construction	0.253	0.010	0.436***	-0.134	0.021	-0.017
Trade	0.085	0.051	0.143	-0.371**	-0.043	-0.104***
Hotels and restaurants	0.067	0.020	0.069	-0.378**	-0.323***	-0.172***
Transport	0.089	0.082	0.393**	-0.200	0.076**	0.023
Financial intermediation	-0.35	0.035	0.355	0.068	0.0548	0.081*
Real estate	0.109	0.140	0.161	-0.315*	-0.088**	-0.062**
Education	0.029	-0.179	-0.064	-0.327	-0.177***	-0.162***
Health	-0.688*	-0.270*	0.114	-0.403**	-0.238***	-0.157***
Other services	-0.184	0.006	0.032	-0.441**	-0.135***	-0.199***
Obs	2214	1811	2258	1624	4376	4334
Adj R2	0.056	0.108	0.163	0.107	0.308	0.403

Notes: Robust standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Authors' calculations from the LFS.

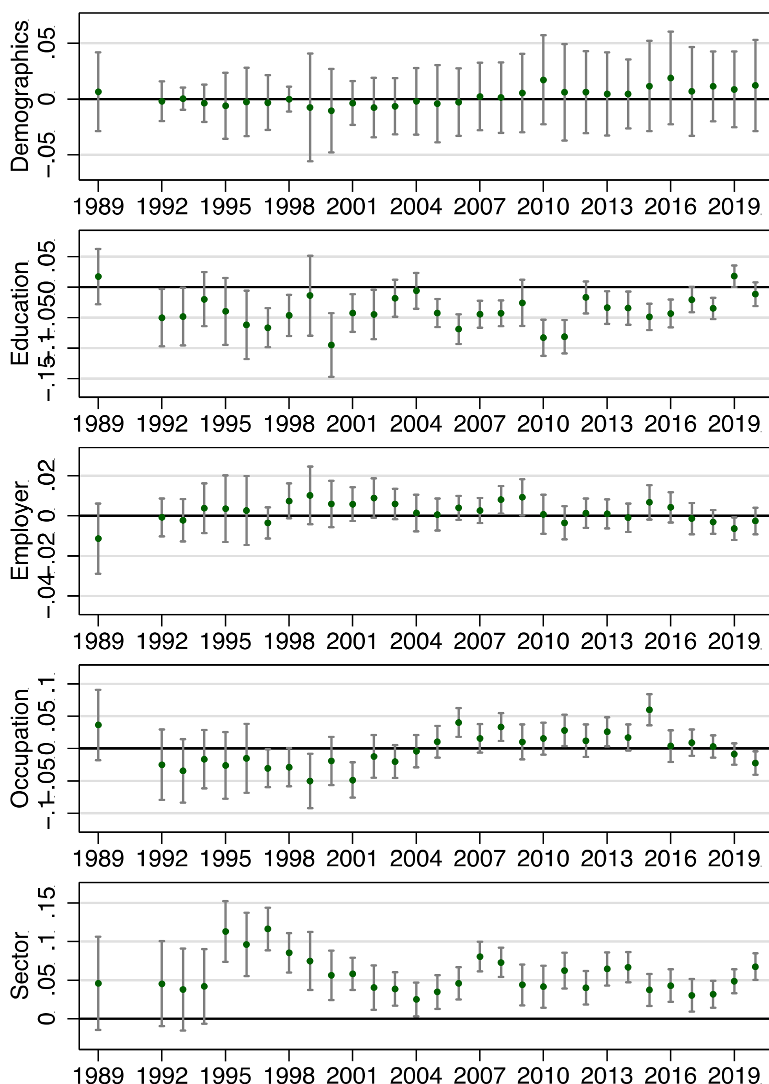
Table A 2 / Mean values of explanatory variables for men and women in 1989, 1992 and 2020

	1989		1992		2020	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Log(wage)	5.8	5.3	3.6	3.3	7.061	6.846
wage	439.2	260.2	48.5	35.8	1318.3	1049.6
Estonian	0.655	0.634	0.659	0.644	0.680	0.684
age	40.3	41.3	40.3	41.3	42.84	45.79
Primary	0.221	0.200	0.218	0.189	0.107	0.0436
Secondary	0.633	0.640	0.643	0.656	0.599	0.510
Tertiary	0.146	0.159	0.139	0.156	0.295	0.447
General education	0.140	0.250	0.202	0.295	0.285	0.187
Teaching	0.012	0.075	0.010	0.069	0.00804	0.0865
Humanitarian	0.009	0.027	0.009	0.024	0.0309	0.0553
Social sciences	0.031	0.211	0.027	0.204	0.0898	0.272
Natural sciences	0.005	0.009	0.005	0.007	0.0671	0.0423
Medicine	0.008	0.059	0.008	0.054	0.373	0.174
Engineering	0.480	0.204	0.446	0.191	0.0633	0.0404
Agriculture	0.140	0.074	0.130	0.068	0.00759	0.0765
Services	0.174	0.090	0.164	0.087	0.0750	0.0661
Up to 10 employees	0.023	0.051	0.095	0.084	0.267	0.214
10-19 employees	0.019	0.056	0.061	0.075	0.157	0.115
20-49 employees	0.060	0.106	0.100	0.130	0.184	0.210
50-99 employees	0.067	0.108	0.089	0.120	0.128	0.157
100-199 employees	0.116	0.105	0.107	0.107	0.106	0.104
200-499 employees	0.273	0.211	0.209	0.186	0.0818	0.105
500 and more	0.442	0.365	0.339	0.297	0.0769	0.0948
Tenure	9.892	10.188	8.563	9.211	7.926	9.428
Foreign owned	0.014	0.023	0.048	0.048	0.217	0.201
Managers	0.129	0.091	0.127	0.090	0.133	0.0899
Professionals	0.090	0.179	0.073	0.158	0.153	0.292
Technicians	0.048	0.167	0.059	0.159	0.140	0.174
Clerks	0.014	0.111	0.012	0.111	0.0372	0.0797
Sales	0.019	0.121	0.035	0.142	0.0616	0.184
Skilled agricultural	0.034	0.055	0.045	0.064	0.0141	0.00637
Craft	0.324	0.114	0.320	0.114	0.221	0.0290
Plant operators	0.299	0.058	0.266	0.051	0.180	0.0666
Elementary occupations	0.044	0.106	0.064	0.110	0.0597	0.0784
Agric	0.224	0.122	0.184	0.121	0.0396	0.0156
Fishery	0.049	0.016	0.039	0.014	0.000	0.000
Mining	0.022	0.008	0.024	0.008	0.00994	0.00221
Manufacturing	0.251	0.271	0.235	0.250	0.228	0.166
Construction	0.029	0.015	0.032	0.014	0.0201	0.00795
Retail	0.126	0.030	0.129	0.027	0.175	0.0113
Hotels & restaurants	0.037	0.113	0.077	0.130	0.103	0.145
Transp & communic	0.011	0.036	0.014	0.039	0.0188	0.0528
Finance	0.111	0.048	0.109	0.050	0.166	0.0765
Real estate	0.001	0.009	0.005	0.013	0.0146	0.0247
Public admin	0.038	0.046	0.036	0.036	0.0752	0.0930
Education	0.038	0.044	0.046	0.043	0.0682	0.0851
Health	0.027	0.089	0.027	0.094	0.0358	0.157
Services	0.012	0.109	0.013	0.115	0.0134	0.101
Home prod	0.026	0.046	0.029	0.045	0.0301	0.0609

Source: Authors’ calculations from the LFS.

APPENDIX 3. FACTORS EXPLAINING THE GENDER WAGE GAP, 1989–2020

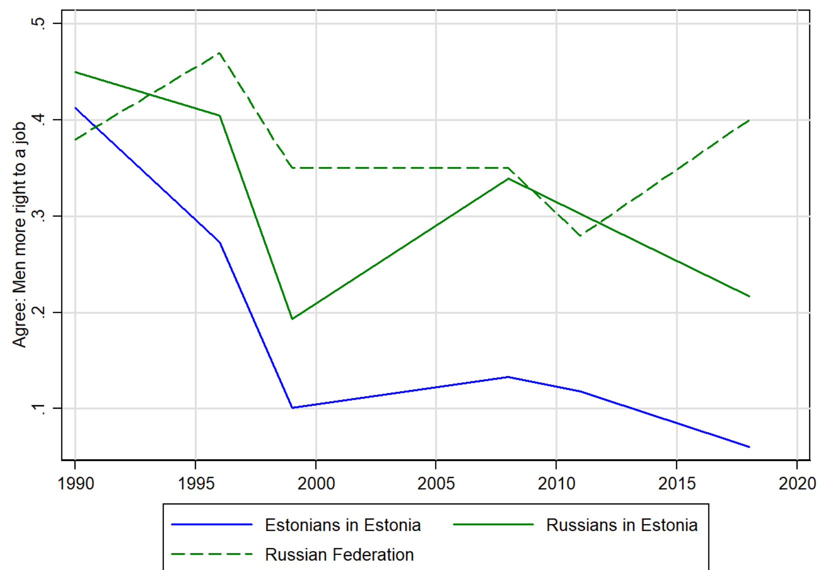
Figure A 2 / Contributions to the explained part of the gender wage gap, 1989–2020



Notes: The gaps on the vertical scale are in log points. The point estimates are reported with 90% confidence intervals.
Source: Authors' calculations from the LFS.

APPENDIX 4. GENDER ATTITUDES BY ETHNICITY IN ESTONIA AND THE RUSSIAN FEDERATION, 1990-2018

Figure A 3 / Gender attitudes by ethnicity in Estonia and in the Russian Federation, 1990-2018.



Source: Agreement with the statement "If jobs are scarce: Men should have more right to a job than women" proportion agreeing: World Value Survey and European Value Survey data collected by Online Analysis tool of World Value Survey.

IMPRESSUM

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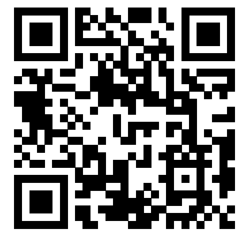

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