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The Impact of Lifetime Events on Pensions: NDC Schemes in Poland, Italy, and Sweden and the Point Scheme in Germany

Agnieszka Chłoń-Domińczak

Marek Góra

Irena E. Kotowska

Iga Magda

Anna Ruzik-Sierdzińska

Paweł Strzelecki

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Agnieszka Chłoń-Domińczak

agnieszka.chlon-dominczak@sqh.waw.pl

Marek Góra

marek.gora@sqh.waw.pl

Irena E. Kotowska

irena.kotowska@sqh.waw.pl

Iga Magda

iga.magda@sqh.waw.pl

Anna Ruzik-Sierdzińska

anna.ruzik-sierdzinska@sqh.waw.pl

Paweł Strzelecki

pawel.strzelecki@sqh.waw.pl

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INAPP – Istituto nazionale per l'analisi delle politiche pubbliche

Corso d'Italia 33
00198 Roma, Italia

Tel. +39 06854471
Email: urp@inapp.org

www.inapp.org

ABSTRACT

The Impact of Lifetime Events on Pensions: NDC Schemes in Poland, Italy, and Sweden and the Point Scheme in Germany*

The paper focuses on the interrupted careers in four countries where pensions are based on lifetime labor income, but they have different labor market patterns. High levels of employment in Germany and Sweden are in contrast with low levels of employment, particularly for women, in Italy and Poland. Career interruptions of women in Italy mean early withdrawal from the labor market, while in Sweden women choose part-time employment. Lower employment rates and gender pay gaps are important causes of differences in expected pension levels. The pension system design and demographics are also different. Prolonging working lives and reducing gender gaps in employment and pay, particularly for those at risk of interrupted careers, is key to ensure decent old-age pensions.

KEYWORDS: NDC, Female Participation, Interrupted Careers, Gender Gaps

JEL CODES: H55, J13, J16, J22, J26

Abbreviations and Acronyms

ESES	European Structure of Earnings Survey
FDB	Financial Defined Benefit
FDC	Financial Defined Contribution
HFP	Hypothetical Future Pension
LCGLIG	Life Course Gender Labor Income Gap
LFPR	Labor Force Participation Rate
LFS	Labor Force Survey
NDB	Nonfinancial Defined Benefit
NDC	Nonfinancial Defined Contribution
NTA	National Transfer Accounts
OECD	Organisation for Economic Co-operation and Development

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1. Introduction

The pension system and the labor market are two sides of the same coin. In prepaid pension systems contributions paid by workers matter for their future pensions.¹ In the case of nonfinancial and financial defined contribution (NDC and FDC) systems, the link between contributions and benefits is very close. In other types of pension systems, such as nonfinancial and financial defined benefit (NDB and FDB) schemes, the link to contributions is partial and depends on the benefit formula design and that the insured perceive contributions as quasi-taxes.² In tax-financed, typically flat-rate pensions, such as social pensions, no link exists between contributions and pension benefits at the individual level. A lack of a direct individual link between contributions and pensions can lead to efficiency losses, weaker incentives to prolong working life, and increased exposure of the pension system to political pressure. If the link is individualized, lifetime developments have a direct impact on future pension levels.

Pension wealth losses due to interrupted or broken careers lead to lower expected benefits in all types of pension systems. For example, according to Organisation for Economic Co-operation and Development estimates (OECD 2015), women from OECD countries who earn the average wage and interrupt their career for five years to care for two young children would lose, on average, 4 percent of their pension income. In two of the analyzed countries, this difference is much higher: Germany stands out with the steepest decline in pension entitlements, at 11 percent, while in Italy it amounts to 10 percent (OECD 2015). There is a need for flexible interventions on the labor market aimed at reduction of risks to leave a job for a long period. Such policy measures are of high relevance in pension systems that have a close link between contributions and benefits, such as NDC schemes.

This paper investigates how different employment patterns over a life course impact expected pension levels. It analyzes three countries that have implemented NDC systems –

¹ Prepaid means contribution-financed as opposed to tax-financed (Góra and Palmer 2019).

² NDC/NDB and FDC/FDB understanding in the paper follows Góra and Palmer (2004).

Italy, Poland, and Sweden – as well as Germany, which has a point system that also provides a direct link between lifetime wages and pension levels.

The four countries are different with respect to the design of their pension systems,³ but more importantly, their labor market characteristics differ. They have different employment rates and wage levels in general and for specific groups of workers. In particular, employment rates and wages between men and women differ substantially between the four countries. In all countries, men usually work longer than women and have higher wages. However, so far the majority of the comparative studies have focused on the expected outcomes of pension systems, simulated using similar assumptions about working careers (i.e., *Pensions at a Glance* reports [OECD 2015] or *Pension Adequacy Reports* [European Commission 2018]).

This paper analyzes how different developments of working lives of men and women in the four countries impact their potential pension income. In particular, it answers two sets of questions. The first set focuses on labor market characteristics and covers the following questions:

- How do employment rates, wages, and labor incomes differ for men and women of different ages?
- What are the differences and similarities in the working histories of workers in the four countries?
- What are the patterns of full and interrupted careers for men and women in the four countries?

The second set refers to pension system outcomes:

- How do different patterns of working histories affect expected levels of pensions under NDC and point systems?

³ See for example Chłoń-Domińczak, Franco, and Palmer (2012) for a comparison of NDC pension system design in Sweden, Italy, Poland, and Latvia.

- Can people with similar life course developments expect similar outcomes in terms of pensions in different countries?
- How do pension levels differ between countries due to pension system design, life expectancy, or labor market characteristics?
- Do interrupted careers lead to a higher risk of old-age poverty? How does this relationship differ across countries?

The first section of this paper provides evidence of current labor market developments, with a particular focus on differences between men and women by age. It looks at the gender gap in pay and employment and their changes after 2000, making use of data from the Labor Force Survey (LFS) and European Structure of Earnings Survey (ESES). The stylized life course labor incomes of men and women are compared using the National Transfer Accounts (NTA) methodology (Istenic and Sambt 2016). Then, the employment histories collected in the SHARE survey are used to identify groups of workers with “interrupted” and “full” careers.

The second section applies the stylized labor market profiles to simulate hypothetical future pensions in the four countries based on the identified sex-specific employment patterns; this assesses the level of pensions considering country and gender-specific profiles of employment over individuals’ life course. To separate the impact of differences in the labor market and differences in the pension system on hypothetical pensions, country-specific employment profiles and the Swedish pension system are used to calculate hypothetical pensions.

The final section concludes with recommendations on integrated policies focusing on policies supporting both a high level and a high quality of employment over individuals’ life course as a key in ensuring adequate pensions in the NDC framework.

2. Labor market differences: What can be learned from recent developments?

Many factors contribute to differences in labor market participation and wages between men and women. These include, most importantly, choices of nonstandard employment,

including part-time or self-employment. Women choose these forms more frequently than men to reconcile their work and family lives, which can be more difficult in some countries than in others.

These choices have implications for pension levels once they retire. This section discusses the evidence related to the gender gap on the labor market and its accumulated impact on life course labor income. Therefore, the focus is on both employment and wage gaps, as well as their impact on the difference in life course earnings by men and women.

Typical profiles of full and interrupted labor market careers of men and women in the four countries are identified – these reflect the differences observed at the macro level, using labor market histories of individuals gathered in the SHARELIFE survey.

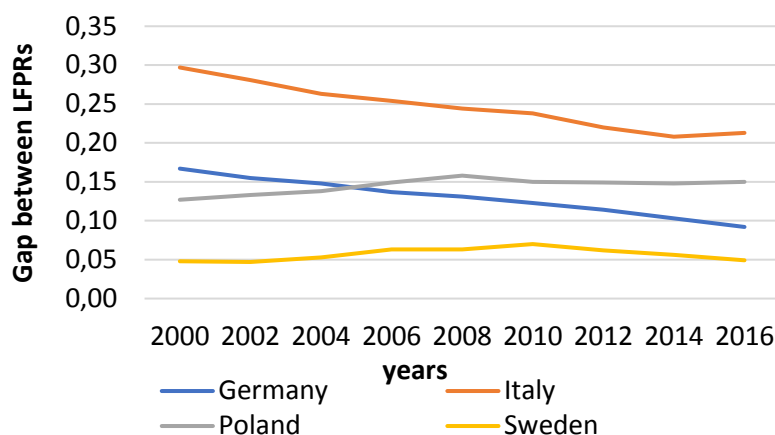
2.1. Labor market participation

Labor market participation, which is crucial for future old-age pension entitlement in defined contribution (DC) systems, differs significantly among the four countries. Sweden experienced the highest increases in the labor force participation rate (LFPR) for both men and women in the last decades. Participation rates have steadily increased since 2000, reaching 89 percent for men and 84 percent for women in the 20–64 age group in 2016. The German labor market is characterized by an equally high and stable LFPR for men (86.5 percent), but a much lower rate for women (77 percent in 2016). Yet women's labor market participation also increased – between 2000 and 2016 it rose by 11 percentage points.

In Italy and Poland, the LFPR of 20–64-year-old men slowly increased, reaching around 80 percent in 2016 in both countries. Labor market participation is lower for women (59 percent in Italy and 66 percent in Poland). As a result, the gap between the LFPR of men and women is highest in the latter two countries, particularly in Italy (Figure 2.1).

The difference in the LFPR of men and women has declined in Italy since 2000, which may indicate gradually changing patterns of economic activity. The German labor market reveals a similar development. In Poland, the gender gap in employment remains stable.

Figure 2.1: The gap between men's and women's LFPR (age 20–64), 2002–2016

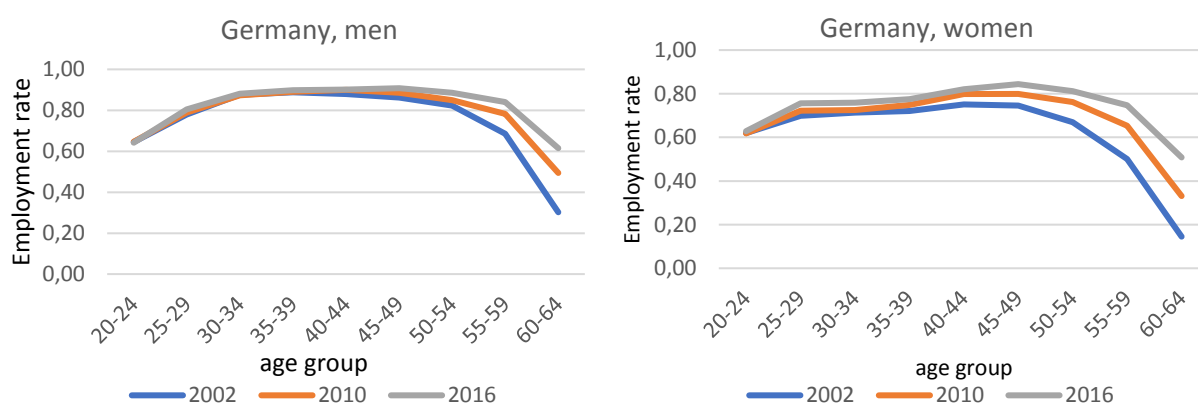


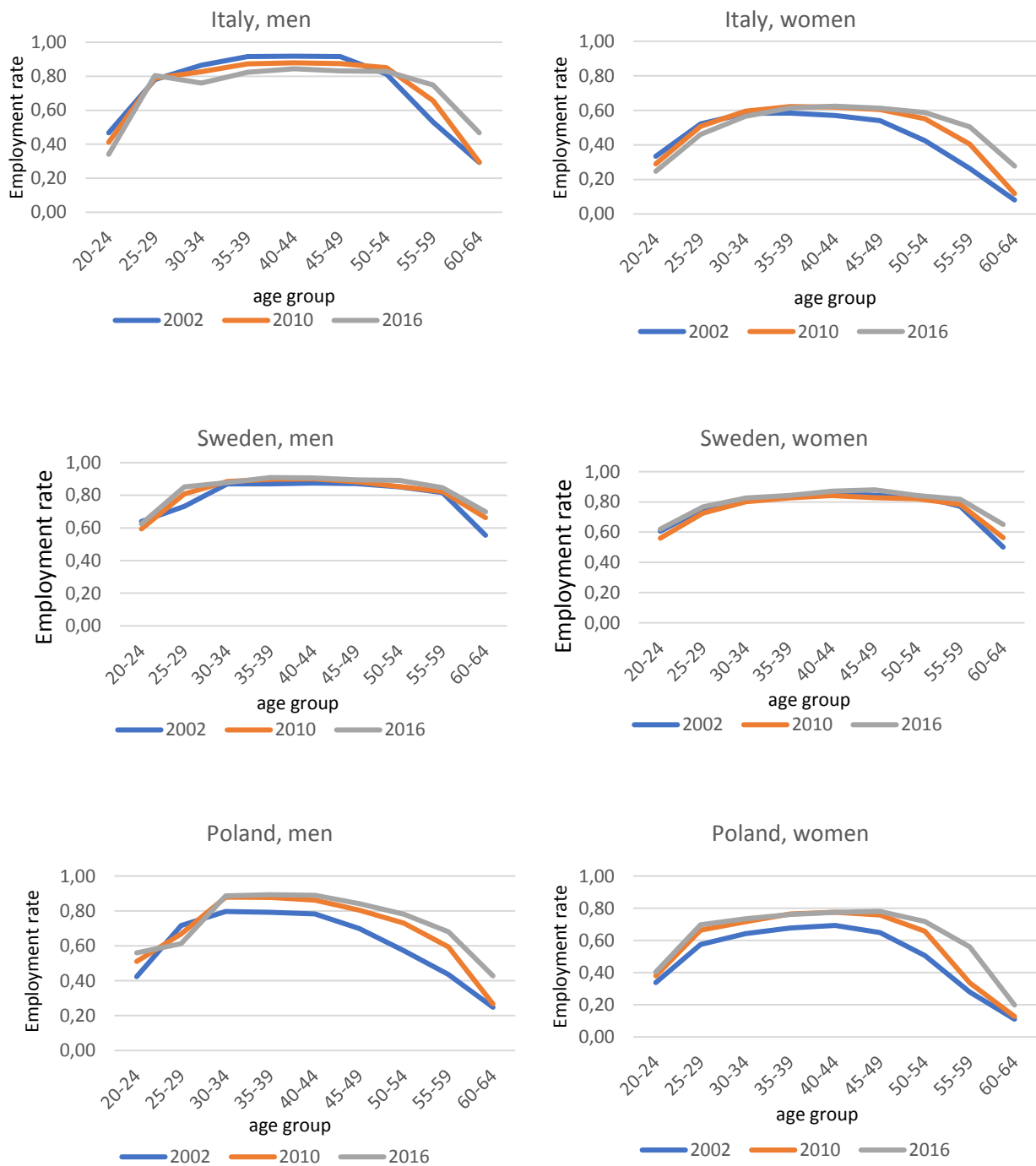
Source: Eurostat database and authors' assessment.

The employment rate in age groups 50 and over increased between 2002, 2010, and 2016 in all studied countries, particularly in Germany, Italy, and Sweden (Figure 2.2).

In Italy, the employment rate declined for those in the prime age group. Older workers survived the last economic crisis relatively well and in some aspects, they were in a better situation in 2016 compared to the years before 2007.

Figure 2.2: Employment rates by age group, gender, and country in 2002, 2010, and 2016



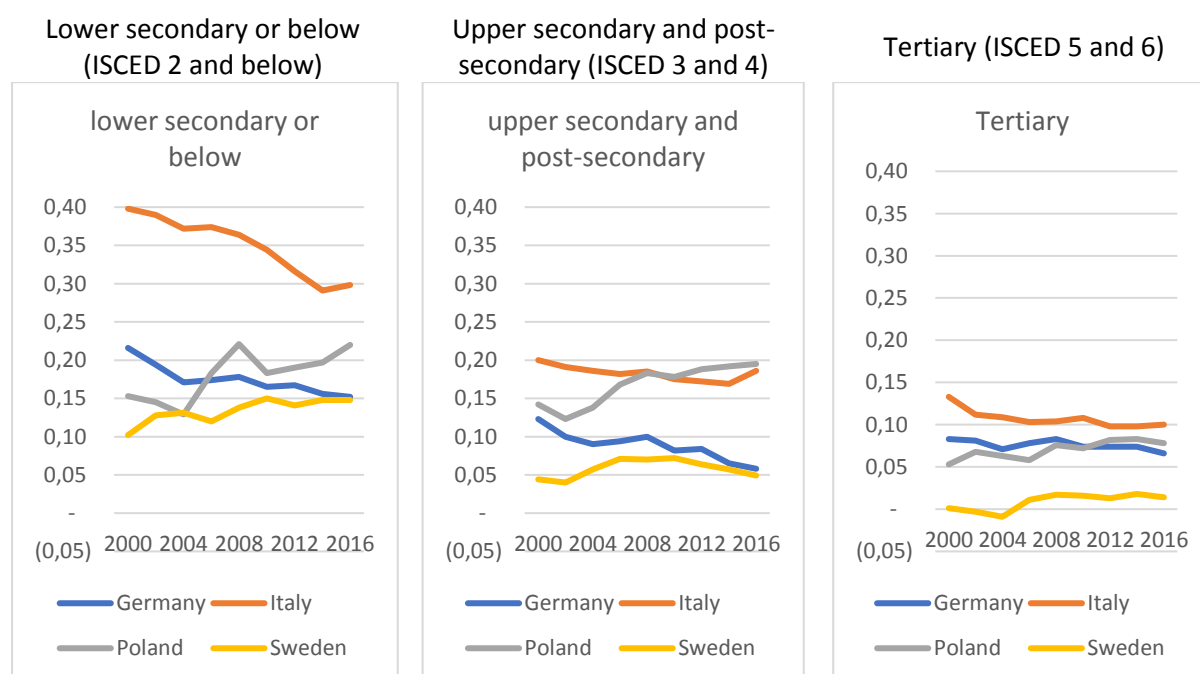


Source: Eurostat LFS database.

The Italian labor market has nearly come back to its pre-crisis employment level, which is still relatively low, especially for women. However, it struggles with a high share of nonstandard contracts, such as “employer coordinated freelance work” (*Contratto di Collaborazione Coordinata e Continuativa, co.co.co*), “project work” (*Contratto di*

Collaborazione a Progetto, co.co.pro), and self-employment, which can also lead to lower levels of access to social protection (Spasova et al. 2017). Swedish employment rates for both sexes stabilized at a high level. Employment rates in Germany are at a high level as well. Despite an increase in employment of people over 50, Poland's women's employment rate is the lowest among all countries. With the exception of Italy, where women work on average less than men at any age, employment rates between sexes differ mainly at older age groups. The level of education influences employment as well as the gender gap in employment. The highest difference between men's and women's employment rates is among those with the lowest level of formal education. It is particularly high but declining in Italy. In Poland, a rising employment gap is observed between men and women with below tertiary education. In Germany, the gender gap in employment by educational attainment declines. In Sweden, virtually no differences exist in employment rates of men and women with tertiary education. With the rising share of highly educated women in the population, the total gender gap in employment is expected to decline in all countries (Figure 2.3).

Figure 2.3: Differences between men's and women's employment rates by education, 2002–2016

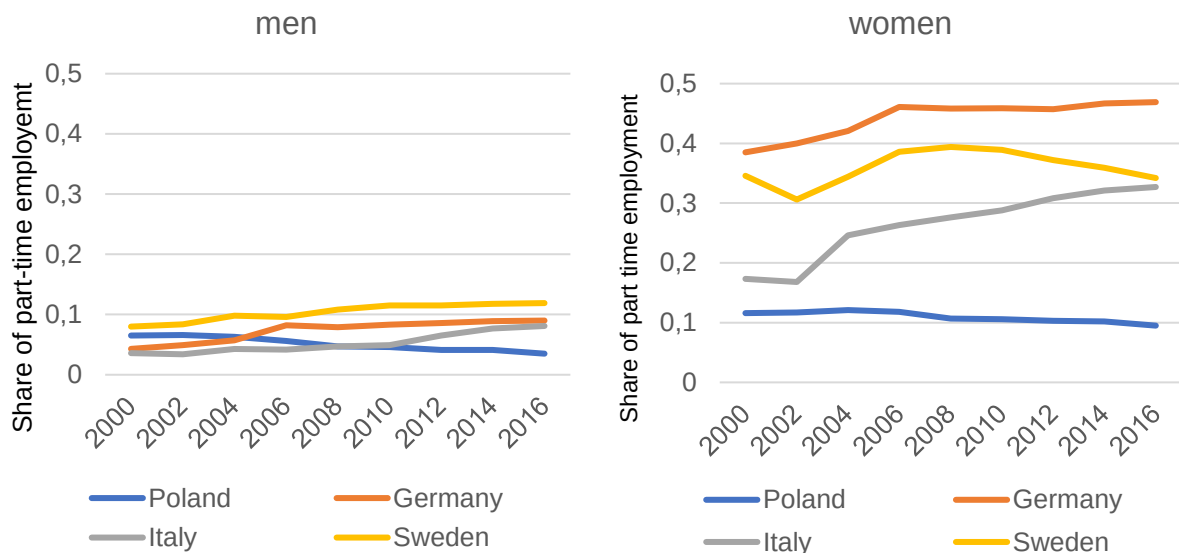


Source: Eurostat LFS database.

Note: ISCED = International Standard Classification of Education.

High employment rates of women in Germany and Sweden are partly due to higher part-time work shares (Figure 2.4). Part-time employment in Italy has been rising for over a decade. Marginal part-time work (below 20 hours a week) is relatively high in Germany (15 percent in 2014), partly due to popular “Minijob” regulations. It is around 8 percent in Sweden and Italy, and low and stable in Poland (3 percent). The incidence of part-time employment is four times higher for women than for men in Germany and three times as high in Sweden. This means that the interrupted career profiles in these two countries are rather through part-time employment and not a withdrawal from the labor market, discussed later in the paper. An increasing share of part-timers accompanies the increasing women’s employment rate in Italy. Moreover, because of the economic downturn, involuntary part-time work has increased significantly in Italy to 63 percent in 2014, from an already high level in the past. To compare, 31 percent of part-timers involuntarily work less than full-time in Poland, 13 percent do so in Germany, and 23 percent in Sweden (European Parliament 2016, 81).

Figure 2.4: Part-time employment as a share of total employment (age 20–64) between 2000 and 2016



Source: Eurostat LFS database.

A higher incidence of interrupted careers among women results mainly from the necessity to reconcile work and family obligations, especially those related to children (Hofäcker and König 2013; Matysiak and Węziak-Białowolska 2016; Rostgaard 2014). As women usually care for children, maternity duties temporarily reduce their labor force participation. Consequently, employment rates of women with small children are much lower in Germany, Poland, and Italy in comparison to childless women of the same age (opposite than for men) (Table 2.1).

Table 2.1: Employment rates (%) of men and women (age 20–49) with at least one child younger than 6, by number of children and country

		2005	2010	2016	2005	2010	2016
		Men			Women		
Germany	No children	79.0	83.4	83.6	79.7	83.9	84.4
	1 child	87.7	91.8	92.6	51.6	62.2	69.3
	2 children	89.8	92.1	92.8	47.4	53.2	63.1
	3+ children	81.9	84.9	83.8	32.8	38.8	43.6
Italy	No children	81.0	76.5	70.7	66.9	65.2	62.0
	1 child	93.8	90.8	87.7	58.4	58.4	59.1
	2 children	93.3	90.8	88.1	49.5	51.5	51.9
	3+ children	90.5	84.8	80.8	35.7	34.5	39.1
Poland	No children	67.4	75.4	79.2	67.2	74.5	78.8
	1 child	87.0	90.3	93.5	56.8	64.1	69.1
	2 children	85.4	91.1	94.5	52.8	60.3	66.0
	3+ children	77.0	86.7	88.7	45.7	54.3	49.2
Sweden	No children		78.6	77.6		74.4	74.5
	1 child		90.0	95.1		69.3	85.1
	2 children		95.0	94.2		80.4	80.8
	3+ children		87.4	92.1		74.9	79.5

Source: Eurostat LFS database.

The largest gap in employment by the presence of children is noticed in Germany and Poland. Interestingly, in 2016 employment rates of Swedish women with children were higher compared to childless women and in general were the highest of all countries, showing the effect of the developed and affordable institutional care for small children in

this country. In Italy, even childless women demonstrate lower employment rates than those observed in the other countries.

The presence of children contributes not only to the lower labor force participation of mothers but also to a reduction in the number of hours worked. The strongest reduction of working time among mothers with young children can be observed in Germany and Sweden.

Summing up, the gender gap in employment exists in all four countries, despite the increasing labor force participation of women. It is higher in Poland and Italy compared to Germany and Sweden. Lower educational attainment and a larger number of children increase the gender gap. In Sweden, the gender gap in employment is low. Moreover, it is nonexistent among men and women with tertiary attainment. Employment rates of women aged 55 and over drop quickly in Poland and Italy, while they remain stable until around 60 percent in Germany and Sweden.⁴ This positive development is to a certain extent offset by a large share of women working part-time, particularly in Germany and Sweden. A major increase is also observed in the share of women's part-time employment in Italy. Only in Poland do workers most often work full-time.

2.2. Gender pay gap

Differences in wages earned by men and women are another important determinant of gender pension gaps, particularly in pension systems based on DC (Chłóń-Domińczak 2017). This section looks at gender pay gaps in the four selected countries to determine their level and cross-country differences, as well as age and cohort patterns.⁵

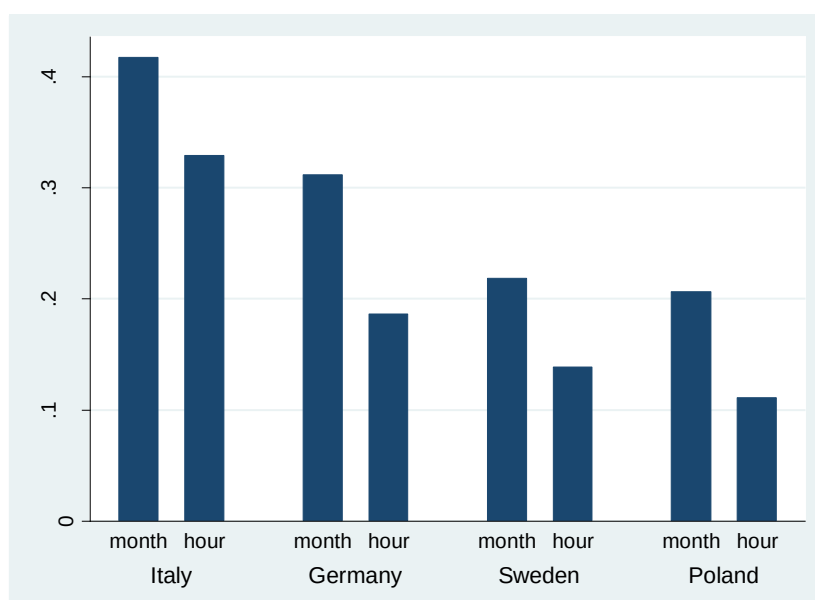
The discussion below refers to raw gender pay gaps, which reflect the difference in average wages earned by men and women. Adjusted pay gaps (accounting for different

⁴ To some extent that can be an effect of a lower retirement age for women in Poland and Italy, who are in a worse competitive position relative to men.

⁵ The analyses were carried out within the framework of a "Gender Pay Gaps – A Cohort Analysis" project supported by the Polish National Science Centre (Grant No. 2013/10 / E / HS4 / 00445). The analyses are based on the European Structure of Earnings Survey (2002, 2006, 2010, and 2014 waves) provided by Eurostat. All errors are the authors'.

compositions of male and female workers with respect to their age, education, or other job-related factors) are a better indicator of gender wage inequality, yet from the perspective of the pension system and gender pension gaps, raw gender pay gaps reflect the labor market characteristics that contribute to future pension inequality. Thus, most of the analysis is based on the raw differences in wages earned by men and women. Considerable differences arise in average hourly wages of men and women in all four countries studied (Figure 2.5). In 2014 in Poland, the average hourly wage of women was 11 percent lower than the average hourly wage of men; in Germany this gap exceeded 18 percent, and it reached almost 33 percent in Italy.

Figure 2.5: Raw hourly and monthly gender pay gaps in 2014

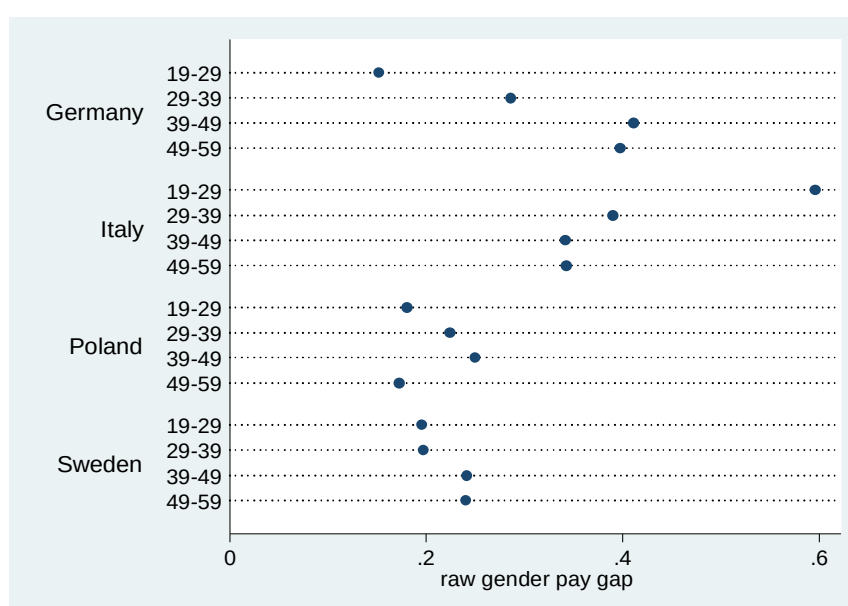


Source: Authors' analysis of the European Structure of Earnings Survey 2014.

Differences in hourly wages of men and women fail to show the entire impact of gender pay gaps on gender pension gaps, as they conceal the fact that women work shorter hours in part-time employment. This contributes to accumulating less pension wealth. To account for this, raw gender pay gaps are presented in terms of hourly and monthly earnings (Figure 2.5). Gender differences in average monthly earnings are higher than gender differences in hourly earnings in each of the four countries. Thus, the overall gender pay gap in earnings – which are the base for pension contributions – amounts to around 20 percent in Poland and

Sweden but exceeds 30 percent in Germany and 40 percent in Italy. The difference between hourly and monthly pay gaps is particularly striking for Germany, where a large share of women work part-time (Matysiak and Steinmetz 2008). While it makes combining work and family life easier, at the same time it translates into a significant pension disadvantage. The size of the gender pay gaps varies by age, though the age patterns are strongly country-specific. The differences are highest in Germany, where young women (age 20–29) earn wages approximately 15 percent lower than men’s wages (Figure 2.6).

Figure 2.6: Age patterns of gender pay gap (GPG) differences, 2014, monthly earnings



Source: Authors’ analysis of the European Structure of Earnings Survey 2014.

This gap is almost double that for those aged 30–39, and exceeds 40 percent for men and women aged 40–49 (slightly decreasing afterward). In Poland and Sweden, gender pay gaps also increase with age and show a similar pattern, but the differences are much lower. In Italy, young men and women display substantial differences in average wages. These gaps increased substantially in 2014. This may relate to the decline in the employment gap among low-skilled men and women – the increased share of low-paid women translated to a higher pay gap. For older Italian workers, the differences are similar across age groups.

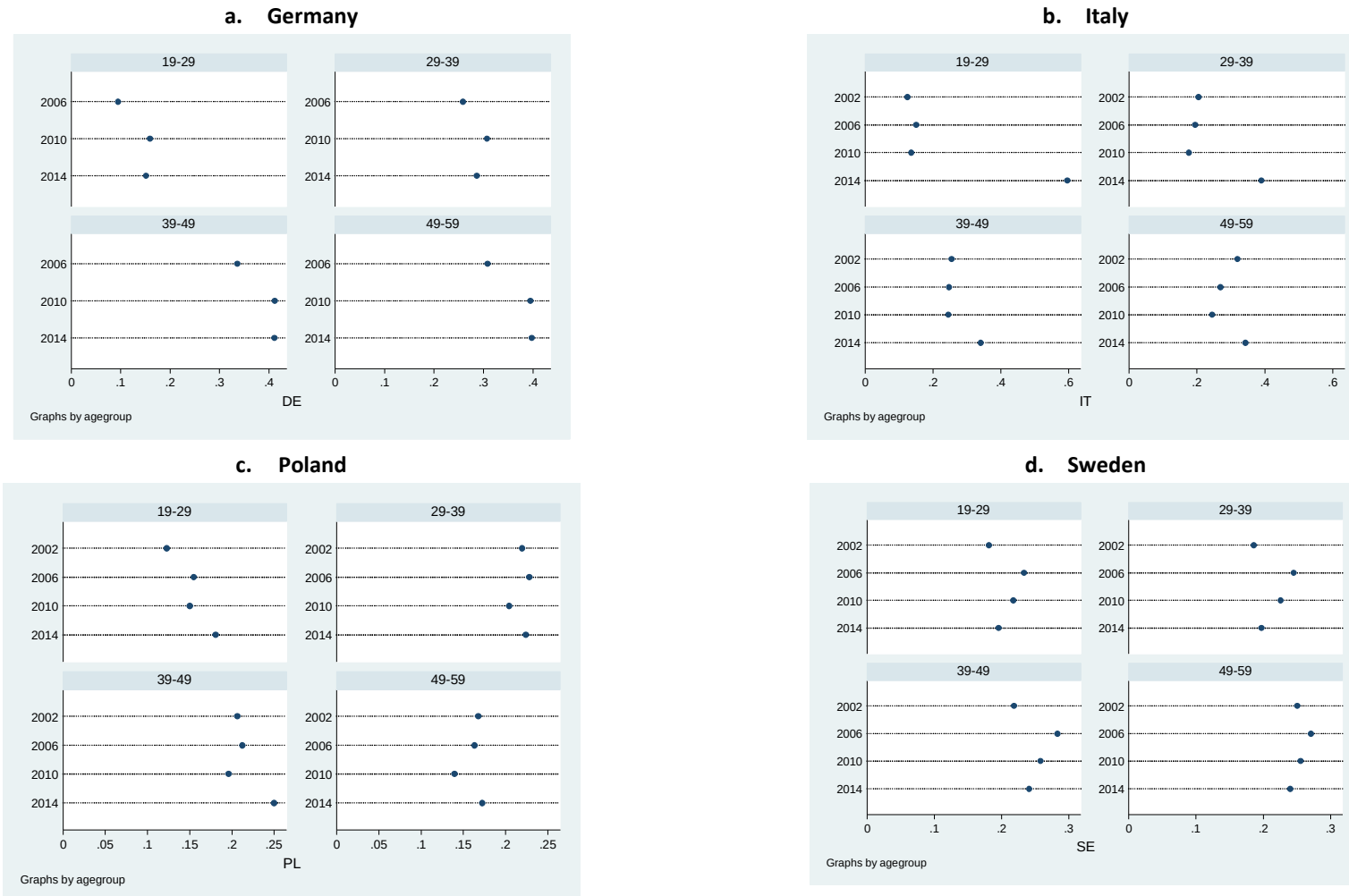
Finally, the dynamics of gender pay gaps over time are investigated from a cohort perspective. In other words, the question asked is whether, for example, today’s young

women are less disadvantaged in terms of pay compared to young women in the early 2000s (which would be expected given the implementation and promotion of antidiscriminatory legislation and equal pay policies in most European countries). To this end, raw gender pay gaps in average wages by age groups are examined at four points in time (2002, 2006, 2010, and 2014⁶) in all four countries.

The expected drop in gender pay gaps over time for subsequent cohorts is not found in any country but Sweden (Figure 2.7a–d). In Germany, Poland, and Italy, gender pay gaps in 2014 for the respective age groups are higher than in 2002/2006. In Germany, gender pay gaps increased in particular between 2006 and 2010. In Poland, gender pay gaps decreased during this time, but increased afterward (by 2014). Italy experienced no change in gender pay gaps between 2002 and 2010, and a high increase afterward. Finally, Sweden observed a substantial increase in gender pay gaps in 2006 – and a strong fall afterward. Overall, while the patterns of increasing or decreasing gender pay gaps vary between countries, no trend of more equal wages can be observed, at least in the medium term captured with these data. What could explain the differences in gender pay gaps by age? It seems that the institutional setting is likely to play a major role (Baran et al. 2014). For instance, the fact that gender pay gaps decrease for the oldest age group (49–59) in Poland (and Germany to a lesser extent) is likely explained by self-selection of (better-earning) women, reflecting large flows of women to inactivity in that age group, explained by the availability of early retirement schemes. The fact that older women are much more disadvantaged in terms of pay than younger women – in virtually all countries studied – points to the importance of the cumulated job experience, which is lower for women, and different job careers of men, rarely interrupted for family reasons. The strong age disadvantage observed in Germany likely reflects its family policy setting, which included several incentives for women to withdraw from the labor market and lower their attachment, with low support for equal partnership policies (OECD 2017).

⁶ The choice of these reference points is due to data availability. In particular, 2002 data are unavailable for Germany.

Figure 2.7: Gender pay gaps (GPG) by cohort, 2002–2014

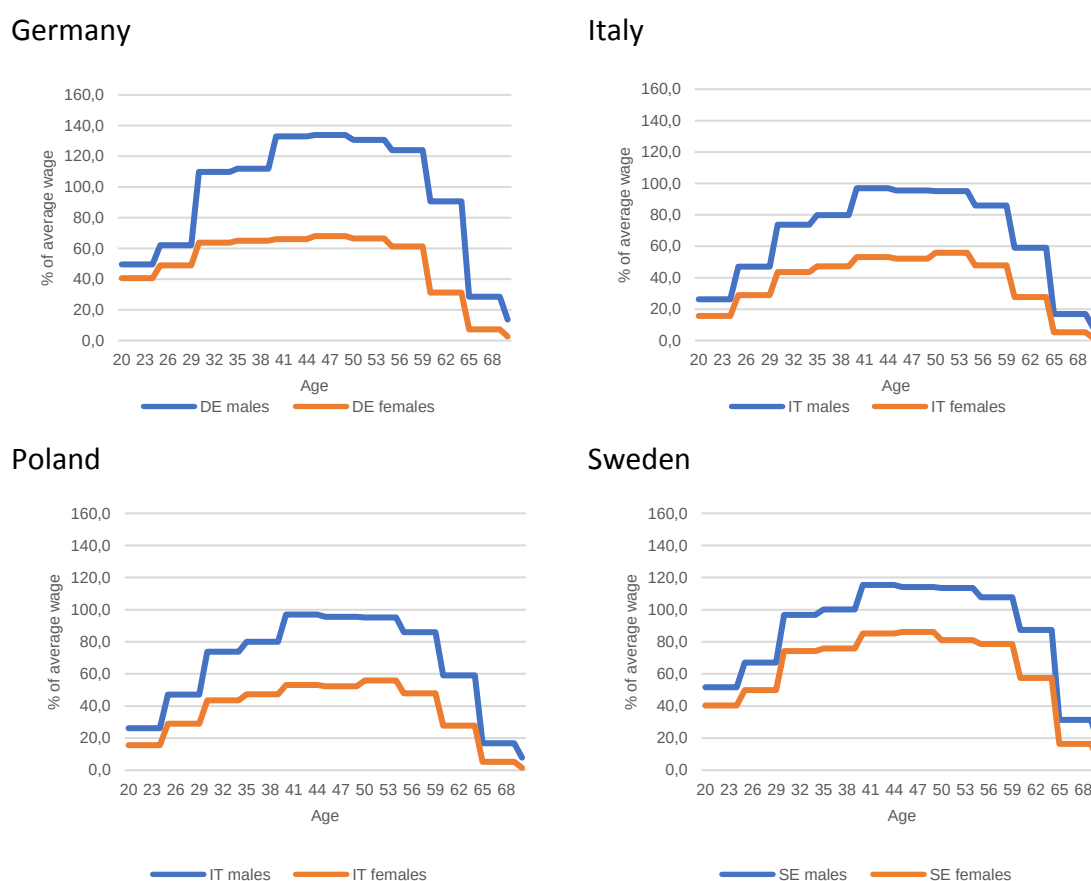


Source: Authors' analysis of the European Structure of Earnings Survey 2002, 2006, 2010, and 2014.

2.3. Employment and wages combined: The gender gap on the labor market

The combination of average wages and employment rates by age and sex indicates the overall labor market gap. This gap is estimated based on the data structure of the ESES discussed in sections 1.1–1.2, but also based on the results of the NTA (Istemic and Sambt 2016), which use the European Union Statistics on Income and Living Conditions (EU-SILC) to estimate the age profiles of labor income. Stylized profiles of labor income of men and women are depicted in Figure 2.8. Combining the two dimensions shows that the gender gap in labor income is higher compared to the wage gap. Germany tends to have the highest income gap, and Sweden the lowest.

Figure 2.8: Stylized age profiles of labor income estimated using LFS and ESES data, 2014



Source: Authors' assessment.

Note: Age profiles are calculated by multiplying average wages in 10-year age groups and employment rates in 4-year age groups, as presented in sections 1.1. and 1.2.

The gender gaps at different ages lead to a higher cumulative gender gap in the life course. Summing the stylized life course income for men and women, the accumulated life course gender labor income gap (LCGLIG) is substantial. To measure the LCGLIG, the following equation is proposed:

$$LCGLIG = 1 - \frac{\sum_{i=20}^{65} w_i^f * e_i^f}{\sum_{i=20}^{65} w_i^m * e_i^m}, \text{ where:}$$

w_i^m – average wage of men at age i measured in relation to the average wage in the country,

e_i^m – employment rate of men at age i ,

w_i^f – average wage of women at age i measured in relation to the average wage in the country, and

e_i^f – employment rate of women at age i .

Based on Eurostat data, the estimated value of LCGLIG is highest in Germany, at 46.8 percent. In Italy the value is 44.3 percent, in Poland 35.4 percent, and in Sweden 27.3 percent. This shows that even relatively low differences at given ages can lead to a large difference in lifetime income, which translates directly into a similar difference in the level of pensions.

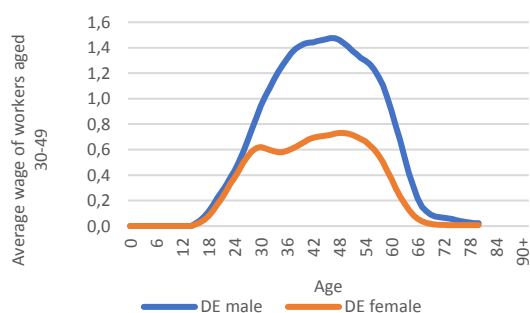
The impact of both lower labor market participation and wage gaps on labor income at various ages is also confirmed by the shape of the age profiles of labor income estimated using the NTA methodology (Lee and Mason 2011; Mason et al. 2009).

As shown in Figure 2.9, in all countries the labor income of women is below that of men, which is consistent with the stylized profiles shown in Figure 2.7. The NTA estimates are based on actual reported incomes, which are complemented by analysis of the reasons for the existing gaps in labor income related to employment gaps and wage gaps, as presented in Figure 2.8. Both estimates show that the gender differences are already visible for women

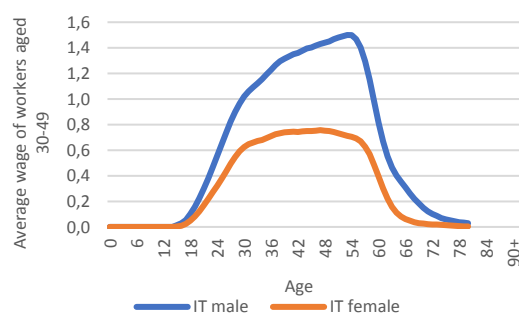
under 30, particularly in Sweden and Germany, which can be a result of career breaks due to childbearing periods.

Figure 2.9: Age profiles of labor income in the four countries (NTA estimates), 2010

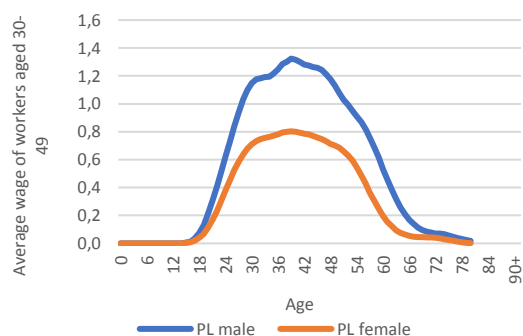
Germany



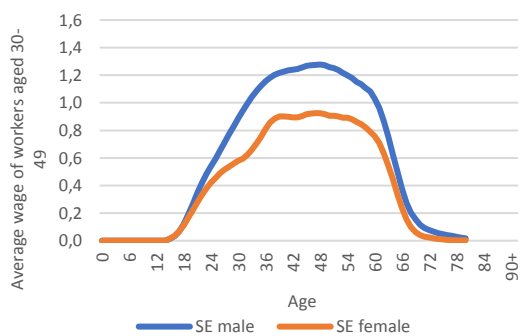
Italy



Poland



Sweden



Source: Istenic and Sambt 2016.

Women's income at their prime age is also below that of men. The largest differences refer to persons at prime age. Only in Sweden does the labor income of men and women converge at later stages of the life course.

Both estimates confirm that a combination of three factors – the gender pay gap, gender differences in employment rates, and lower work intensity due to the higher share of women working part-time – leads to a significant gap in per capita incomes that will undoubtedly translate into a gender pension gap. The estimates of the LCGLIG on the gender-specific NTA labor income profiles indicate higher differences between men and women, compared to the profiles derived from the LFS and ESES data. In Germany, the

LCGLIG reaches 49.2 percent, in Italy 48.3 percent, in Poland 42.1 percent, and in Sweden 30.5 percent.

2.4. Employment paths: Do distinct employment patterns exist in the countries?

Interruptions in work careers are usually not randomly distributed in the population but cumulated for specific persons. They are omitted in the analysis of the aggregate average age profiles. The following section copes with that problem by comparing individual work careers from the retrospective survey to find typical patterns of full and interrupted careers characteristic of the analyzed countries and gender. The average differences in the labor market participation of men and women result from a combination of different individual life course developments that lead to interrupted employment careers, particularly for women. However, unstable and interrupted work careers are not only assigned to women. Many explanations arise for different patterns of work careers. One explanation is the family situation. As discussed earlier, in families with children employment rates are lower, particularly for women. As a result, persons can have limited or no work experience. There are also persons who decide to reconcile work and family life with more frequent career breaks or by working part-time. This heterogeneity of decisions can be explained by psychological factors that lead to more child care-oriented behavior (Hakim 2003; Vitali et al. 2007). However, such choices frequently reflect the limitations of institutional child care. The differences in labor market choices of persons with different numbers of children have an impact on individual pension levels (Kotowska, Stachura, and Strzelecki 2008; Vitali et al. 2007).

Another determinant for the divergence in patterns of the stability of work experiences is the heterogeneity of health and disabilities in the population (Adeline and Delattre 2017). The process of collecting human capital during a life course can also lead to heterogeneity in patterns of more and less educated persons. Persons with tertiary education usually enter the labor market later but are more attached to employment in later ages. The significant share of unstable work careers can be an indicator of a dual labor market, with relatively

better opportunities for persons without interrupted careers, and fewer stable jobs for persons whose career was interrupted (Reich, Gordon, and Edwards 1973; Elger 2015).

To address the problem of the heterogeneity in employment biographies, retrospective data from the SHARE database Waves 1, 2, 3 (SHARELIFE), 4, 5, and 6⁷ are used (see Börsch-Supan et al. [2013] for methodological details). This section uses data from the generated Job Episodes Panel⁸ (see Brugiavini et al. 2013 and Antonova et al. 2014 for methodological details). The Job Episodes Panel release 6.0.0 is based on SHARE Waves 1, 2, and 3 (SHARELIFE).⁹

The SHARE dataset contains retrospective data about past employment based on the answers of persons aged 50 and over. This analysis uses data about the episodes of work in each year of career for all four countries.

The limitation of such approach is the fact that employment histories are typical of people from already retired generations, while younger generations most likely experience different patterns. Nevertheless, the country differences illustrate the divergent labor market developments that are still likely to affect different pension outcomes for people by country.

To analyze the typical patterns of work careers based on retrospective data, a sequence analysis technique is applied that allows definition of the measure of similarity between different life paths (Brzinsky-Fay, Kohler, and Luniak 2006). For each year of the analysis, three possible states are distinguished: full-time employment, part-time employment, and

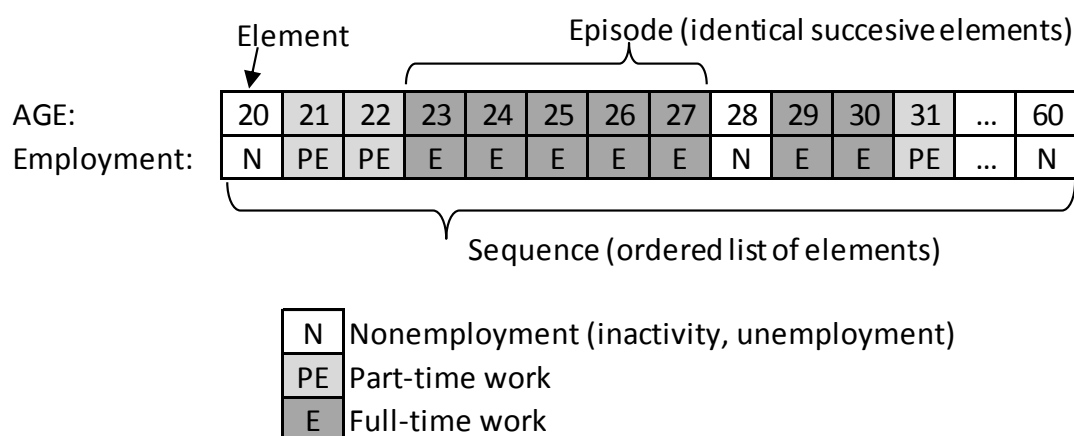
⁷ DOIs: 10.6103/SHARE.w1.610, 10.6103/SHARE.w2.610, 10.6103/SHARE.w3.610, 10.6103/SHARE.w4.610, 10.6103/SHARE.w5.610, 10.6103/SHARE.w6.610

⁸ DOI: 10.6103/SHARE.jep.600

⁹(DOIs: 10.6103/SHARE.w1.600, 10.6103/SHARE.w2.600, 10.6103/SHARE.w3.600. The SHARE data collection was primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), and FP7 (SHARE-PREP: N°211909, SHARE-LEAP: N°227822, SHARE M4: N°261982). Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, HHSN271201300071C), and from various national funding sources is gratefully acknowledged (see www.share-project.org).

inactivity/unemployment. In the calculations of the distances between work careers, it is assumed that part-time employment is halfway between full-time employment and not working. The concept of the sequence analysis is illustrated in Figure 2.10.

Figure 2.10: Conceptual diagram of a sequence of labor market episodes



Source: Authors' elaboration based on Brzinsky-Fay, Kohler, and Luniak 2006.

The result of the sequence analysis is a matrix of distances between persons reflecting the similarity of their work careers. Then the matrix defined at the micro level is used in a cluster analysis with the Ward metric to identify the two most distinct clusters. In the majority of countries, the difference is rather clear. For example, for women in Poland, sequences that describe working life can be divided into two clusters (Figure 2.11).

In the second cluster, sequences are similar mainly because they consist of elements of full-time careers. Episodes of not working usually appear at the end of working life and are rather short in comparison with periods of work. On the contrary, the first cluster groups the sequences that contain mainly episodes of not working or part-time work.

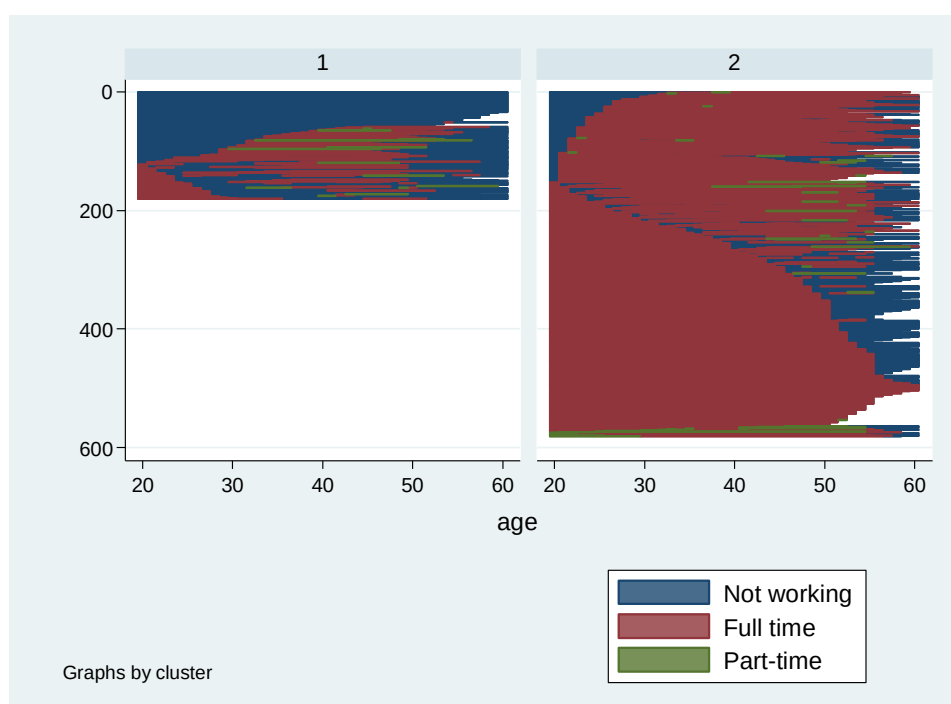
The episodes of full-time work are relatively short. Clearly such procedure leads to an identification of the two groups. The first cluster represents similar "interrupted careers"

and the second cluster can be interpreted as a normal “full-time” career pattern specific to Polish women.

For other countries and sex groups, two similar distinct clusters are identified (see all results in the appendix). The first one is always constituted by people with interrupted careers characterized with periods of inactivity or part-time work. The second one includes people with usually uninterrupted full-time work careers. The division of population in two clusters makes it possible to calculate age-specific employment rates with additional distinction on full-time and part-time jobs. The first cluster with lower employment rates in full-time jobs appears more frequently among women, but is also observed to some extent among men (Figure 2.12 and Figure 2.13).

Figure 2.11: Labor market sequences of individual persons’ job episodes in two clusters for women in Poland

(1 = “interrupted career”; 2 = “full career”)



Source: Authors’ estimates based on SHARE Job Episodes Panel data.

The meaning of “interrupted” work pattern also differs between countries and between sexes. In Germany, Italy, and Poland the main difference between full and interrupted careers among men was employment at age 50+ (Figure 2.12).

In general, shorter labor market careers were considered as interrupted. The interrupted careers of men in these countries accounted for 21–36 percent of all careers. In Sweden the typical interrupted career of men described a group of persons with maximum employment rates during the whole working life of about 40 percent and relatively frequent part-time work. However, this group accounted for about 4 percent of men (Figure 2.12).

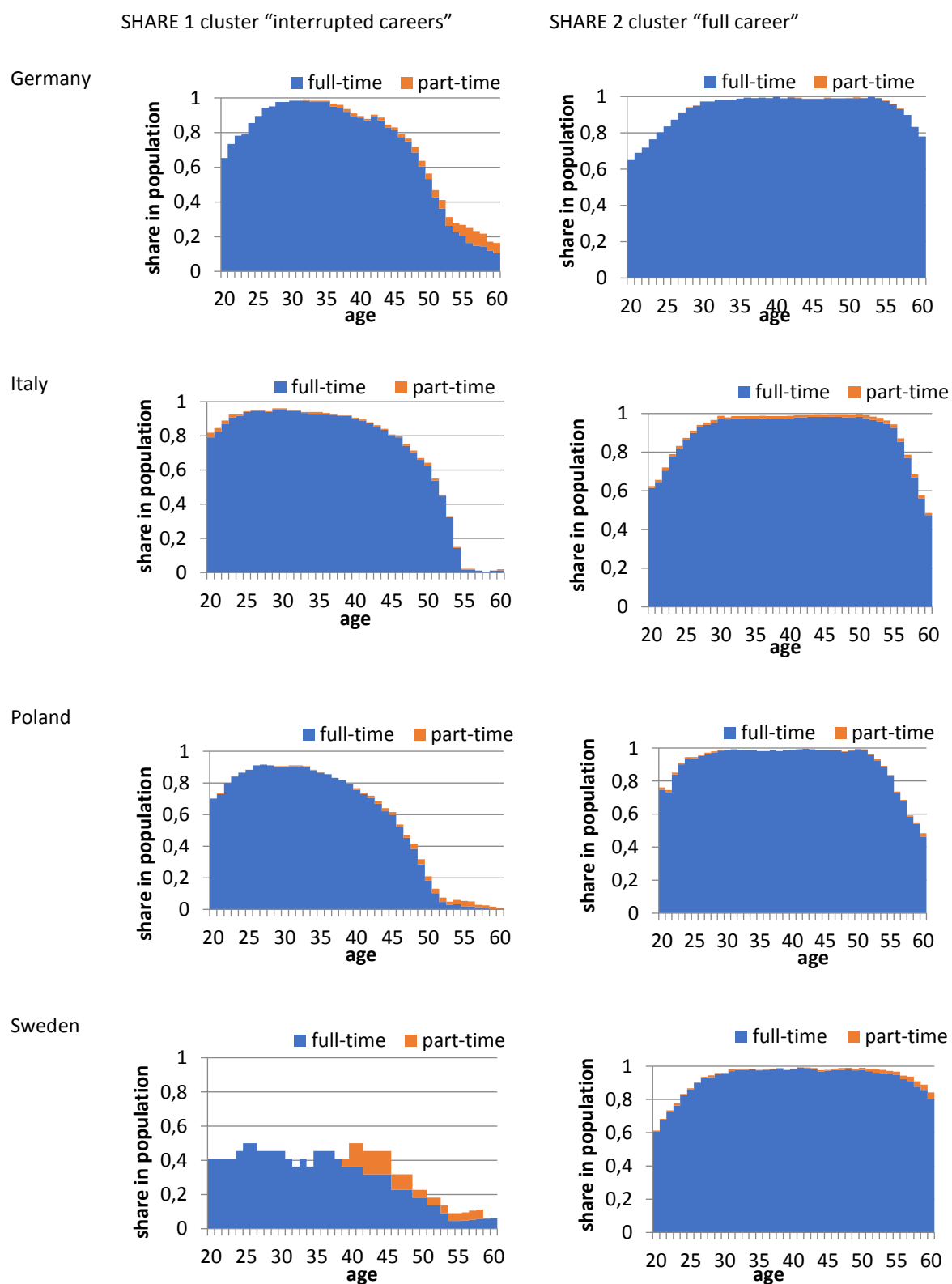
The remaining 96 percent of men had very stable and high employment rates up to the age of 60. The meaning of “interrupted” career is even more diverse for women (Figure 2.13).

In Italy, women’s labor force participation is in general very low, the result of the almost complete lack of labor market participation of almost one-half of women. It seems to be the extreme case of this type of interrupted career.

In Poland women with full-time careers have relatively high employment rates. Interrupted careers seem to have been a result of initial withdraw from employment in childbearing and childrearing periods, and limited returns to the labor market at later stages of their life course.

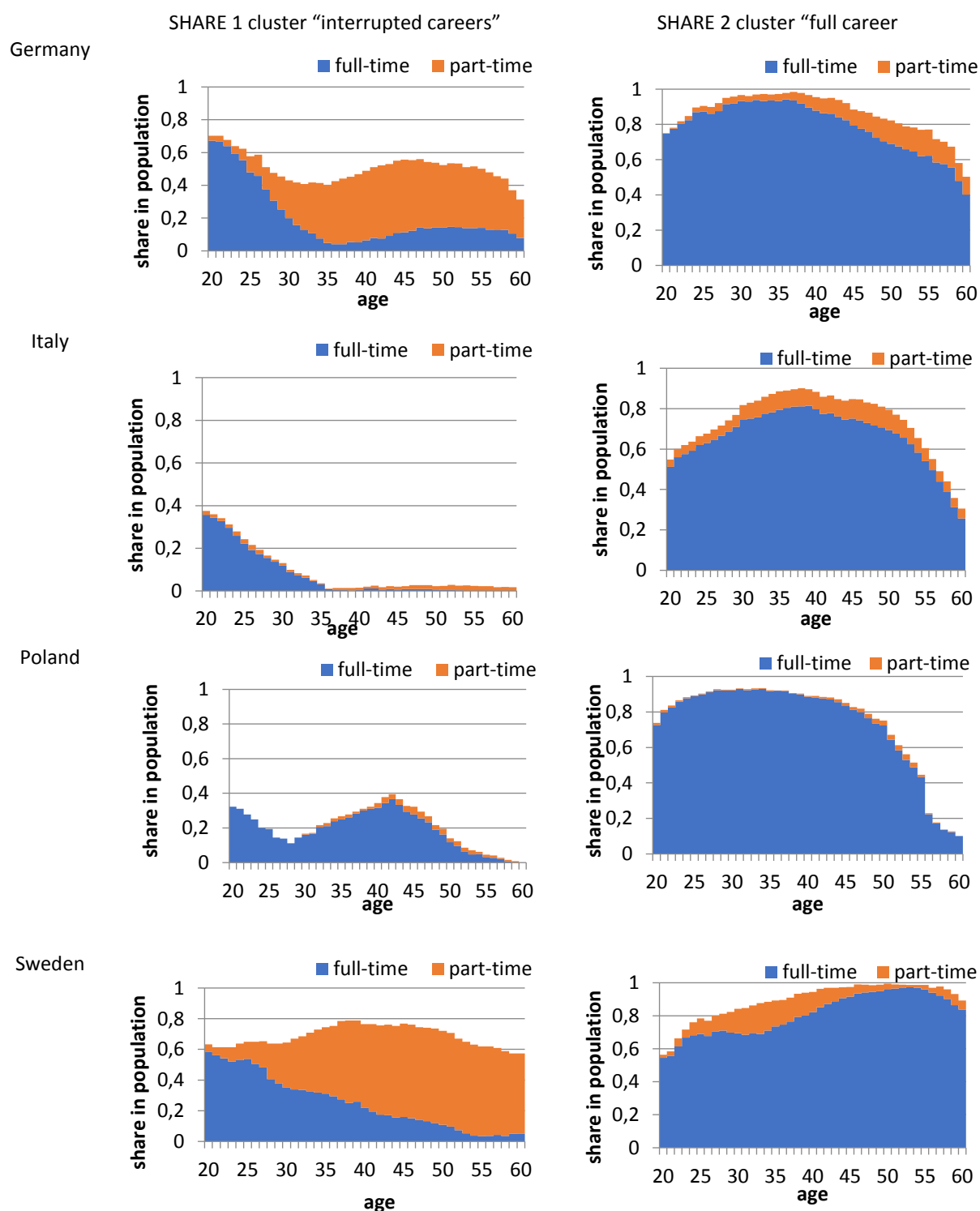
Part-time employment is hardly used. At the same time, part-time employment seems to be very frequent among women with “interrupted” patterns of work careers in Germany and Sweden. These outcomes are consistent with the earlier findings on the employment characteristics of men and women in the four countries.

Figure 2.12: Average employment rates in full-time and part-time age profiles in two clusters: “interrupted career” and “full career” – results for men



Source: Authors' estimates based on SHARE Job Episodes Panel data.

Figure 2.13: Average employment rates in full-time and part-time age profiles in two clusters: “interrupted career” and “full career” – results for women



Source: Authors’ estimates based on SHARE Job Episodes Panel data.

The differences in the employment rates combined with differences in wage levels calculated for age groups 20–29, 30–49, and 50 and over for people with full-time and part-time employment translate into differences in the life course labor income gap. The estimated life course labor income in the four groups for all countries is compared, taking the level of labor income of men with full careers as the baseline (Table 2.2). Career interruptions give the highest penalty in lifetime labor income in the case of women with interrupted work careers. In Italy, the life course income of these women consists of only 6 percent on average of men’s income with a full career (100 percent). This means that the gap between life course income of men with full careers and women with interrupted careers ranges from 94 percent in Italy to about 54 percent in Sweden. It should also be noted that if women have relatively full careers, the gap with men with full careers still remains high – between 37 percent and 17 percent. In fact, in Germany, Italy, and Poland the lifetime income of women with a full career is relatively similar to that of men with an interrupted career. These differences have an important influence on individual pension rights in NDC schemes or point systems, as discussed later.

Table 2.2: Relationship between the level of life course labor income (%) of men and women in the clusters with full and interrupted careers compared to men with full careers

	Men		Women		Share of persons in interrupted career cluster (%)	
	Full (%)	Interrupted (%)	Full (%)	Interrupted (%)	Men	Women
Germany	100	64	68	26	21.3	53.3
Italy	100	66	64	6	27.1	48.9
Poland	100	57	63	16	35.7	24.4
Sweden	100	41	83	46	4.1	37.0

3. Employment histories and pension levels

This section presents simulations of pension levels for men and women in the four countries. Different employment paths by country and sex are assumed, contrary to the assessments of hypothetical replacement rates by the OECD (OECD 2015) and the European

Commission presented in Pension Adequacy Reports (European Commission 2018). The latter focus on comparing expected pension benefits under different pension systems for people with standard profiles of employment careers, and the assumptions usually applied refer to the full (or almost full) employment length and different (but standardized) earnings levels.

The goal here is to assess the expected outcomes of pension systems considering the country-specific labor market situation regarding gender-related biographies, employment, and wages. As shown in the previous section, the labor market differences between countries and between men and women within countries are significant. The adequacy of future pensions will depend on those distinct employment histories.

3.1. Pension simulations: Assumptions and the approach

To estimate the expected levels of future pensions, a microsimulation model was prepared to calculate the level of old-age pensions in the four countries. The model calculates hypothetical future pensions (HFPs) in relation to the country average wage in the year of retirement. HFPs are calculated for individuals who start their employment at age 20 in 2017 and continue their labor market careers according to profiles specified in the respective scenario. Four different scenarios of employment paths (for both men and women) are applied in the simulations:

- Average Eurostat scenario: Probabilities of employment are set according to the average employment rates by country, sex, and age (in 5-year age groups). Levels of wages (compared to the average) are set using the average wages by country, sex, and age (in 10-year age groups), as presented in sections 1.1 and 1.2 and combined in section 1.3.
- NTA scenario: The labor income that is the basis for the contribution calculation is based on the NTA age profiles of labor income by country and sex, as presented in section 1.3.
- SHARELIFE scenario for workers with interrupted careers: Probabilities of employment are set according to the first cluster identified in the sequence

analysis, as presented in section 1.4, and levels of wages are similar as in the Eurostat scenario.

- SHARELIFE scenario for workers with full careers: Probabilities of employment are set according to the second cluster identified in the sequence analysis, as presented in section 1.4, and levels of wages are similar as in the Eurostat scenario.

The simulations are simplified for comparative purposes. They do not take into account country-specific regulations that result in capping the covered wage for average earners (which is the case of Sweden), nor do they include the recognition of pension rights due to career interruptions, such as child care. Other assumptions in the simulations are based on the Ageing Working Group (AWG) assumptions (European Commission 2015), as listed in Table 3.1. Life expectancy used for pension calculation is based on the 2013 Eurostat population projections (EUROPOP 2013).

Table 3.1: Country-specific assumptions used in pension simulations

	Germany	Italy	Poland	Sweden
Wage, employment, and economic growth:				
Average wage growth rate (%)	1.5	1.2	2.2	1.5
Employment growth rate (%)	-0.5	0.1	-0.6	0.5
Wage bill growth rate (%)	1.0	1.0	1.0	1.0
GDP growth rate (%)	1.0	1.3	1.6	2.0
Contributions				
Contribution NDC (% of wage)	n.a.	33.00	12.22	14.88
Contribution NDC-2 (% of wage)	n.a.	n.a.	4.38	n.a.
Contribution FDC (% of wage)	n.a.	n.a.	2.92	2.33
Indexation and rates of return				
Indexation of the NDC account (%)	n.a.	1.3	1.0	1.5
Indexation of NDC-2 account (%)	n.a.	n.a.	1.6	n.a.
Rate of return on FDC account (%)	n.a.	n.a.	2.0	2.0
Annuity calculation				
Discount rate for annuity calculation (%)	n.a.	1.5	0.0	1.60
Adjustment of point value due to life expectancy	14%	n.a.	n.a.	n.a.

Source: Authors' assessment based on AWG and OECD assumptions.

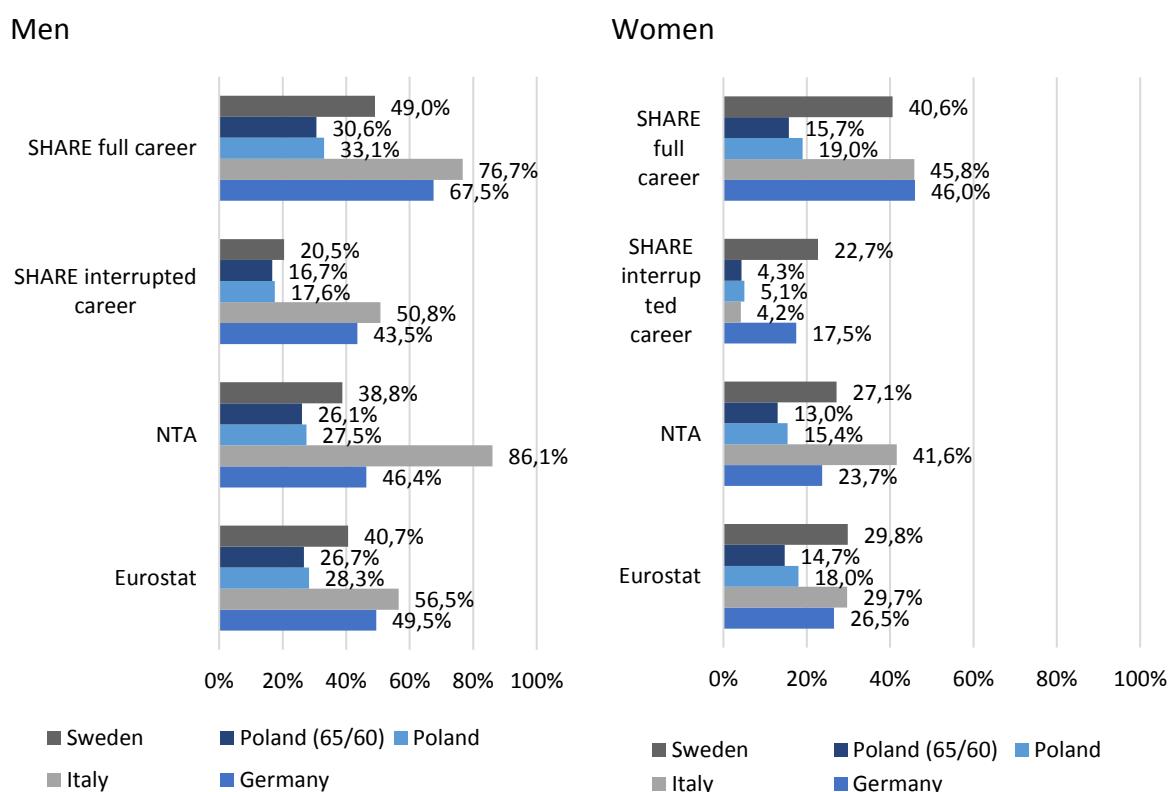
Note: n.a. = not applicable.

3.2. Hypothetical future pensions

HFPs are calculated separately for men and women according to the four scenarios. The amount of contributions paid at a given age depends on the age- and sex-specific employment probability and labor income, according to the applied scenario. It is assumed that both men and women retire at age 67 (target retirement age in Germany, Italy, and Sweden). For Poland, results are also presented for lower ages: 65 for men and 60 for women, the legal retirement age as of October 2017.

Figure 3.1 shows the simulation results. Men can expect higher pensions compared to women in all countries.

Figure 3.1: HFPs of men and women under different assumptions on labor market paths by country (% of average wage)



The difference is largest in Italy and Germany (26.8 percentage points and 22.9 percentage points, respectively, in the Eurostat scenario). In the remaining two countries, the difference slightly exceeds 10 percentage points upon the retirement age of 67. Under the lower

retirement age in Poland, the difference increases to 12.0 percentage points. This is an outcome of accumulated differences in both labor market participation and average wages by sex.

Differences also arise between countries. The Eurostat and NTA scenario results are similar. In the Eurostat scenario with average employment rates and average wages by age, the highest level of HFPs for men is in Italy, exceeding 56 percent of average wage, followed by Germany, Sweden, and Poland. For women in the same scenario, HFPs in Sweden and Italy are close to 30 percent, and are slightly lower in Germany. In Poland, assuming a retirement age of 67, women's HFPs remain below 20 percent and for lower retirement age (60 years), fall below 15 percent.

Last but not least, the HFPs based on the two profiles of "interrupted" and "full" careers indicate the gaps in the HFPs generated by the accumulated impact of career breaks. For men, the largest difference is seen in Sweden (28.6 percentage points), but it should be noted that the majority of them (almost 96 percent) are in the full career group. In Italy and Germany, men with interrupted careers withdraw from employment earlier. As a result, they can expect their pensions to be lower by 25.8 percentage points and 24.0 percentage points, respectively. Poland has the lowest difference, at 15.5 percentage points. The share of men with interrupted careers is also higher in the three latter countries, as discussed in section 1.4.

The pattern of interrupted careers of women in Poland and Italy leads to the expected level of HFPs below 5 percent of average wage. This is significantly below the poverty line and a minimum pension guarantee.

This outcome for Italy is mainly due to the very short work careers of women, who withdraw from employment very early, presumably as they establish families and have children. In Poland, higher participation rates are seen, but given the design of the pension system, in particular the lower contribution rate and no discount rate for annuity calculation, the estimated benefits are low.

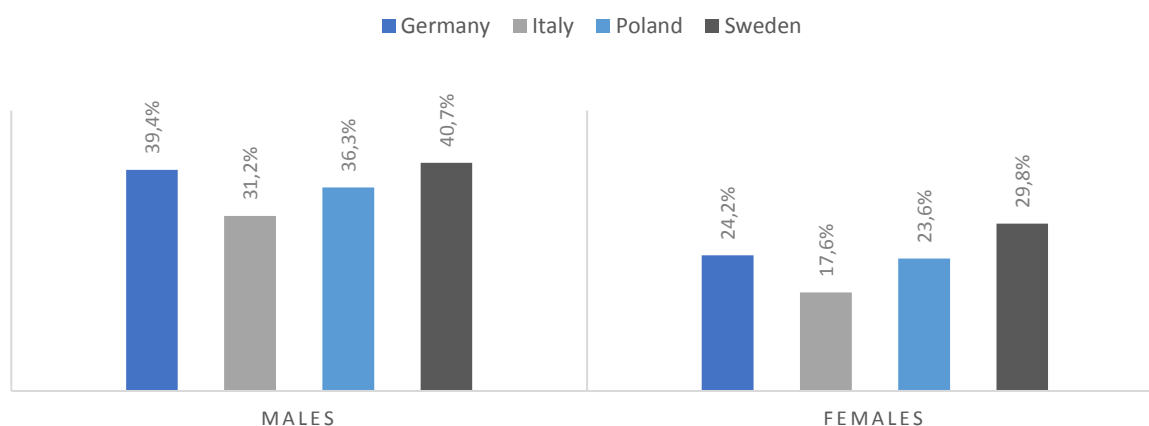
The gap due to career interruption in Italy is very high at 41.6 percentage points, while in Poland it is much smaller, at 13.9 percentage points. In Germany and Sweden, career interruptions for women lead to gaps of 17.9 percentage points and 28.5 percentage points, respectively.

3.3. Impact of employment paths and pension system design on theoretical future pensions

To assess how differences in age and wage income profiles by sex affect pension levels, a simulation was run indicating the pension level in Sweden for workers with wage income and employment rate profiles according to national characteristics (Figure 3.2).

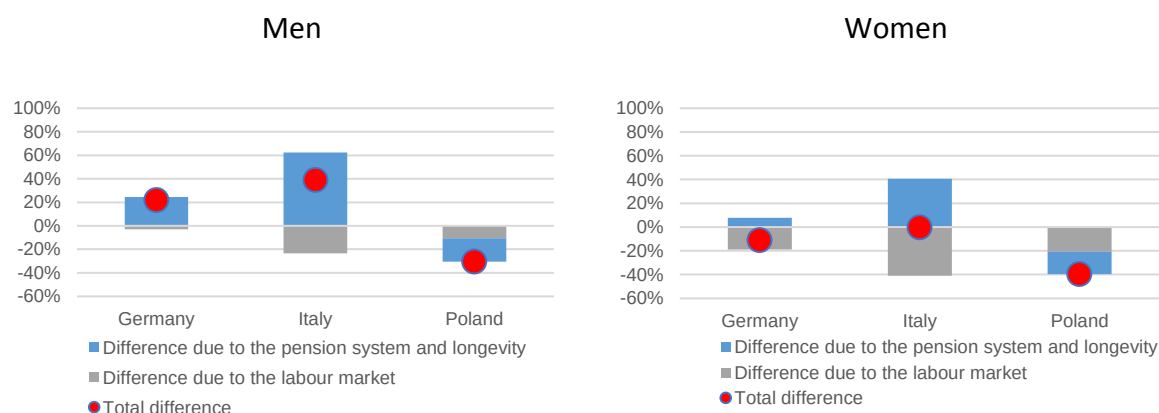
For all three countries the level of HFPs for both sexes in the Swedish pension system is lower due to the lower labor market participation observed in these countries. The difference is smallest in Germany and largest in Italy.

Figure 3.2: Pensions levels in Swedish pension system for country-specific assumptions on employment rate and wage levels by age and sex (% of average wage)



The decomposition of the difference in the level of HFPs between Sweden and the other three countries has three components: the pension system and longevity effects and the labor market effect are presented in Figure 3.3.

Figure 3.3: Decomposition of the difference between HFPs in Sweden and the other three countries



The results show that the pension systems in Germany and Italy provide more generous benefits compared to Sweden, contrary to the Polish system, which provides relatively lower benefits. Labor market differences lead to lower benefits as the labor market participation of both men and women in Sweden is higher than in the other three countries.

4. Summary and conclusions

The labor market plays a crucial role in all types of pension systems. In prepaid systems, especially in NDC and FDC schemes, that role is strong and visible also at the individual level. That has a lot of advantages (as discussed in Góra and Palmer 2019). At the same time, this means that accumulated differences by gender in the aggregated labor income over the life course translate to differences in pension levels. These differences are less pronounced in other types of pension systems that do not have a direct link between lifetime earnings and pensions, such as NDB or FDB schemes. The analysis here shows that patterns of interrupted careers mean much shorter time spent in employment compared to full careers, particularly in Italy and Poland. Career interruptions affect significant shares of both men and women. Women with interrupted careers in Poland and Italy are at risk of having extremely low old-age pensions in NDC systems (below 5 percent of the average wage). Women in Germany, if the patterns of interrupted careers remain unchanged, can expect pensions that are below 20 percent the average wage, while in Sweden they barely exceed one-quarter of the

average wage. This means that if their old-age income relied only on their own old-age pensions linked to life course earnings, they would face a high risk of old-age poverty.

This risk may be mitigated by two types of policy interventions. The first one, more difficult politically but sustainable in the long run, focuses on finding ways to improve labor market outcomes, particularly for groups at risk of interrupted careers. Longer working lives and higher wages lead to improved life course wages and higher pensions. The second type of intervention is through the adjustment of pension rules, which may seem more attractive in the short term but some of the types of such interventions merely hide the problems rather than solving them. Women who interrupt their careers frequently rely on their husband's benefits or survivors' pensions as a source of financing their consumption at old age. Pension systems also recognize selected periods of breaks, such as for child care, in the form of additional pension rights or dedicated mothers' pensions, as in Germany. Such a measure is also considered in Poland. As a result, the actual poverty among older women is significantly reduced.

Given population aging and the increasing financial strain of pension systems, it is important to consider solutions that enable women to accumulate their own pension rights. It should be stressed that solutions such as generous survivors' benefits or lower retirement age of women encourage career interruptions and earlier withdrawal from the labor force.

A mix of policies including those aimed at reducing gender differences on the labor market and transparent compensation for selected justified career breaks, such as maternity or child care leave,¹⁰ is a sustainable policy direction.

Two directions in labor market policy should be seen jointly. The first one is the increase in labor market participation over an entire life course. Differences at different stages of life accumulate when it comes to receiving pension. At the beginning of the employment activity, such policies should focus on smoothing the school-to-work transition. Population aging, late parenthood, and increasing numbers of generations living in parallel as well as

¹⁰ For a discussion of solutions applied in NDC countries see Chłoń-Domińczak, Franco, and Palmer (2012).

more diverse life histories challenge the traditional perception of “rush hours,” which refers to coinciding life activities (education, entering the labor market and starting employment, union formation, and parenthood) at some stages of life. Therefore, reconciliation of work and family over a life course seems to better address the needs of people at different stages of their lives. The key issue is the redistribution of work and care within family networks, especially between women and men. Moreover, since family obligations related to children seem to be crucial for establishing a labor market position and career prospects of both women and men, policies supporting reconciliation of work and parenthood are highly relevant. Measures that strengthen women’s breadwinner role and foster men’s involvement in family care will result in more gender equality in the labor market. Later, policies are needed to support the return to employment after longer spells of remaining outside the labor force. Finally, policies should aim at prolonging working lives and preventing early labor market withdrawal of both men and women. All these interventions are equally important to reduce the risk of interrupted and short careers.

Gender pay gaps are substantial. They do not diminish for new cohorts of workers and will remain an important contributor to women’s pension disadvantage once these women retire. These labor market inefficiencies need to be tackled –both better enforcement of equal pay policies and, again, more policies promoting equal shares of unpaid work and child care are needed. Those in place so far helped to bring more women into the labor market over the past two decades, but as this paper’s data and analyses show, they failed to improve women’s pay in relation to men’s.

This analysis presents the nature and approximate scale of selected (and arguably the most important) labor market problems affecting the outcome of pension systems at the micro level. Country-specific assumptions on labor market participation are combined with the pension system design to compare the outcomes of the combined effect of pension system design applied in the specific labor market context of selected countries. This expands the up-to-date comparisons in the literature, which focuses primarily on differences in the design of pensions, ignoring the pronounced differences in the employment careers of men and women between countries. The analysis also shows that differences in the patterns of

interrupted careers lead to a high risk of low and very low pensions. The paper provides new evidence on the development of NDC pension systems under different labor market performance and institutional settings. For women, differences in expected future pensions are caused to a larger extent by differences in their employment profiles, more than by the design of pension systems and longevity.

The transparent link between contributions and benefits in the NDC system makes such systems sustainable in the long run. They also have clear incentives for individuals for higher and longer labor market participation, which is necessary in the context of population aging and shrinking working-age populations. To fully exploit the benefits of such systems, it is important to highlight the existing risks related to the existing labor market gaps, including in particular interrupted careers. These risks need to be tackled through labor market policies, not by fiddling with the pension system design, which would weaken the link between contributions and benefits. Compensation for care periods, such as maternity or child care leave, in the form of transparent contributions paid to the NDC system in an amount that compensates for the pension loss may help to reconcile work and family life without affecting pension system transparency and sustainability. Transparent pension systems are an asset of the countries discussed herein. Changing them to hide the labor market problems would not help to solve their labor market problems and could lead to destabilization of their pension systems.

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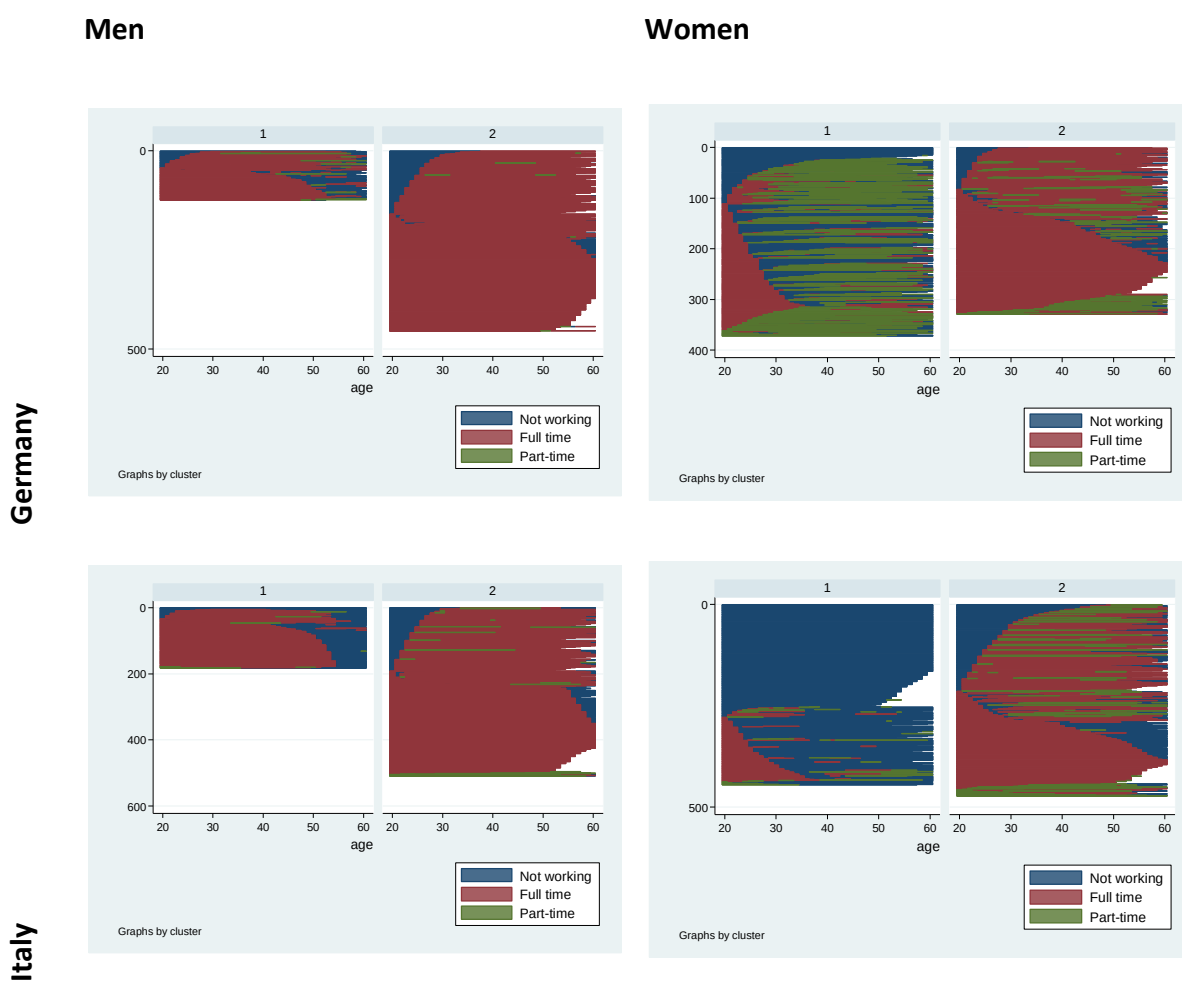
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Appendix

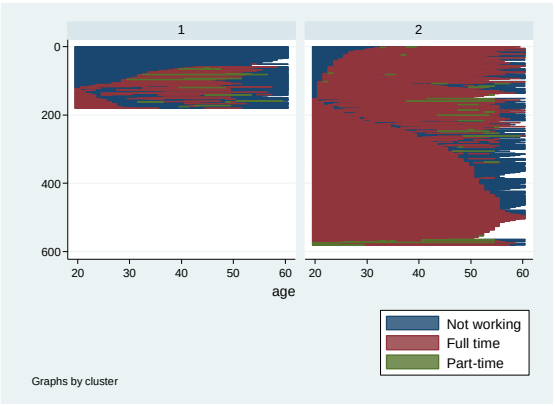
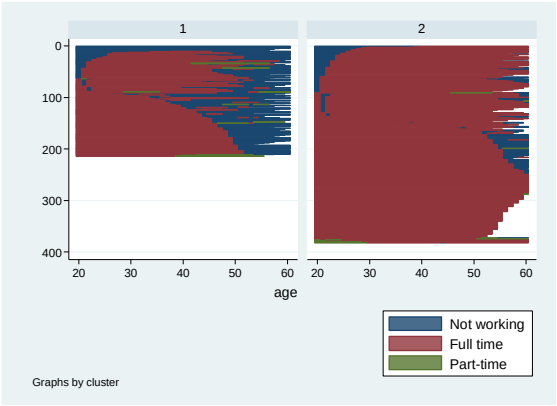
The results of the sequence analysis and segmentation of work careers in Germany, Sweden, Poland, and Italy are shown in the figures below. Each figure presents the individual work careers (vertical axis) by age (horizontal axis), which can consist of three possible states (not working, working full-time, and working part-time) for two clusters: 1 = interrupted careers and 2 = full careers.



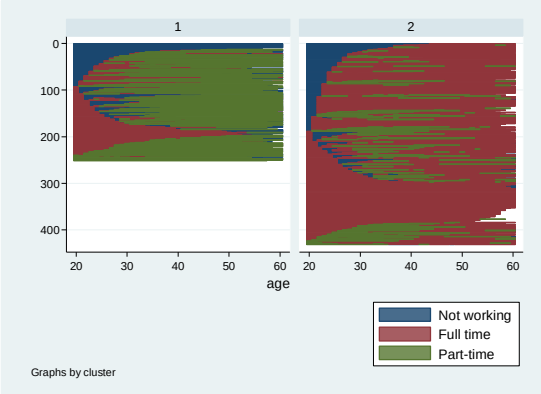
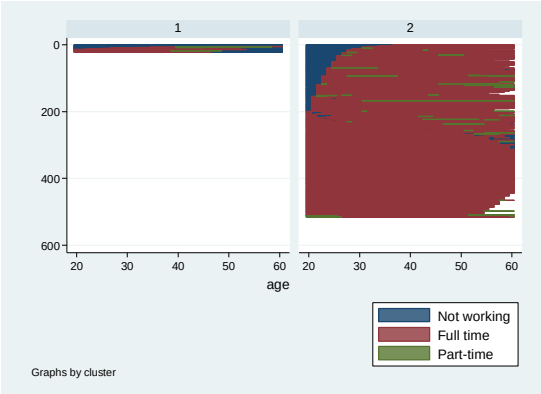
Men

Women

Poland



Sweden



Source: Authors' estimates based on SHARE Job Episodes Panel data.