FACES OF JOBLESSNESS IN ESTONIA: ANATOMY OF EMPLOYMENT BARRIERS

James Browne and Daniele Pacifico

Faces of Joblessness in Estonia

Anatomy of Employment Barriers

OECD

BETTER POLICIES FOR BETTER LIVES

Faces of Joblessness in Estonia
Anatomy of Employment Barriers

Project team: James Browne, Rodrigo Fernandez, Herwig Immervoll,
Dirk Neumann, Daniele Pacifico, Céline Thévenot.

Version October 2016 - via www.oecd.org/social/faces-of-joblessness.htm

TABLE OF CONTENTS

Tables

Figures

Boxes

ACKNOWLEDGEMENTS

This project is co-funded by the European Union

Faces of Joblessness in Estonia

Anatomy of Employment Barriers

1. INTRODUCTION AND SUMMARY

This Profile Analysis Note (PAN) for Estonia assesses the characteristics and employment barriers of working-age individuals with no or weak labour-market attachment. It is one of six such country notes in a joint EC-OECD project covering Estonia, Ireland, Italy, Lithuania, Portugal and Spain. The objective of this project is to provide a novel perspective on employment difficulties, and to aid in the identification of policy approaches to overcome them. The project website at http://www.oecd.org/social/faces-of-joblessness.htm provides further information.

Each PAN develops profiles of key employment barriers and quantifies their incidence and intensity among jobless individuals and among those who work very little or intermittently. The statistical approach is described in an associated methodological background paper (Fernandez et al., 2016; Immervoll and Isik-Dikmelik, 2016) and is consistent with that employed in a related EC-World Bank activity covering six further EU countries. The empirical results from each PAN will be used to inform a dialogue on policy approaches and options that could address the most prevalent employment barriers in selected population groups and strengthen their labour-market attachment. This dialogue will take place in a second part of the EC-OECD project. Its results and an associated policy inventory will be presented in a series of six Country Policy Papers (CPP).

A key motivation behind this project is the finding from the literature on activation and employment-support policies (AESPs), and on social protection systems more generally, that careful targeting and tailoring to individual circumstances are crucial factors for policy success. However, policy discussions do not necessarily reflect this. They often refer to broader labour-market groups such as "young people", "older workers", "people with disabilities" or "lone parents". Similarities of employment barriers among members of such broader groups is implicitly assumed but not well documented (for instance, being "young" is not an employment barrier). As a result, policy interventions targeted on the basis of characteristics such as age, health status or family situation alone may be ill-adapted to the needs of jobless individuals and those with precarious employment patterns. An in-depth inventory of people's employment barriers, and an identification of groups who share similar combinations of labour-market obstacles, can contribute to a better match between individual needs and available support, and make associated policy interventions more effective and less costly.

Countries frequently seek to account for individual circumstances and labour-market difficulties by means of powerful statistical tools that "profile" individual benefit claimants using administrative data. Such tools are useful for tailoring the employment programmes that each registered individual is offered. But they typically cannot be used to provide a broader perspective on the employment barriers facing the entire population of non-workers as data tends to be only available for a subset of the non-working population, such as the registered unemployed. This note complements existing profiling instruments by adopting more of a "birds-eye" approach that considers the employment barriers of *all those with no or weak labour market* attachment. This sizeable and heterogeneous group constitutes the potential client group for AESPs. Understanding their employment barriers is not only important for linking up services provided by different institutions, but it is also essential for identifying groups who would benefit from employment-related programmes or incentives, but who are not currently clients of any of the institutions providing such measures.

A comprehensive assessment of potential employment barriers requires detailed information on people's skills, work history, health status, household circumstances and incomes. The European Union Survey on Income and Living Conditions (EU-SILC) contains detailed information for identifying and assessing potential barriers to employment and is the primary source of data for this note. EU-SILC offers cross-country comparability, a longer *reference period[1]* than alternative household surveys over which one can assess the respondents' main activity status, and detailed information on individual and family circumstances including people's work-related skills end education, work history, health status, income sources, tax liabilities and benefit amounts. However, there is a relatively long time-lag between data collection and availability (SILC 2014 was distributed in February 2016) and less detailed information on labour-force status than standard labour-force surveys.

In SILC-Estonia 2014, individuals with *no or weak labour market attachment* represent 31% of the of *working-age population.[2]* Of those, the biggest group (59%) are individuals who are *persistently out of work* (either unemployed or labour-market inactive for more than 12 consecutive months) whereas the rest (41%) show a *weak* labour market attachment in the form of unstable/intermittent jobs, restricted working hours, or near-zero earnings. Among all these vulnerable groups together, particularly prevalent employment barriers are low work-related skills (46% of those with no or weak labour market attachement), health limitations (43%) and low work experience (31%).

The results of a statistical clustering analysis suggest that the population with no or weak labour market attachment can be separated into **ten groups** with similar employment barrier profiles. Focusing on the prevailing characteristics in each group, these clusters may be summarised as follows:

1. "Experienced early retirees with health limitations" (20% of those with no or weak labour market attachement)
2. "Older labour market inactive adults with health limitations, low skills and limited work experience"(19%)
3. "Working poor" (15%)
4. "Well-off mothers with care responsabilities" (13%)
5. "Prime age long-term unemployed with low skills" (10%)
6. "Youth with limited work experience" (7%)
7. "Experienced prime age unemployed men with few obstacles to employment" (5%)
8. "Unskilled mothers with care responsibilities and limited work experience" (5%)
9. "Long-term unemployed youth without any past work experience" (4%)
10. "Younger severely disabled" (4%)

These group labels indicate that proxy groupings, which are commonly referred to in the policy debate, such as "women", "disabled", "youth", include distinct sub-groups with very different employment-barrier profiles. For instance, several distinct combinations of employment barriers are common for young people: "some but limited work experience", "severely disabled", "unskilled unemployed" with scarce job opportunities. There are also many young people with poverty risks despite (limited) employment in Group 3, and skilled young people with children frequently face financial work disincentives (Group 4).

---

1. The data collection of the labour-market status in the SILC questionnaire consists of 13 identical questions. Twelve of them refer to the self-assessed status in each month of the income reference period (the calendar year *before* the interview) and an additional question refers to the moment of the interview. The *reference period* in this note starts the first month of the income reference period and lasts till the moment of the interview.

2. Ages 18 to 64, excluding individuals in full-time education or compulsory military service.

In most groups a significant proportion of individuals face more than one potential employment barrier simultaneously. One third face *at least two* such barriers simultaneously, and about one in four face *three or more*. For instance, most of the "young severely disabled" (Group 10) have both low skills, no previous work history and severe health limitations, whereas a majority of "unskilled mothers" (Group 8) have care obligations, low skills and limited work experience. As a result, addressing one type of employment obstacle may not be enough to boost employment levels significantly. From a policy perspective, the results point to a need to carefully sequence different activation and employment support measures, and to co-ordinate them across policy domains and institutions.

Section 2 of this note begins by providing some background information on the evolution of social and labour market conditions in Estonia and how this compares with the other five countries studied in the project, and with the EU average. Section 3 uses the most recent EU-SILC data to provide quantitative measures for different types of employment barriers and their incidence among individuals with no or weak labour-market attachment. Section 4 applies a statistical clustering technique to organise this population into the groups with homogeneous combinations of employment barriers and presents key demographic and socio-economic characteristics of each group. A short concluding section highlights selected directions for extending the approach presented here.

2. LABOUR MARKET AND SOCIAL CONTEXT

In Estonia as well as in the five other countries covered by this project, the economic crisis has significantly impacted labour markets, which in turn caused increased poverty and material deprivation. In Estonia, the impact of the crisis was especially marked during the first years following the onset of the crisis, and followed by a strong recovery. Figure 2.1 shows the variation of employment rates in the six countries between 2007 and 2014 and compares these with the EU average. Estonia stands out in a number of respects: first, the employment rate before the financial crisis of 2008 was significantly above the EU average, by around 4 percentage points (ppts); second, the fall in employment rates seen between 2008 and 2010 was the largest among the six countries (around 8 ppts as opposed to less than 2 ppts for the EU average); and third, the recovery in employment rates between 2010 and 2015 was the strongest of all of the six countries studied. By 2015, the employment rate had exceeded its 2007 level, though the number of people in employment was lower as the size of the working-age population shrank by 2% during this period as a result of a historical fall in the birth rate and net emigration during this period.

Figure 2.1. Employment rates: strong recovery after the crisis

In % of the working-age population
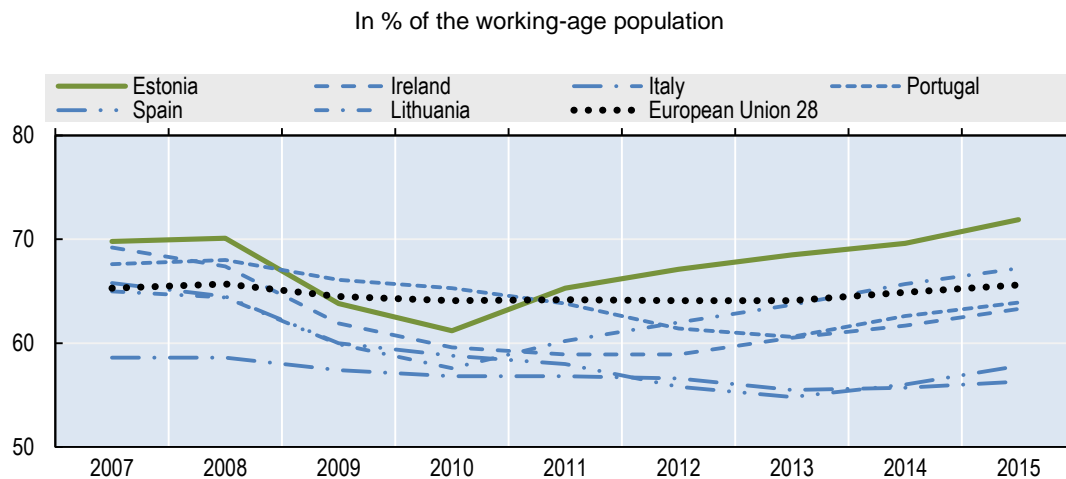
Source: Eurostat Labour Force Statistics.

As in other countries, employment rates are higher in Estonia for men than women and for those aged 25-55 than those aged under 25 or over 55. The gender employment gap was 5.8 ppts in 2013, which is smaller than in many other countries, and the gap has narrowed in recent years (from 7.1 ppts in 2007). It however remains large for women with children aged under 3.[3] A reason behind this is the lack of childcare provision for young children in Estonia. With support from the European Social Fund, the Estonian Government has begun to increase the number of childcare places in Estonia to alleviate this problem.[4] By contrast, lone-parent employment rates are high in Estonia: Eurostat Labour Force Statistics show that 78% of lone parents were in paid work in Estonia in 2015, the highest of the six countries studied here with the exception of Portugal.

Despite high levels of female employment, the gender wage gap has remained high. In 2010 (the latest years for which comparable data are available), the raw gender wage gap in Estonia was the highest

---

3.   European Commission (2016), Figure 3.2.4.

4.   European Commission (2016), OECD (2015b).

in the EU: median female full-time earnings were 26.6% lower than median male full-time earnings.[5] The Estonian Government is planning to make policy changes to address this: the Gender Equality Act is set to be amended to mandate labour inspectors to check that the principle of equal pay is being observed by employers, and the parental leave system will be made more flexible by allocating some of the leave to the father.

Among young people in Estonia, both the unemployment rate and the NEET rate (that is, the proportion not in education, employment or training) are below the EU average. Employment rates for young people are no higher than the EU average, however, as a relatively large proportion of young people in Estonia are in education and training. The Estonian Government has since 2015 implemented the Youth Guarantee, which has introduced two new measures to increase youth employment in 2015. Additional careers advice has been provided in schools and a new work-based training scheme called "My first job" has been introduced for those who have been unemployed for at least four months. This programme involves wage and training subsidies for employers who take on young people with low work experience who have previously been unemployed on a contract of at least two years.

As with other groups, employment levels of older people are relatively high in Estonia. In 2013, the employment rate among those aged 55 to 64 was around 12 ppts above the EU average. Recent policy reforms aim to increase employment among older people further. In particular, the "Work Ability" scheme (introduced in stages from 2016) has sought to increase employment among those (often older) individuals claiming incapacity pensions. This scheme involves a new procedure to assess incapacity for work and a broader set of AESPs for those already claiming a disability pension.

As is the case in other countries, those with lower levels of education and skills have lower employment rates. Skills shortages for highly educated workers have been noted in recent OECD and EC country reports, which have also argued for reforms to vocational education in order to strengthen work-based learning and reduce skills mismatches (OECD, 2015b; European Commission, 2016). This is despite relatively high levels of education in Estonia where the proportion of adults with tertiary education is in line with the OECD average. The OECD's Survey of Adult Skills (OECD, 2013c) has found that levels of adult literacy and numeracy in Estonia are above the average for the countries covered by the survey (and higher than Ireland, Italy and Spain; Lithuania and Portugal were not covered by the first round of the survey), though scores on problem solving in a technology-rich environment were below average. The OECD recently recommended (OECD, 2015b) that Estonia further expands active labour market policies (ALMPs): although progress has been made in this area, for example by increasing support for the long-term unemployed through job coaching and training, spending in this area remains low in comparison to other countries.

Incidence of economic hardship

High employment rates in Estonia mean that the proportion of working-age adults living in households with very low work intensity (that is to say those where adults work less than 20% of the time they potentially could work during the year) is below the EU average and the lowest of the six countries studied (see Table 2.1 below). In line with strong labour-market attachment, the proportion of the population that is at-risk of poverty or social exclusion (AROPE) is also low. However, levels of income poverty (defined as households with less than 60% of median equivalised household disposable income) are nevertheless high in Estonia, at 22% compared to the EU average of 17%. Poverty rates are especially high among jobless individuals and those working part time.[6] Rates of severe material deprivation are low, suggesting that many of those with a relatively low current income in Estonia may not be long-term poor

---

5.   *Source*: OECD Labour Force Statistics.

6.   Part-time work is however relatively uncommon in Estonia: only 8% of workers work part-time, compared to 18% in the EU-28 as a whole.

and, as a result, are able to maintain an adequate standard of living during periods of low income. Indeed, the rate of persistent poverty in Estonia is lower than that in Italy, Lithuania, Portugal and Spain (figures for Ireland are not available), though still above the EU average. Estonia is unusual in having higher poverty and material deprivation rates for households without children than for those with children. A possible explanation for this is that although spending on unemployment benefits and social assistance benefits is very low in Estonia, spending on family benefits is more in line with that of other EU countries.

Table 2.1. Risk of poverty or social exclusion

2014, in % of people aged 16-64

	Estonia	Ireland	Italy	Lithuania	Portugal	Spain	EU28
People at risk of poverty or social exclusion	24	30	30	26	29	32	26
People at risk of poverty							
All	20	17	20	18	19	23	17
Not working	36	31	31	35	32	36	31
Working	12	6	11	8	11	13	10
full-time	11	3	10	7	9	10	8
part-time	20	11	17	24	31	23	16
Households without children	25	15	16	18	16	16	15
Households with children	18	16	24	20	23	28	19
People living in households with severe material deprivation [1]							
All	6	9	12	12	10	8	9
Households without children	7	6	10	16	10	6	8
Households with children	5	10	13	12	11	9	10
People living in households with very low work intensity [2]	10	24	12	12	11	15	11

1. Individuals aged 18-64.
2. Individuals aged 18-59.

Source: Eurostat (EU-SILC 2014).

Target groups for activation and employment-support policies

Individuals with labour market difficulties frequently move between non-employment and different states of "precarious" employment. As a result, limiting attention to "snapshots" of non-employed (or underemployed) individuals in a specific point in time, such as those based on labour force surveys, may not capture the true extent of labour-market difficulties or the need for policy intervention. To cover the potential scope of AESPs, the **target population** of the analysis in this note includes working-age individuals who are "*persistently*" *out of work* (either unemployed or labour-market inactive for more than 12 consecutive months) as well as individuals whose labour-market attachment is "weak".[7] "Weak" labour-market attachment can include individuals with *unstable jobs* working only sporadically, those working with *restricted working hours*, and those with *very low earnings* (due to, for example, working informally or in very low productivity self-employment).

Box 2.1 defines each sub-group of the *target* population more precisely and explains how these are identified in the SILC data. The target population is a sub-set of the *reference* population of working-age

7. This paper does not attempt to distinguish between voluntary and involuntary joblessness or reduced work intensity. Individuals can of course choose to be out of work, or in part-time or part-year employment, voluntarily, and some surveys ask respondents whether they "want to work". However, those saying they do not want employment, or prefer to work part-time or part-year, may do so as a result of employment barriers they face, such as care obligations or weak financial incentives, which policy might potentially address. If extended voluntary labour-market inactivity or underemployment creates or exacerbate certain types of employment barriers, it may subsequently give rise to involuntary labour-market detachment or partial employment in later periods.

adults relevant for AESPs. The **reference population**, in turn, is defined as all working-age adults except for full-time students and those in compulsory military service as these groups are typically outside the scope of AESPs.

Not everybody with no or weak labour-market attachment may be an intended target for AESPs. The appropriate scope of AESPs is an important policy decision and may, e.g., exclude those with care responsibilities or severe health problems, or those deciding not to work for some other reason. The aim of the broad definition of the target population adopted in this note is not to be prescriptive about the appropriate scope of AESPs, but to inform policy decisions by documenting employment barriers and other circumstances of all those with no or limited employment. The approach is thus descriptive. It takes no position on whether policy intervention is justified for specific groups but identifies empirical combinations of employment barriers for a broad group of individuals with *potential* labour-market difficulties. Based on the results, policymakers can decide which groups should and should not be targeted by AESPs.

Box 2.1. Population groups with potential labour market difficulties (target population)

The target population in this note includes those who are persistently out-of-work, as well as those with weak labour-market attachment.

The **persistently out-of-work** population (*long-term unemployed* or *inactive*) includes individuals reporting no employment activity throughout the *reference period*. The reference period corresponds to 12 consecutive monthly observations in the *income reference year* (January-December of year T-1) plus one additional observation at the *moment of the interview* (in year T).

The group with **weak labour market attachment** refers to individuals reporting employment activity during the *reference period* matching any of the following three situations:

   i)   **Unstable jobs**: individuals working only a limited number of months throughout the reference period. The threshold is equivalent to Eurostat's low-work-intensity measure: Above zero but no more than 45% of potential working time in the income reference year. To reconcile information reported for the income reference period and at the moment of the interview the following individuals are also considered in this group: 1) Workers who report no work activity during the income reference period but who are working at the moment of the interview and, 2) workers with between 45% and 50% of work activity during the income reference period who do not report any work activity in either the last month of the income reference period or at the moment of the interview.

   ii) **Restricted hours**: workers who spent most or all of the reference period working *20 hours or less* a week. However, individuals working 20 hours or less who are not likely to have additional work capacity, e.g. due to ongoing education or training, are excluded.

   iii) **Near-zero earnings**: individuals reporting some work activity during the income reference period but negative, zero or *near-zero* monthly earnings (less than one third of the statutory minimum wage for 2013). In addition to possible classification error, situations included in this group could signal potential labour market difficulties, such as underpayment and/or informal activities.

1.   The 20-hours threshold is approximately in-line with the 45% "part-year" threshold that identifies the group with unstable jobs. For a 40-hours working week in a full-time job, 45% of full-time would correspond to 18 hours a week. However, in SILC, the distribution of working hours in the main job shows a high degree of bunching at 10, 15, 20 and 25 hours a week. As the closest multiple of 5, a value of 20 hours was therefore chosen.

Figure 2.2 shows the *evolution* of the target population in Estonia between SILC survey years 2008 and 2014 (since the reference period is the year prior to the interview, these data refer to the period 2007 to 2013). Despite the major definitional differences, the resulting patterns are similar to the trends based on LFS-data shown earlier in Figure 1. Long-term unemployment and underemployment rise between 2008 to 2010 (SILC years 2009 and 2011) and subsequently fell until 2012 (SILC year 2013). Economic inactivity rates remained constant throughout the period in question. Underemployment had not yet returned to its pre-crisis levels by 2013 (SILC year 2014), and indeed increased in the most recent period.

Figure 2.3 shows the composition of the target population in SILC 2014. Of the 59% who were out of work throughout the reference period, the most common status was "unfit to work" (unable to work because of illness or disability), followed by equal proportions in retirement or undertaking domestic tasks (14% each). 12% reported being unemployed throughout the reference period. Among those with some work activity, most have unstable employment patterns (working less than 45% of the number of hours of a full-time full-year worker), mostly because they spent a considerable part of the year not working at all. Those who worked part time throughout the year make up only 5% of the target population. The size of the "near-zero earnings" category is also large at 16% of the target population: some of these individuals spent a considerable part of the year not working at all, but most of them were in work throughout the whole reference period.

Figure 2.2. Trends of population groups with potential labour market difficulties

In % of reference population
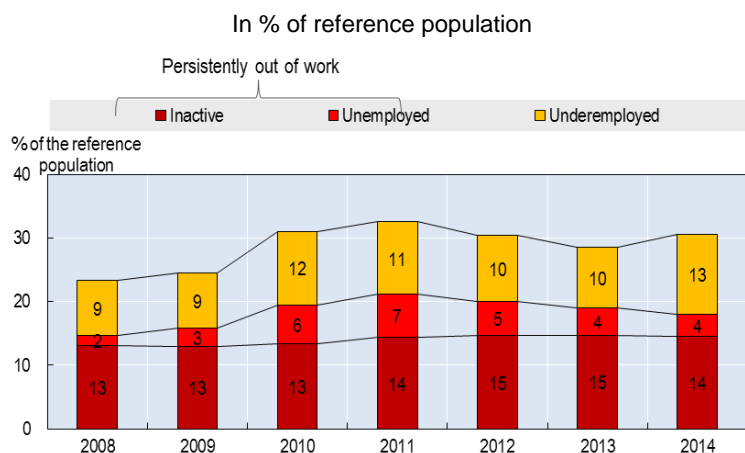
Source: Calculations based on EU-SILC 2008-2014. See Box 2.1 for the definitions of the three groups.

Figure 2.3. Composition of the Estonian population with labour market difficulties
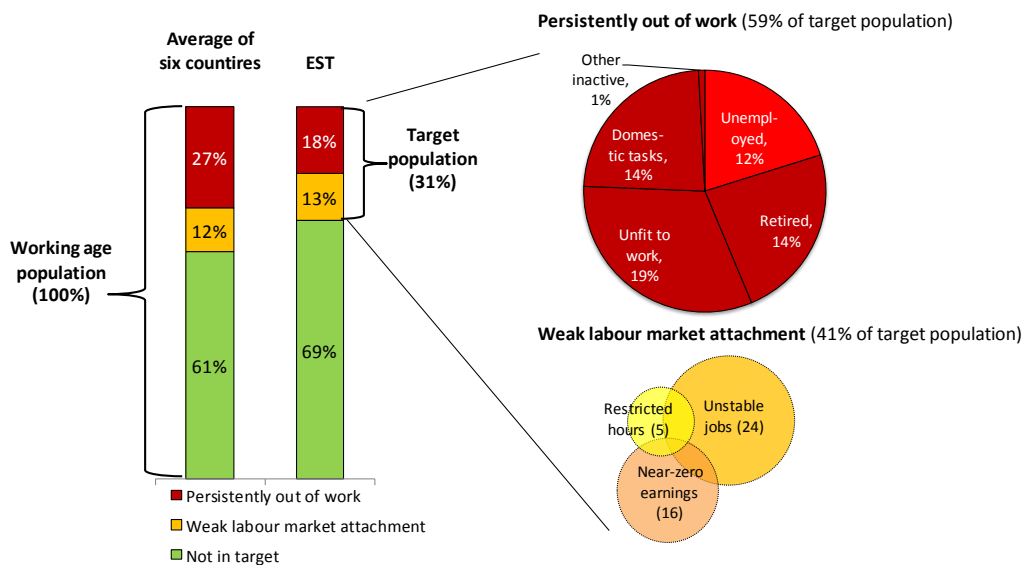
Note: The six-country average is unweighted.

Source: Calculations based on EU-SILC 2014. See Box 2.1 for the definitions of the three groups.

3. EMPLOYMENT BARRIERS IN ESTONIA

Working age individuals with no or weak labour-market attachment potentially face a number of employment barriers that prevent them from fully engaging in labour market activities (Table 3.1). A thorough understanding of these barriers is a pre-requisite for designing and implementing policy interventions in a way that is well-targeted and suitably adapted to the circumstances of different policy clients. Following Immervoll and Scarpetta (2012), this note examines three types of employment barrier, namely:

- **Insufficient work-related** *capabilities* , e.g. a lack of *skills*, *work experience*, care responsibilities and *health*-related limitations;

- **Lack of** *financial work incentive* **to look for "good" job**, e.g., because of low potential pay, relatively *generous out-of-work benefits*, or high standards independently of own work effort;

- **Scarce** *job opportunities*, e.g., a *shortage of vacancies* in the relevant labour-market segment, friction in the labour market due to information asymmetries, or discrimination in the workplace.

Figure 3.1. Employment barriers: conceptual framework

Source: Fernandez et al. (2016).

The employment barriers outlined above cannot all be measured directly so this note uses a set of workable indicators corresponding to each category outlined above. Fernandez et al. (2016) provides a fuller discussion of the indicators and their rationale, including descriptive statistics for selected countries. The indicators used are as follows:

- **Capability, item 1. "Low" skills**: if an individual has low professional skills (their most recent job was in the lowest two categories of the ISCO-08 classification system). Those who demonstrate high skills by having a tertiary degree are assumed not to face this employment barrier even if their most recent job was low-skilled. If an individual has no work experience at all, they are also included in the "low skills" group. [8]

- **Capability, item 2.** Two measures of work experience:

  - **No *recent* work experience:** if an individual did no paid work during the reference period (i.e. they were without employment for at least 12 months).

  - **"Low" relative *total* work experience:** the indicator takes one of three values: 1 for those who have *no past work experience at all*, 2 for those who have *some* work experience but have worked *less than 60%* of the time since they left full-time education, and 3 otherwise (i.e., if their total work experience is not "low").

- **Capability, item 3. Health limitations:** If an individual reports some or severe long-standing physical or mental limitations in daily activities.

- **Capability, item 4. Care responsibilities:** if an individual has a family member who requires care[9] and is either *the only* potential care giver in the household, or they are the only person in the household who is economically inactive or working part time *because of care responsibilities.*

- **Incentives, item 1. Capability, item 4. "High" non-labour income:** if the household's income excluding that relating to the work efforts of the individual in question,[10] adjusted for household size, is more than 1.6 times the median value among the reference population.

- **Incentives, item 2. "High" earnings replacement benefits:** if earnings-replacement benefits are more than 60% of an individual's estimated potential earnings in work.[11]

- **Opportunity, item 1. Scarce job opportunities:** unemployed individuals characterised by active job-search and willingness to take up employment during most of the income reference period (*at least* seven months) until the moment of the SILC interview (inclusive).[12]

---

8. This indicator is different from that in Fernandez et al. (2016), which classifies individuals who have achieved less than upper secondary education as facing an employment barrier. The reason is the peculiar combination of mid-high education levels and low work-related skills common among the older cohorts of the Estonian labour force.

9. Family members assumed to require care are children under the age of 12 receiving less than 30 hours of non-parental childcare a week and adults reporting severe limitations in daily activities due to their health and being economically inactive throughout the reference period (and in the case of those of working age, that permanent disability is the reason for their inactivity).

10. This includes earnings, individual-level earnings replacement benefits and the individual's share of household-level earnings replacement benefits. See Fernandez et al. (2016) for details. Starting from 2014, EU-SILC differentiates between means-tested and non means-tested household-level benefits. This indicator considers only means-tested household-level earnings replacement benefits.

11. Potential earnings are estimated in SILC with a regression model corrected for sample selection. See Fernandez et al. (2016) for details.

12. Fernandez et al. (2016) adopts an "inferential" approach for identifying individuals with low job opportunities. They estimate the risk of facing potential demand-side constraints, i.e. being either long-term unemployed or working part-time involuntarily, in different labour-market segments described by regions, age, gender and education. Based on the estimates, individuals with a risk higher than 1.6 times the median are considered facing "scarce job opportunities". This inferential approach works better in countries with a high number of individuals facing demand-side constraints relative to the working age population.

Table 3.1 shows the share of individuals in the *target* and the broader *reference* population facing each employment barrier. It shows that, with one exception, those in the target population are more likely to face each employment barrier, and that this is in most cases particularly true for those who are out of work during the reference period.

Section 2 showed that the largest share of the out-of-work section of the target population were those who reported being unfit to work, so it is unsurprising that more than half of those in this group report health limitations to daily activities. It is also unsurprising that the target population has less work experience on average than the rest of the reference population, and that the target population is more likely to face the "scarce job opportunities" barrier to employment since this is defined as having been unemployed and actively looking for work during most of the reference period.

Care responsibilities and high levels of earnings-replacement benefits are much less common barriers to employment in the target population. However, these are a major employment barrier for some groups: it was shown previously that employment rates in Estonia are very low for women with young children. The relatively low rates of earnings-replacement benefits in Estonia means that work disincentives from this channel seem to be infrequent, but again it is clear that they are important for some.

The "high levels of non-labour income" barrier is the only one that is less prevalent in the target population than in the reference population. In other words the target population are *less* likely to have a relatively high-earning spouse (or another income source that is not dependent on their own work effort) than the reference population as a whole. Table A.2 (in Annex A) provides a breakdown of individuals belonging to the target population in terms of age, sex, education level, activity status and other relevant individual and household characteristics.

In practice people's individual and family circumstances are complex and often lead to situations where they face multiple barriers to employment. Figure 3.2 shows the number of (simultaneous) barriers faced by individuals in the target population. It shows that only 24% face only a single employment barrier, about one third of the target population face two barriers, another third faces three barriers or more. The next section uses a statistical clustering technique to examine which combinations of these barriers are most common.

Table 3.1. Employment-barrier indicators

% of population facing different types of barrier

	Working age population	"Target" population		
		All	Persistently out of work	Underemployed
Insufficient work-related capabilities				
"Low" skills	34	46	54	35
Health limitations	26	43	55	26
Care responsabilities	5	16	18	14
No work experience at all	2	7	12	0
Positive but "low" relative work experience	18	31	35	26
No recent work activity	18	59	100	0
Positive but "low" recent work activity	13	27	0	66
Lack of financial work incentives				
"High" non-labour income	31	29	26	34
"High" earnings replacements	7	15	19	9
Scarce job opportunities				
Scarce job opportunities	4	12	15	7

Note: See text for definitions and thresholds.

Source: Calculations based on EU-SILC 2014.

Figure 3.2. Number of simultaneous barriers

% of target population

Estonia

Average of six countries

■ 4 or more barriers □ 3 barriers □ 2 barriers ■ single barrier □ No major barrier
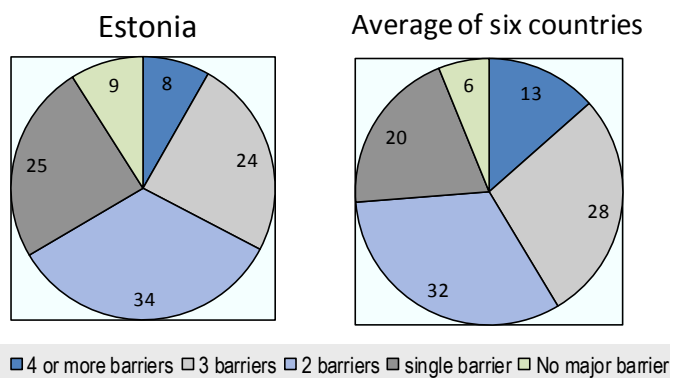
Note: The six-country average is unweighted.

Source: Calculations based on EU-SILC 2014.

4. FACES OF JOBLESSNESS IN ESTONIA

This section builds on the framework described in Fernandez et al. (2016) for *segmenting* the Estonian target population into groups of individuals with *similar combinations* of employment barriers. Using the 2014 SILC data the segmentation process leads to the identification of **ten groups** that provide a detailed representation of Estonians with no or weak labour-market attachment (the "target population").[13]

The following paragraphs describe each group in detail. At the end of each paragraph a box reports a Venn diagram showing extent and degree of overlap of the main barriers characterising the group, as well as a list of selected individual and household characteristics with a "high" probability of occurrence within the group. Together, this information can help in attaching labels ("*faces*") to group members, although labels are necessarily arbitrary to some extent. Table A.2 in Annex A reports the complete list of individual and household characteristics.

Group 1 (**20%** of the target population): **"*Experienced early retirees with health limitations*"**. Most people in this group are relatively old (average age 61 years) and have considerable work experience (36 years on average, the highest of the ten groups). They are largely (77%) labour-market inactive with 56% reporting their labour market status as "retired" and 20% as "unable to work". Many group members report long-standing physical or mental *health limitations* (60%) although only 34% receive sickness or disability benefits. These benefits or other early retirement benefits are high relative to potential earnings for 46% of this group, which could create weak financial *work incentives*. 74% have no recent work experience and many have also *low skills* (48%). Individuals in Group 1 mostly face one or two employment barriers (see Figure 4.1).
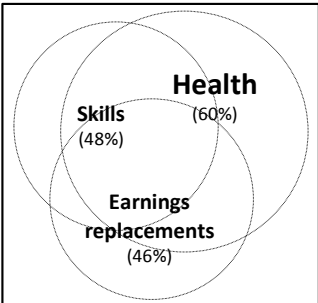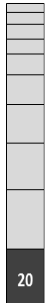
Box 4.1. Group 1: "*Experienced early retirees with health limitations*"

Main employment barriers[1]	Selected characteristics[2]	% of the target pop.
Skills (48%), Health (60%), Earnings replacements (46%)	- 61 years old (average) - Majority women - Retired/Inactive - 36 years of paid work (average) - 13.4 years of schooling (average) - Couple without children - Average equivalised disposable income: EUR 5 975 (2nd quintile)[3] - Average number of simultaneous employment obstacles: 1.8	20

The following notes apply for all groups presented in this section.

1. Surface areas of shapes in the diagram are proportional to the number of group members facing the related barrier ("Proportional Venn Diagrams"). The outer square represents the group size (100%). The diagram shows the three main barriers characterising the group members and is based on the indicators discussed in Section 2 with the exception of *recent* work intensity (due to the strong two-way causal link with the other barriers).

2. Characteristics that distinguish this group from other groups, i.e., categories that have a high probability of occurring in the group. Table A.2 reports individual and household characteristics in more detail.
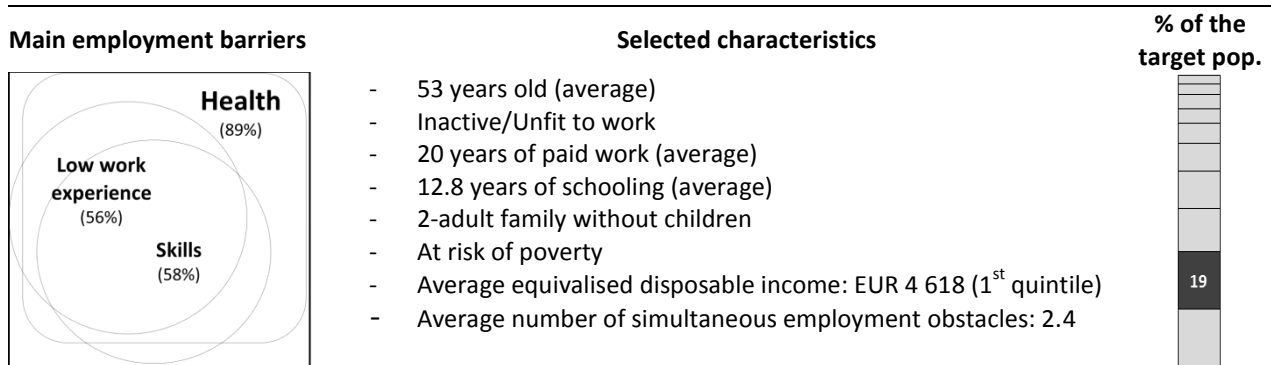
3. Income quintiles are calculated for the entire national population.

Source: Calculations based on EU-SILC 2014.

---

13.   Annex A outlines the segmentation method and the process that lead to the identification of the ten groups. Fernandez et al. (2016) describes in detail the econometric model and the related methodological framework.

Group 2 (**19%** of the target population): **"*Older labour market inactive adults with health limitations, low skills and limited work experience*"**. This group consists of older working-age people (average age 53) reporting long-standing physical or mental *health limitations* (89%, a third reporting "severe" limitations) and receiving sickness or disability benefits (70%). They have all some past *work experience* (20 years, on average) but for the majority (56%) this is low relative to their potential experience. In addition to poor health and low relative work experience, 58% of group members have also *low skills*. Individuals in this group are likely to face at least two simultaneous employment barriers (see Figure 4.1) and have the second highest risk of poverty of all groups.

Box 4.2. Group 2: "*Older labour market inactive adults with health limitations, low skills and limited work experience*"

Main employment barriers	Selected characteristics	% of the target pop.
	- 53 years old (average) - Inactive/Unfit to work - 20 years of paid work (average) - 12.8 years of schooling (average) - 2-adult family without children - At risk of poverty - Average equivalised disposable income: EUR 4 618 (1st quintile) - Average number of simultaneous employment obstacles: 2.4	

Group 3 (**15%** of the target population): **"*Working poor*"**. Unlike the first two groups who are largely inactive, 90% of this prime-age group (average age 43) report work activity during the reference period. In general these individuals do not face multiple overlapping barriers and about 30% do not face any of the employment obstacles considered in this note (see Figure 4.1). The most relevant three employment barriers are low *skills* (31%), high non-labour incomes affecting work *incentives* (28%) and *health limitations* (22%). Although 72% report full-time work during most of the reference period, 82% declared *near-zero earnings*. While around a third of those are self-employed whose earnings may be expected to be volatile, the large share of employees reporting zero or near-zero earnings (58%, 48% full time employees) could indicate informal employment, underpayment or simply be the result of measurement error (for example, workers not declaring earnings from undeclared work to the SILC survey). 51% of individuals in this group are in the bottom income quintile of the income distribution and 52% are at risk of poverty.

Box 4.3. Group 3: "*Working poor*"

Main employment barriers	Selected characteristics	% of the target pop.
	- 43 years old (average) - Majority male - Employed - 20 years of paid work (average) - 13.6 years of schooling (average) - Average equivalised disposable income: EUR 5 277 (2nd quintile) - Average number of simultaneous employment obstacles: 1	
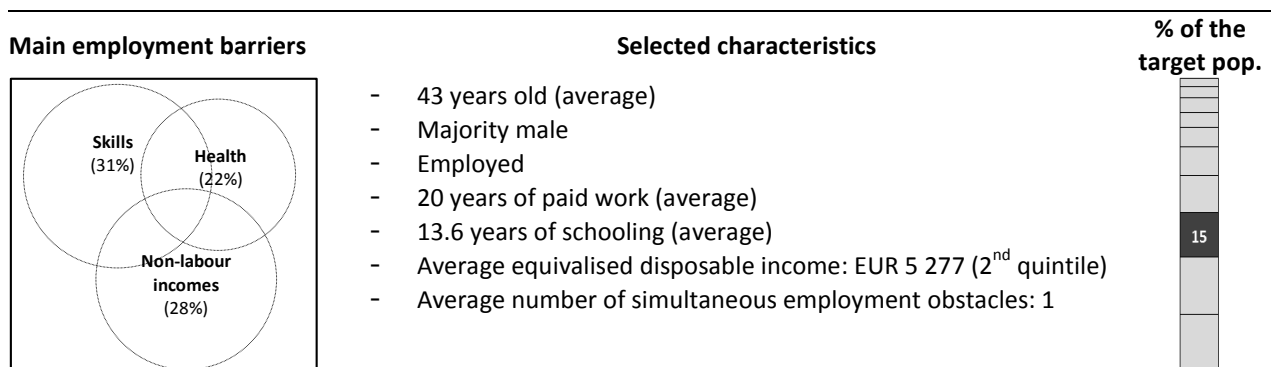
Group 4 (**13%** of the target population): "***Well-off mothers with care responsibilities***". This group is almost all female (97%), relatively young (34 years on average) and has young children (95%, the youngest child is 2 years old on average). In most cases, these children receive less than 30 hours a week of non-parental childcare and live in families where the mother is the only potential care giver, so *care responsibilities* can limit this group's availability for paid work. 91% of group members live with another adult who is in paid work (in most their partner) and 72% have weak *work incentives* resulting from high levels of household income that are not related to their own work effort (this group has the highest equivalised household incomes of all ten groups; EUR 10 794/year). Although all group members have worked in the past, with ten years of paid work experience on average, for 30% this *work experience* is low relative to their potential experience. Despite these barriers, there are signs that many group members are moving into work as their children get older: 88% were out of work during most of the income reference period, whereas 38% were in work at the time of the interview (and a further 2% were actively seeking employment). Other characteristics of this group also point to strong employability. The group has the highest average level of education of all the groups (15.6 years on average) with 60% having a tertiary degree and many (59%) have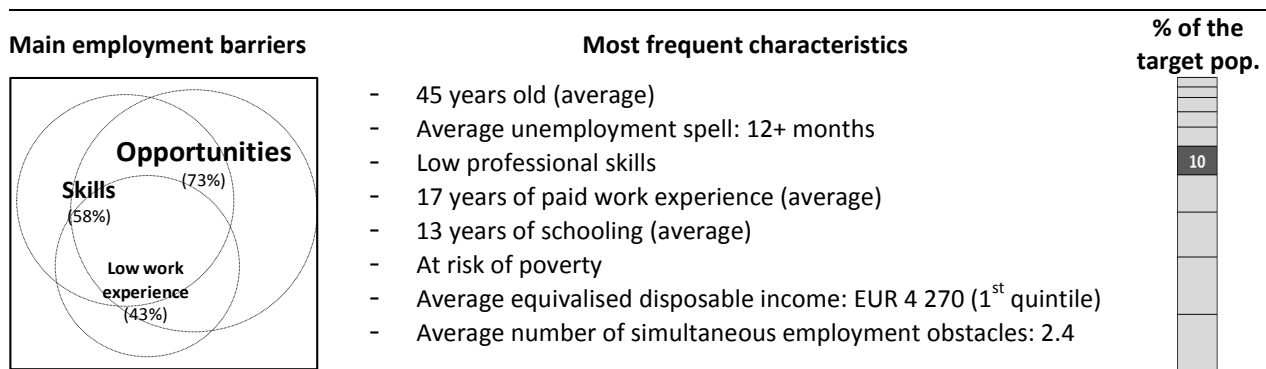 previously worked in one of the three highest skilled occupation types in the ISCO-08 standards: professionals, managers or technicians and associate professionals.

Box 4.4. Group 4: "*Well-off mothers with care responsibilities*"

Main employment barriers	Selected characteristics	% of the target pop.
	- 34 years old (average) - Women - Housework and care responsibilities - 10 years of paid work (average) - 15.6 years of schooling (average) - Household type: Couple with 2 children - Average equivalised disposable income: EUR 10 794 (5th quintile) - Average number of simultaneous employment obstacles: 1.9	**13**
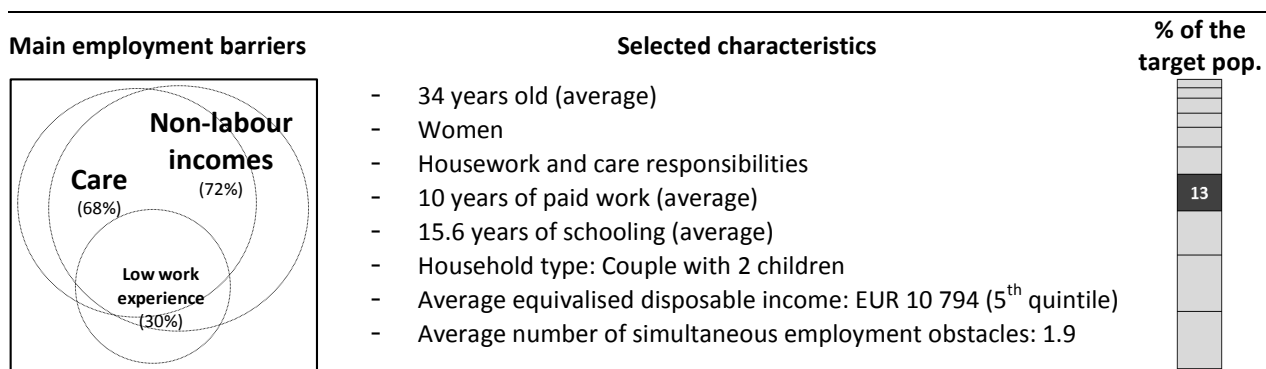
Group 5 (**10%** of the target population): "***Prime age long-term unemployed with low skills***". The most distinctive feature of this group is that a large majority (88%) had been unemployed throughout the income reference period and that 73% are still actively looking for a job at the moment of the interview. Thus, the most prevalent barrier is scarce *job opportunities*, which often overlaps with *low skills* (58%) and low *work experience* relative to their age and education (43%). 51% live in workless households and, although the poverty risk is the highest of all groups (63%), benefit coverage is low, with only 22% receiving unemployment benefits, 1% social assistance benefits and 16% housing benefits. Individuals in this group are likely to face at least two simultaneous employment barriers (see Figure 4.1).

Box 4.5. Group 5: "*Prime age long-term unemployed with low skills*"

Main employment barriers	Most frequent characteristics	% of the target pop.
	- 45 years old (average) - Average unemployment spell: 12+ months - Low professional skills - 17 years of paid work experience (average) - 13 years of schooling (average) - At risk of poverty - Average equivalised disposable income: EUR 4 270 (1st quintile) - Average number of simultaneous employment obstacles: 2.4	**10**

Group 6 (**7%** of the target population): *"Youth with limited work experience"*. This group consists largely of young individuals (28 years on average) who have been labour-market inactive (40%) or unemployed (40%) for an average of ten months during the income reference period. Individuals in this group have all some past *work experience* but for 71% this is low relative to their potential experience. 47% have also *low skills*. Financial *work incentives* can represent another potential employment barrier for this group as many live in high income households. The equivalent disposable income is the second highest across the ten groups and many group members can draw on other income sources independently from their own work effort (36%), which can further reduce the incentives to look for or accept a job. However, the effect of these barriers seems to generate only a temporary obstacle to employment, as the majority (81%) had managed to find a job by the time of the SILC interview.

Box 4.6. Group 6: "*Youth with limited work experience*"

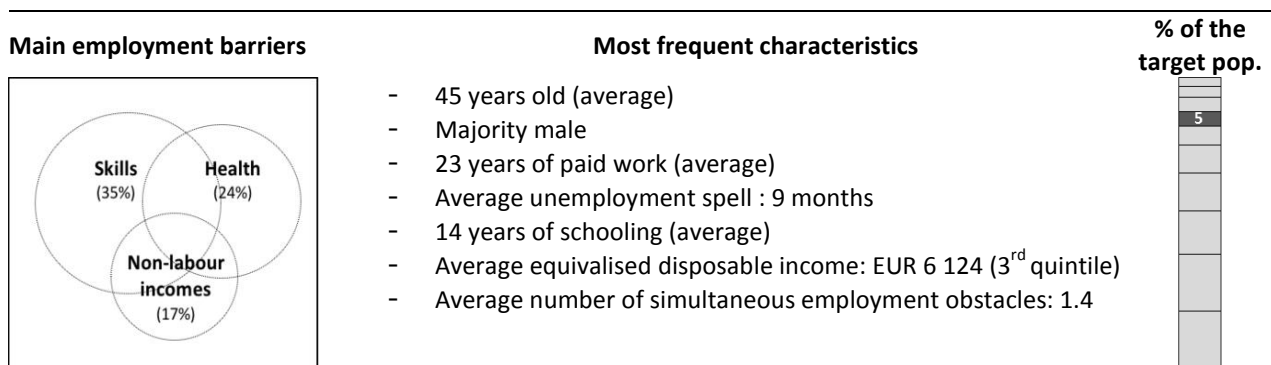| Main employment barriers	Most frequent characteristics	% of the target pop.
	- 28 years old (average) - Unemployed/inactive - Average unemployment spell: 10 months - 6 years of paid work experience (average) - 13 years of schooling (average) - Average equivalised disposable income: EUR 6 500 (3rd quintile) - Average number of simultaneous employment obstacles: 1.7	
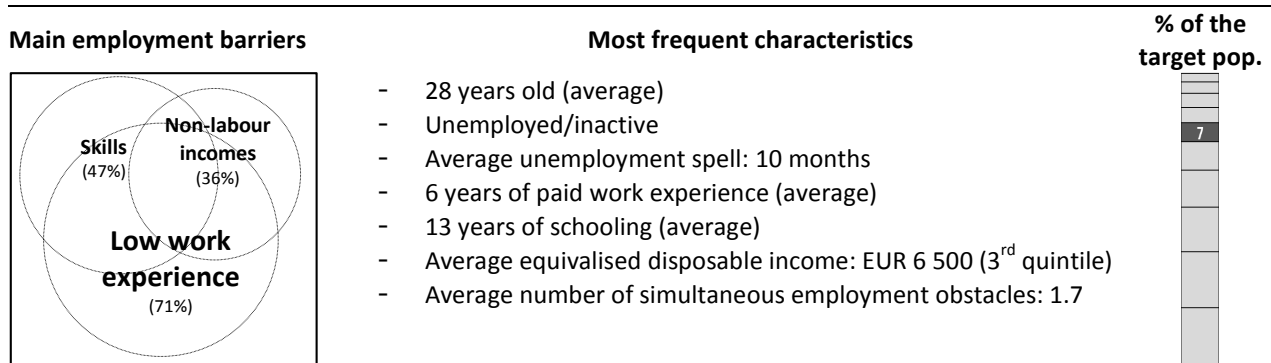
Group 7 (**5%** of the target population): **"*Experienced prime age unemployed men with few obstacles to employment*"**. This group is almost entirely composed of prime-age men (76%, 45 years on average) without young children (78%) who had been unemployed for most of the reference period (97%). 61% received unemployment support during the income reference period. The majority of group members have considerable work experience and face the lowest average number of simultaneous employment obstacles of all groups (see Figure 4.1). Perhaps unsurprisingly then given the work readiness and willingness to work of this group, around 60% of the group had found a job by the time of the SILC interview while 35% were actively looking for a job. The most common employment barriers characterising this group are *low skills*, *health limitations* and rather high non-labour incomes that could affect *work incentives*).
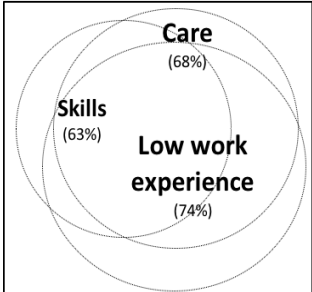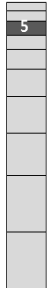
Box 4.7. Group 7: "*Experienced prime age unemployed men with few obstacles to employment*"

Main employment barriers	Most frequent characteristics	% of the target pop.
	- 45 years old (average) - Majority male - 23 years of paid work (average) - Average unemployment spell : 9 months - 14 years of schooling (average) - Average equivalised disposable income: EUR 6 124 (3rd quintile) - Average number of simultaneous employment obstacles: 1.4	

Group 8 (**5%** of the target population): **"*Unskilled mothers with care responsibilities and limited work experience*"**. This group is characterised by relatively young (30 years on average) women (100%) from rural areas (65%) with no recent work experience (89%) and *care responsibilities* (78%). Women in this group have on average two young children, the youngest of whom is three years old. 93% received family benefits during the income reference period for an average amount of EUR 2 809/year. The

majority have some past *work experience* (75%) but for 74% this is low relative to their potential experience. 63% have also *low skills*. Individuals in this group face three simultaneous barriers to employment on average; the third-highest among the ten groups (see Figure 4.1).

Box 4.8. Group 8: "*Unskilled mothers with care responsibilities and limited work experience*"

Main employment barriers	Most frequent characteristics	% of the target pop.
Care (68%) / Skills (63%) / Low work experience (74%)	- 30 years old (average) - Women - Inactive/Housework - No or low professional skills - 3 years of paid work experience (average) - Single earner couple with 2 young children (average) - Average equivalised disposable income: EUR 6 500 (3rd quintile) - Average number of simultaneous employment obstacles: 3	5

Group 9 (**4%** of the target population): *"Long-term unemployed youth without any past work experience"*. This group is largely made of young (92%, 24 years on average) men (81%) who had been unemployed throughout the income reference period (79%) and who are still actively seeking employment at the moment of the inte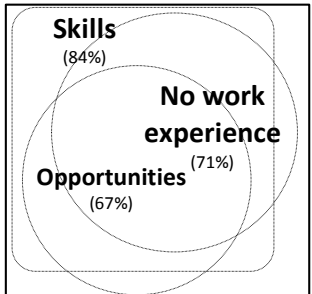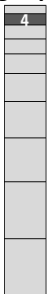rview. As a result, one of the most prevalent barriers they face is scarce *job opportunities* (67%). The other main employment barrier for this group is low *skills* (84%). Individuals in this group have the second lowest average years of schooling (11.9) and 71% have no past *work experience at all*. About 64% live with their parents, 45% are at risk of poverty and 33% experience material deprivations (with half of them classified as *severely* deprived). Members of this group face 3.1 employment barriers on average, the second highest of the ten groups (see Figure 4.1).

Box 4.9. Group 9: "*Long-term unemployed youth without any past work experience*"

Main employment barriers	Most frequent characteristics	% of the target pop.
Skills (84%) / No work experience (71%) / Opportunities (67%)	- 24 years old (average) - Majority male - Unemployed/inactive - Average unemployment spell: 12+ months - No past work experience - 12 years of schooling (average) - Households with 2+ adults - Average equivalised disposable income: EUR 4 990 (2nd quintile) - Average number of simultaneous employment obstacles: 3.1	4

Group 10 (**4%** of the target population): "*Younger severely disabled*". Individuals in this group have *low skills* (96%) and 95% face *health limitations* (63% *severe* limitations). No-one in the group (100%) has recent *work experience* and 94% have never worked. The majority (63%) are prime age individuals while 35% are youth; the average age is 33. About 40% face weak financial *work incentives* as a result of high earnings replacement benefits (e.g. disability benefits) relative to their potential earnings. Although the poverty rate among this group is lower than the average for the target population at 33%, 21% face severe material deprivation, suggesting that they face costs of being disabled that are not taken into account when calculating poverty rates, or that they have been poor for a long time and do not have other resources to fall back on. They have the lowest average years of schooling (9.9) among the ten groups, and the highest average number of simultaneous obstacles to employment (3.5 on average).

Box 4.10. Group 10: "*Younger severely disabled*"

Main employment barriers	Most frequent characteristics	% of the target pop.
Skills (96%) **Health** (95%) **No work experience** (94%)	- 33 years old (average) - Mostly men - Inactive - Severe health limitations - No past work experience - Primary/lower-secondary education - 10 years of schooling (average) - Average equivalised disposable income: EUR 5 600 (2nd quintile) - Average number of simultaneous employment obstacles: 3.5	

Figure 4.1. Share of individuals facing multiple employment barriers in each group

In descending order of shares facing at least three barriers
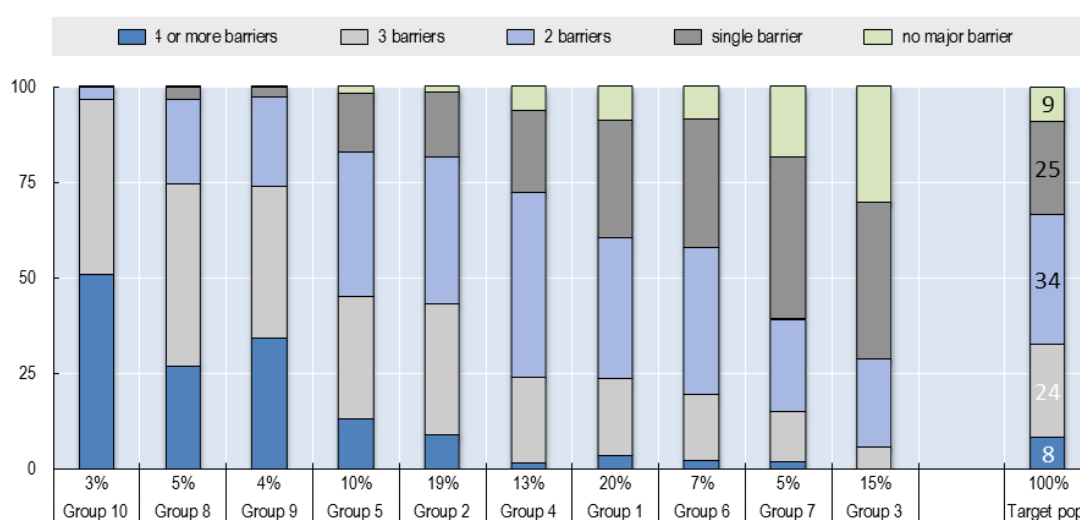
Note: Group sizes are reported on the horizontal axis (see Boxes 4.1 to 4.10 for details). Groups are as follows: 1. "Experienced early retirees with health limitations", 2. "Older labour market inactive adults with health limitations, low skills and limited work experience", 3. "Working poor", 4. "Well-off mothers with care responsibilities", 5. "Prime age long-term unemployed with low skills", 6. "*Youth with limited work experience*", 7. "Experienced prime age unemployed men with few obstacles to employment", 8. " Unskilled mothers with care responsibilities and limited work experience", 9. "*Long-term unemployed youth without any past work experience*", 10. "Younger severely disabled".

Source: Calculations based on EU-SILC 2014.

5. CONCLUSIONS

This note has used a novel method for identifying, analysing and visualising the most common employment barrier profiles characterising the Estonian population with potential labour market difficulties. The underlying premise is that out-of-work individuals (unemployed and inactive) and workers with weak labour market attachment face a number of possible employment obstacles, and each of them may call for different policy responses. The success of activation and employment-support policies (AESPs), and of social protection measures more generally, is therefore expected to hinge on effective strategies to target and tailor policy interventions to individual circumstances.

The segmentation method used in this note has uncovered patterns that can provide concrete guidance for policy design and targeting strategies in Estonia. Results show that "short-hand" groupings that are often referred to in the policy debate, such as "youth", "women", "unemployed", are far from homogeneous, and may distract attention from the specific employment obstacles that policies seek to address. Indeed, some of these categories include several distinct sub-groups with very different combinations of employment barriers.

For example, results point to two quite different groups of economically inactive mothers that are likely to respond to policies in different ways. One group is characterised by high levels of household incomes and young children requiring care. However, their high income may make them relatively unresponsive to policies seeking to encourage them into paid work through stronger financial incentives or more public childcare provision. The other group of economically inactive mothers live in poorer households, have limited work experience and low work-related skills. Financial incentives such as in-work support and affordable childcare may be effective for this group, but a longer-term approach to addressing their employment barriers may also need to include active labour market policies to tackle skills deficits.

A relatively large number of individuals report health problems that may contribute to their employment difficulties. These problems affect all age groups in Estonia but their profiles and characteristics are, again very different. One group is older, with considerable past work experience and high levels of earnings-replacement benefits. A second is a little younger, poorer and has some work experience, and the third is younger still with no work experience and much more likely to be low-skilled. In view of these different characteristics, a uniform approach to those with health problems would likely be inappropriate.

Similarly, the clusters point to two separate groups of younger people with labour-market difficulties. Although both groups exhibit low levels of work-related skills, one group has some work experience but is less likely to report being unemployed during the reference period. Members of the second group have never had any paid employment and have been actively seeking work for at least a year. Again, these differences suggest scope for employing quite different policy approaches for different types of youth.

Although the clustering results do not in themselves say which groups should be the focus for AESPs, they may highlight priority groups for policy interventions. For instance, very high poverty risks, a large number of young people or a strong over-representation of women in some groups may signal a need to review whether existing targeting strategies meet governments' social cohesion objectives. A high poverty risk combined with weak work incentives may call for caution in applying benefit sanctions (such as for some individuals in Group 2). By contrast, groups with relatively high incomes and financial disincentives caused by high levels of income replacement benefits (such as Group 1) may indicate scope for targeted benefit reductions or for tightening benefit eligibility conditions.

Likewise, information on the intensity and number of barriers faced by individuals can inform difficult policy decisions involving trade-offs between helping those in greatest need and targeting those

who are likely to be the most responsive to policy interventions. For example, it is debatable whether resources should be channelled primarily to those with severe or multiple barriers who are, in some sense, furthest from obtaining or holding a stable job or to groups with moderate employment difficulties, for whom policy interventions may have a greater probability of success.

A forthcoming Country Policy Paper to be produced as part of this project will take stock of existing policy measures for some of the groups identified here. Based on that policy inventory, it will seek to analyse whether they are well-aligned with the employment barriers identified here.

REFERENCES

Arias, O.S., C. Sánchez-Páramo, M. E. Dávalos, I. Santos, E.R. Tiongson, C. Grun, N. de Andrade Falcão, G. Saiovici and C.A. Cancho (2014), *Back to Work: Growing with Jobs in Europe and Central Asia*, Washington, DC, doi:10.1596/978-0-8213-9910-1.

Eurofound (2012a), "NEETS - Young People Not in Employment, Education or Training: Characteristics, Costs and Policy Responses in Europe", Publications Office of the European Union, Luxembourg.

European Commission (2016), "Employment and Social Developments in Europe"

European Commission (2015), "Upskilling Unemployed Adults (aged 25 to 64): The Organisation, Profiling and Targeting of Training Provision", Publications Office of the European Union, Luxembourg.

Fernandez , R., H. Immervoll, D. Pacifico and C. Thévenot (2016), "Faces of Joblessness. Characterising Employment Barriers to Inform Policy", Forthcoming SEM Working Paper, OECD, Paris.

Immervoll, H. and A. Isik-Dikmelik (2016), "Cooperation with the OECD on Assessing Activating and Enabling Benefits and Services in the EU: OECD-World Bank Joint Methodological Report", unpublished report submitted to the European Commission, March.

Immervoll, H. and S. Scarpetta (2012), "Activation and Employment Support Policies in OECD Countries. An Overview of Current Approaches", *IZA Journal of Labor Policy*, Vol. 1(1), pp. 1-20.

OECD (2016), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264252073-en.

OECD (2015a), "Activation Policies for More Inclusive Labour Markets", in *OECD Employment Outlook 2015*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2015-7-en.

OECD (2015b), *OECD Economic Surveys: Estonia*, OECD Publishing, Paris.

OECD (2015c), *Education at a Glance: OECD Indicators*, OECD Publishing, Paris.

OECD (2014a), "The Crisis and its Aftermath: A 'Stress Test' for Societies and for Social Policies", *Society at a Glance: OECD Indicators*, OECD Publishing, Paris.

OECD (2013a), "Activation Strategies for Stronger and More Inclusive Labour Markets in G20 Countries: Key Policy Challenges and Good Practices", G20Task Force on Employment, Report prepared for the G20 Summit in St. Petersburg, July, http://www.oecd.org/g20.

OECD (2013b), "Activating Jobseekers: Lessons from Seven OECD Countries", in *OECD Employment Outlook 2013*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2013-7-en.

OECD (2013c), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris.

Schwarz, G.E. (1978), "Estimating the Dimension of a Model", *Annals of Statistics*, Vol. 6(2), pp. 461-464, Doi:10.1214/aos/1176344136.

Vermunt J. K. and J. Magidson (2016), *Technical Guide for Latent GOLD 5.1: Basic, Advanced, and Syntax*, Statistical Innovations Inc., Belmont, MA.

Using 2014 SILC data for Estonia, the segmentation algorithm outlined in Annex B leads to a model with **ten groups**. Table A.1 shows the estimated parameters, i.e. the *share* of individuals facing the employment barriers in each latent group and the related *group size* in the target population (first row). Groups are ordered by size; colour shadings are used to highlight barriers with higher (dark blue) and lower (light blue) frequencies in each group.

Table A.1. Latent class estimates

Percentage of individuals with selected characteristics, by group

		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Target Pop
	Group Size (Target population=100)	**20**	**19**	**15**	**13**	**10**	**7**	**5**	**5**	**4**	**4**	**100**
	"Low" skills	48	58	31	8	58	47	35	63	84	96	46
	Health limitations	60	89	22	11	33	6	24	13	14	95	43
	Care responsabilities	2	1	0	68	14	9	13	78	13	2	16
	No work experience at all	0	0	0	0	0	0	0	25	70	94	7
Core indicators	Positive but "low" relative work experience	0	56	21	30	43	71	0	74	29	6	32
	No recent work activity	74	93	2	49	86	0	0	89	100	100	59
	Positive but "low" recent work intensity	16	7	20	51	14	100	100	11	0	0	27
	"High" non-labour income	23	11	28	72	19	36	17	46	31	20	29
	"High" earnings replacements	46	17	2	2	2	2	16	0	1	40	15
	Scarce job opportunities	1	0	0	0	73	7	32	0	67	0	12

Note: Section 3 describes the indicators and applicable thresholds. Group sizes refer to the target population as defined in Section 2. Colour shadings identify categories with high (dark blue) and lower (light blue) frequencies. Complementary categories (e.g. "high" skills) are omitted. Additional information on model selection and model specification is provided in Annex B.

Source: Authors' calculations based on EU-SILC 2014

Table A.2. Characterisation of the latent groups

Percentage of individuals with selected characteristics, by group

		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Target Pop
Number of individuals (%)		**20**	**19**	**15**	**13**	**10**	**7**	**5**	**5**	**4**	**4**	**100**
Number of individuals (frequency)		46091	45093	34562	29651	22390	15395	11610	11573	8710	7023	232098
Unstable jobs		12	4	15	43	14	93	99	10	2	0	24
Restricted working hours		8	4	7	11	0	10	2	2	0	0	6
Zero or near-zero earnings		12	1	81	3	2	9	8	0	0	0	16
*Women**		61	44	40	97	45	45	24	100	19	39	54
Age groups*	*Youth*	0	1	24	23	2	76	2	56	92	35	19
	Prime age	1	58	56	76	85	24	85	44	8	62	48
	Old-age	98	41	20	1	13	1	14	0	0	3	33
Age (average)		61	53	43	34	45	28	45	30	24	33	45
Main activity during the reference period	*Employed FT*	6	0	48	0	0	0	0	0	0	0	8
	Employed PT	8	4	10	10	0	16	1	2	0	0	6
	Self-employed FT	2	0	24	0	0	0	0	0	0	0	4
	Self-employed PT	2	0	8	2	0	3	0	0	0	0	2
	Unemployed	4	2	0	2	88	40	97	4	79	0	21
	Retired	56	17	2	0	1	0	0	0	0	1	15
	Unfit to work/disable	20	67	2	1	4	1	0	1	4	87	21
	Housework	2	10	3	84	7	19	1	90	11	9	21
	Other inactive	0	0	3	1	0	20	0	2	6	3	2
Main activity at the moment of the interview	*Employed*	21	6	84	38	2	81	59	6	0	0	31
	Unemployed	2	2	5	2	84	9	35	9	77	3	16
	Inactive	77	92	11	61	14	10	6	86	23	97	53
Length of unemployment spell†		..	..	..	..	11	4	9	..	10	..	2
Level of education (ISCED)	Primary	0	2	1	0	1	2	0	2	6	27	2
	Lower secondary	19	25	16	6	18	24	9	27	40	39	20
	Upper secondary	57	57	57	33	64	55	52	59	46	31	53
	Tertiary	24	16	27	60	18	19	38	12	9	3	26
Years of education†		13.4	12.8	13.6	15.6	13.0	13.0	14.3	12.6	11.9	10.0	13.4

Table A.2. Characterisation of the latent groups *(cont.)*

Percentage of individuals with selected characteristics, by group

		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Target Pop
Number of individuals (%)		**20**	**19**	**15**	**13**	**10**	**7**	**5**	**5**	**4**	**4**	**100**
Number of individuals (frequency)		46091	45093	34562	29651	22390	15395	11610	11573	8710	7023	232098
Work-related skills (ISCO)	*No work-related skills*	0	0	0	0	0	0	0	25	70	94	7
	Elementar occupations (very low skills)	24	23	11	8	19	16	12	22	5	2	17
	Craft and machine operators (low skills)	31	41	27	7	45	35	37	19	16	4	29
	Clerk and sales (Mid/low skills)	24	22	27	26	17	21	20	22	6	0	22
	Technicians et al. (Mid skills)	8	6	15	16	8	11	10	6	2	0	9
	Professionals (Mid/high skills)	9	5	8	34	7	10	17	6	0	0	11
	Managers (High skills)	4	2	12	9	3	6	4	1	0	0	5
Years of paid work experience†		36	20	20	10	17	6	23	5	3	..	20
Severe health limitations		17	32	5	2	4	1	2	1	3	63	13
Migrant		32	19	17	8	18	3	13	4	3	12	17
Equivalent disposable income (€/year - average)		5,975	4,618	5,276	10,794	4,277	6,569	6,124	6,549	4,970	5,608	6,085
Position in the income distribution	*Bottom quintile*	37	50	51	16	61	36	39	30	44	29	41
	Second quintile	28	29	19	9	16	17	16	26	25	35	22
	Third quintile	17	14	14	18	11	23	19	24	19	28	17
	Fourth quintile	13	6	9	27	7	16	19	14	8	7	12
	Top quintile	5	1	8	30	5	9	7	7	3	2	8
AROPE (eurostat methodology)		39	54	52	17	63	36	41	33	45	33	43
Material deprivation (Eurostat)	*No material deptivation*	75	59	81	90	51	78	68	78	67	63	72
	Deprived (inability to pay for at least 3 items)	13	21	11	7	24	16	19	12	17	16	15
	Severe (inability to pay for at least 4 items)	12	21	8	2	26	6	13	9	16	21	13
Benefits - Recipients and average amounts	*Sickness and disability recipients (%),*	36	71	21	21	17	18	20	25	11	89	35
	they receive, in average† (€/year)	2,036	2,523	1,500	880	1,452	785	..	1,076	..	3,189	2,033
	Unemployment benefits recipients (%),	6	4	6	7	22	20	61	13	16	2	11
	they receive, in average† (€/year)	1,753	..	..	..	1,298	991	3,294	..	..	...	1,717
	Social Assistance recipients (%),	1	1	3	0	1	6	1	0	8	3	2
	they receive, in average† (€/year)	..	..	..	..	..	..	..	..	..	..	590
	Housing Benefits recipients (%),	4	7	1	1	16	4	8	6	5	3	5
	they receive, in average† (€/year)	..	409	..	..	894	..	..	..	..	..	693
	Family-related benefits recipients (%),	10	20	34	96	39	55	32	93	39	34	39
	they receive, in average† (€/year)	1,308	908	1,514	5,943	1,021	1,898	1,307	2,809	738	844	2,917
	Old-age Benefits recipients (%),	67	23	7	1	4	1	1	0	0	4	19
	they receive, in average† (€/year)	3,401	2,962	..	..	..	..	..	..	..	...	3,253
Family type	*Single*	23	24	17	0	14	10	35	0	5	7	16
	Couple without children	50	41	29	2	27	19	23	3	8	25	29
	Couple with children	3	9	25	82	29	32	21	74	17	21	28
	2+ adults without children	16	14	18	2	17	15	6	2	39	27	14
	2+ adults with children	6	10	11	14	9	21	13	15	25	14	11
	Lone parents	1	3	1	0	4	3	2	6	4	6	2
Have children*		6	11	23	95	32	41	22	89	28	23	32
Number of children†		1	1	1	2	1	1	2	2	..	..	2
Age of the youngest child†		5	6	5	2	6	4	6	3	..	...	4
Live in rural area*		42	57	38	35	36	44	29	65	41	52	44
Household with other working household members		41	37	64	91	49	70	47	79	70	56	56
Number of simultaneous barriers		2.0	2.4	1.5	2.0	2.5	1.9	1.4	3.0	3.1	3.5	2.2

Note: Colour shadings identify categories with high (darker) frequencies. The average number of simultaneous barriers per individual is computed for the core indicators in table A1.1 with the exception of recent work experience. Income quintiles refer to the entire population. Poverty risks and material deprivation are calculated with the Eurostat methodology.

* The variable enters as an additional indicator in the latent class model. See Annex B for details.

† Average across observations with strictly positive values. Averages based on less than 30 observations are omitted.

Source: Authors' calculations based on EU-SILC 2014.

The segmentation method presented in this paper is *Latent Class Analysis* (LCA). This method exploits the interrelations of an array of indicators through a fully-specified (i.e. parametric) statistical model for organising the target population into homogeneous groups. In the present framework, the indicators represent employment barriers and the statistical algorithm therefore identifies population sub-groups sharing similar barriers to employment, e.g. "low skills *and* limited labour demand" for Group 1; "low work experience *and* low financial work incentives" for Group 2, etc.

LCA has three main advantages relative to other common segmentation (or "clustering") methods: 1) Formal statistical tests guide the selection of the optimal number of groups and other model's features; 2) LCA does not allocate individuals into specific groups in a deterministic way but, instead, provides *probabilities* of group membership, thus reducing possible classification errors in any post-estimation analysis; 3) LCA deals easily with common data-related issues such as missing data and complex survey designs.

Latent Class Analysis does not automatically provide an estimate of the *optimal* number of latent classes. Instead, models with different number of classes are estimated sequentially and the optimal model is chosen based on a series of statistical criteria. To summarise, the model selection process starts with the definition of a *standard* latent-class model that is repeatedly estimated for an *increasing number of latent classes* (Step 1).[14] The choice of the *optimal* number of classes is primarily based on goodness-of-fit and error-classification statistics (Step 2, see also Figure B.1), and then on the analysis of potential misspecification issues (Step 3). Fernandez et al. (2016) describes these steps in detail and provides guidelines for practitioners interested in adapting the approach to specific analytical needs or data.

Figure B.1 summarises graphically Step 2 above for the Estonian SILC 2014; The blue bars show the percentage variations of the *Bayesian Information Criterion* (BIC; Schwartz, 1978)[15] for increasing numbers of latent groups, whereas the black line shows, for the same groups, the *classification error statistics* (Vermunt and Magdison, 2016).[16] In general, a smaller value of the BIC indicates a more optimal balance between model fit and parsimony, whereas a smaller value of the classification error statistics means that individuals are well-classified into one (and only one) group. In Figure B.1 the BIC is minimised for a model with ten classes and a classification error of 15% indicates that the model provides a good representation of the heterogeneity in the underlying data.

---

14.   A *standard* latent class model means that the likelihood function is derived under the so-called Local Independence Assumption (LIA). See Fernandez et al. (2016) for details.

15.   The BIC summarises into a single index the *trade-off* between the model's ability to fit the data and the model's parametrisation: a model with a higher number of latent classes always provide a better fitting of the underlying data but at the cost of complicating the model's structure.

16.   The classification error shows how-well the model is able to *classify* individuals into specific groups. To understand the meaning of the classification error index it is important to keep in mind that LCA does not assign individuals to specific classes but, instead, estimates probabilities of class membership. One has therefore two options to analyses the results: allocate individuals into a given cluster based on the highest probability of class-membership (*modal* assignment) or *weighting* each person with the related class-membership probability in the analysis of each class (*proportional* assignment). The classification error statistics is based on the share of individuals that are miss-classified according to the modal assignment.

Figure B.1. Selection of the optimal number of latent classes

% Var. BIC (left axis)   Class. Err (right axis)

Number of latent groups
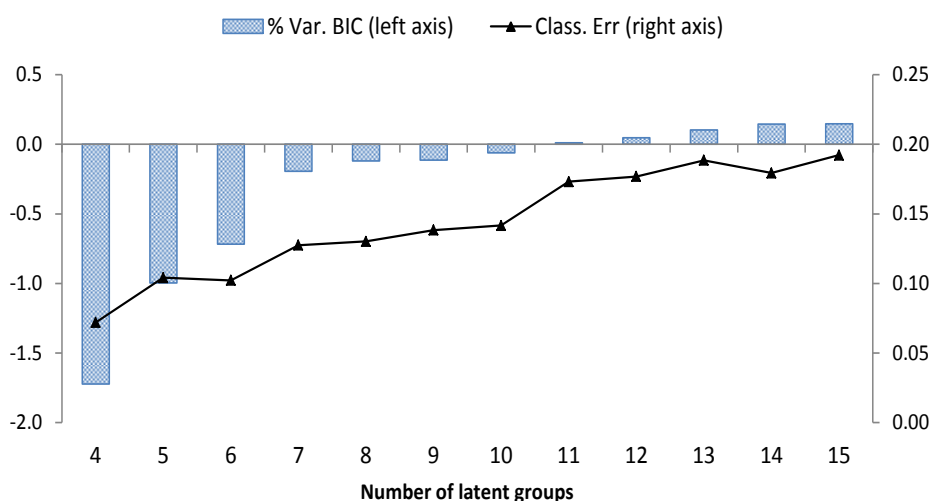
Post-estimation tests based on the *Bivariate Residuals* (Vermunt and Magdison, 2005) show for the 10-class model some residual *within-group* correlation between four pairs of indicators. This indicates that the model violates to some extent the Local Independence Assumption (LIA).[17] Increasing the number of latent classes always reduces the residual dependencies between indicators. For instance, the 13-class model in SILC-2014 shows no signs of local dependencies, but this comes at the cost of a higher classification error (Figure B.1).

Following Fernandez et al. (2016) and Vermunt and Magdison (2005) the residual dependencies between indicators is addressed with the so-called *direct effects*; these are ad-hoc terms that enter the specification of the likelihood function to model explicitly the *joint* probabilities of pairs of indicators conditional on group membership. The inclusion of direct effects eliminates any residual correlation between the relevant pair of indicators (by construction) but it also requires repeating the model selection process, as the new baseline model with local dependencies may lead to a different optimal number of classes. For the new baseline model with direct effects the BIC still points to a 10-class model, which therefore remains the favourite solution.[18]

---

17.   The LIA shapes the algebraic specification of the model and, in practice, requires the indicators to be *pairwise* independent *within* latent groups. Bivariate residuals are Pearson chi-squared tests comparing the *observed* associations between pairs of indicators with the *expected* association under the assumption of *local independence*; large differences between estimated and observed associations signal violations of the LIA.

18.   Gender, age and regional differences define labour market segments that are worth including in the latent class model to account for differences between and within these groups. Fernandez et al. (2016) discusses three possibilities for including additional variables in the model's specification. In SILC-2014 for Estonia the favourite specification in terms of lower classification error, interpretation of the results and specification tests considers these additional variables directly in the classification model. Figure B.1 is based on a model that includes information on age (three categories: 18-29, 30-54, 55-64), gender and degree of urbanisation (two categories).