

MARYNA TVERDOSTUP

Human capital and labour market
disparities



DISSERTATIONES RERUM OECONOMICARUM
UNIVERSITATIS TARTUENSIS

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School of Economics and Business Administration, University of Tartu, Estonia

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LIST OF AUTHOR'S PUBLICATIONS AND CONFERENCE PROCEEDINGS

I. Papers in the international journals

1. **Tverdostup, M.**, Paas, T. (2018). "Immigrant-Native Wage Gap in Europe: the Role of Cognitive Skills and their Use at Work". *International Journal of Manpower* (forthcoming).
2. **Tverdostup, M.**, Paas, T. (2018). "Skills heterogeneity and immigrant-native wage gaps in European countries". *International Journal of Economic Sciences* (forthcoming).
3. **Tverdostup, M.**, Paas, T. (2017). "Gender-specific human capital: identification and quantifying its wage effects". *International Journal of Manpower*, Vol. 38, No 6, 854–874.
4. **Tverdostup, M.**, Masso, J. (2016). "The Labour Market Performance of Young Return Migrants After the Crisis in CEE Countries: The Case of Estonia". *Baltic Journal of Economics*, Vol. 16, No. 2, 192–220.
5. **Tverdostup, M.**, Paas, T. (2016). "The gender wage gap in the human capital framework: A cross-Nordic assessment based on PIAAC". *Estonia Discussions on Economic Policy*, Vol. 2/2016, 137–160.

II. Other research publications

1. **Tverdostup, M.**, Paas, T. (2017). "Gender Unique Human Capital and Labour Market Returns". DIEM: Dubrovnik International Economic Meeting, 332–345.
2. Paas, T., **Tverdostup, M.** (2017). "Human capital in Nordic Countries and Estonia: PIAAC-based assessment". *Baltic Rim Economies*, University of Turku, No. 1/2017, 56–57.
3. **Tverdostup, M.**, Paas, T. (2016). "Sooline palgalõhe täiskasvanute oskuste uuringu PIAAC tulemuste raamistikus: Eesti põhjamaade võrdluses". *Eesti majanduspoliitilised väitlused*, 2/2016, 56–61.

III. Working papers

1. Zinovyeva, N., **Tverdostup, M.** (2018). Gender identity, co-working spouses and relative income within households. *IZA Discussion Paper*, No. 11757.
2. Ashyrov, G., Paas, T., **Tverdostup, M.** (2017) "The input-output analysis of blue industries: Comparative study of Estonia and Finland". *University of Tartu Working Paper Series*, No. 109.
3. **Tverdostup, M.**, Paas, T. (2017) "The role of cognitive skills and their use at work in explaining the immigrant-native wage gap". *University of Tartu Working Paper Series*, No. 104.
4. Sheehan, M. et al. (2016). "Policy Synthesis and Integrative Report on Youth Self-Employment In Europe", *STYLE Working Papers*, STYLE-WP 7.4/2016. CROME, University of Brighton, Brighton.

5. Masso, J., Kureková L. M., **Tverdostup, M.**, Žilincíková, Z. (2016). "Return migration patterns of young return migrants after the crises in the CEE countries: Estonia and Slovakia", *STYLE Working Papers*, STYLE-WP 6.1. CROME, University of Brighton, Brighton.
6. **Tverdostup, M.**, and Paas, T. (2016). "Assessment of labour market returns to gender unique human capital: evidence from Estonia". *Gecomplexity Discussion Papers*, (5), 28.
7. Masso, J., **Tverdostup, M.**, Sheehan, M., et al. (2015). "Mapping Patterns of Self-Employment: Secondary Analysis Synthesis Report". *STYLE Working Papers*, WP7.2.
8. **Tverdostup, M.**, Masso, J. (2015) "The labour market performance of young return migrants after the crisis in CEE countries: The Case of Estonia". *University of Tartu Working Paper Series*, No. 98.

IV. Chapters in monographs

1. Masso, J., **Tverdostup, M.**, Mierina, I., Espenberg, K. (2018) "Labour Market Inequalities in Conditions of Limited Social Dialogue: The Case of the Baltic States". In: Daniel Vaughan-Whitehead (Ed.) *Reducing Inequalities in Europe*. London, UK: Edward Elgar.
2. **Tverdostup, M.**, Masso, J. (2018). "Young People Who Have Worked Abroad and Their Success in the Labour Market". In: Tiit Tammaru; Raul Eamets; Kristina Kallas (Toim.) (Ed.). *Estonian Human development Report 2016/2017*. Tallinn: SA Eesti Koostöö Kogu.
3. Masso, J., Mýtna-Kureková, L., **Tverdostup, M.**, Žilincíková, Z. (2017). "Return Migration to CEE after the crisis: Estonia and Slovakia". In: Jacqueline O'Reilly, Clémentine Moyart, Tiziana Nazio, Mark Smith (Ed.). *Youth Employment: STYLE Handbook (167–169)*. Brighton, UK: CROME.

V. Conference presentations

1. IZA World Labor Conference, Berlin, Germany, June 2018.
"Gender identity, family businesses and relative income within households" (with Zinovyeva, N.)
2. University of Cologne Summer School in Behavioral Health Economics, Cologne, Germany, June 2018.
"Experimental evidence on diagnosis uncertainty and insurance in credence goods markets" (with Balafoutas, L., Fornwagner, H., Kerschbamer, R., and Sutter, M.)
3. University of Innsbruck Winter School in Credence Goods, Kühtai, Austria, February 2018.
"Modeling diagnosis uncertainty and insurance in credence goods markets" (with Balafoutas, L., Fornwagner, H., Kerschbamer, R., and Sutter, M.)
4. Estonian Economic Association Annual Meeting, Tallinn, Estonia, January 2018.
"The role of cognitive skills and their use at work in explaining the immigrant-native wage gap" (with Paas, T.)

5. Bonn-Innsbruck-Münich Experimental Economics Workshop, Max Planck Institute, Bonn, Germany, November 2017.
“Diagnosis uncertainty and insurance in credence goods markets: Theoretical model” (with Balafoutas, L., Fornwagner, H., Kerschbamer, R., and Sutter, M.)
6. The European Regional Science Association (ERSA) conference, Vienna, Austria, August 2016.
“Gender Unique Human Capital and Labour Market Returns” (with Paas, T.)
7. University of Tartu, Doctoral Summer School in Economics and Innovation, Pärnu, Estonia, August 2016
“Relative income within households and gender wage gap: Evidence from Finland” (with Zinovyeva, N.)
8. University of Tartu, Doctoral Summer School in Economics and Innovation, Pühajärve, Estonia, August 2015
“The labour market performance of young return migrants after the crisis in CEE countries: The Case of Estonia” (with Masso, J.)
9. Economic Challenges in Enlarged Europe conference, Tallinn, Estonia, June 2015
“The labour market performance of young return migrants after the crisis in CEE countries: The Case of Estonia” (with Masso, J.)

INTRODUCTION

List of original studies

This PhD thesis relies on four original studies (published or accepted for publication), each referred to throughout the thesis with a respective Roman numeral.

- I. **Tverdostup, M.**, Paas, T. (2017). Gender-specific human capital: identification and quantifying its wage effects. *International Journal of Manpower*, Vol. 38, No 6, 854–874.
- II. **Tverdostup, M.**, Paas, T. (2018). Immigrant-Native Wage Gap in Europe: the Role of Cognitive Skills and their Use at Work. *International Journal of Manpower* (forthcoming).
- III. **Tverdostup, M.**, Paas, T. (2018). Skills heterogeneity and immigrant-native wage gap in European countries. *International Journal of Economic Sciences* (forthcoming).
- IV. **Tverdostup, M.**, Masso, J. (2016). The Labour Market Performance of Young Return Migrants After the Crisis in CEE Countries: The Case of Estonia. *Baltic Journal of Economics*, Vol. 16, No. 2, 192–220.

Motivation and conceptual idea of the research

Over the last decades, human capital has established itself as a key determinant of individual labour market success and an important driver of overall economic performance. Human capital refers to the productive abilities, skills, knowledge, experience and behavioural traits embodied in people. The classical and novel theories stress the different features of human capital, shedding light on specific aspects of productivity associated with certain domains of skill and ability. However, the common line of all theories is an essential interrelation of human capital and labour market returns. In particular, recent theories of occupation and task-specific human capital (Lazear 2009, Gibbons and Waldman 2006, 2004) emphasise that an individual ability profile is shaped at the workplace, and develops via performing job tasks. Hence, recent approaches to human capital put individual cognitive skills, experience-based abilities and their active application at work as core characteristics of modern productive human capital. These dimensions of individual human capital are addressed in this thesis.

The disparities in human capital, ultimately, enforce the gaps in labour market outcomes. In particular, the focus of this thesis is on three distinct labour market groups where employment and wage performance is particularly sensitive to human capital disparities. Specifically, (i) males vs. females (study I), (ii) immigrants vs. natives (studies II and III), and (iii) return migrants vs. non-migrants (study IV). Each case is specific from the viewpoint of human capital formation, origin of the gap and its association with labour market (*i.e.* wage) outcomes. Hence, the major conceptual difference in the three analysed cases is

the heterogeneous nature of the human capital gaps. However, their fundamental similarity is that, in all cases, individual human capital is one of the major determinants of labour market returns, and therefore any discrepancy may yield substantial gaps in labour market performance. Hence, despite the differential returns to human capital across the three groups, human capital disparities within the groups largely translate to within-group wage gaps. Table 1 summarises the conceptual differences across the four studies.

The analysed labour market groups are of particular research and policy relevance. A number of positive developments, such as education and job access improvements, the increasing labour market commitment of women, rising social awareness and growing gender equality in society (Blau and Kahn 2017), resolved the historically strong gender imbalances in society and in the labour market. However, the gender wage gap is one of major inequalities that persists in the majority of labour markets. Especially in Estonia, the gender pay gap remains the most topical issue. With an unadjusted wage gap of 25.3% in 2016¹, Estonia experiences the highest gender pay disparity in Europe. A number of studies tackle gender pay disparity in Estonia (among others, Meriküll and Mõtsmees 2017, Anspal 2015a, Anspal 2015c, Anspal et al. 2011, Espenberg et al. 2013, Rõõm and Kallaste 2004, Orazem and Vodopivec 2000). The common result of Estonian case studies is the limited explanation power of classical human capital measures (education and work experience) and employment-related traits (occupation, industry, type of employment contract, *etc.*), as even when controlling for these, a substantial share of the pay gap remains unexplained.

Study I of this thesis draws attention to the gender pay gap in Estonia with a focus on gender-unique features of human capital and their wage returns. The human capital accumulation process differs significantly across men and women, as a result of job preferences, occupation and industry segregation, labour market attachment, gender identity norms, and other factors. These factors reflect male and female human capital profiles and, specifically, on cognitive skills, as their development and accumulation is a life-long process, tightly related to the labour market and on-the-job training. Hence, study I focuses on gendered cognitive skills profiles, as a combination of literacy, numeracy and problem solving in technology rich environments, as well as formal education. The research suggests a novel insight into the gender skills gap and explores whether gender-specific combinations of cognitive skills, usually non-attained by the opposite gender, contribute to gender pay disparity. The study also offers insights into the, so-called, “glass ceiling effect” in relation to gender-unique and gender-comparable human capital profiles. The research focuses on the Estonian case, as one of the most relevant contexts for gender pay gap research. However, the follow-up study by Tverdostup and Paas

¹ Source: Gender pay gap statistics by Eurostat. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Gender_pay_gap_statistics

The indicators of similar magnitude are reported in other sources.

(2016), which is not included in this thesis, explores the same research question using data from Nordic countries.

The human capital gaps are widely addressed as major factors of migration-driven labour market disparities in the literature. In the face of recent increases in immigration and the expanding challenges of the integration of immigrants into the European labour market and society, the analysis of immigrant profiles, labour market potential and assimilation problems have renewed importance. Numerous studies have documented that immigrants have relatively low human capital attainments due to (i) negative selection into migration (Borjas 1999, 1987); (ii) non-transferable formal educational credentials and home country work experience (Friedberg 2000, Chiswick 1987); (iii) lack of host country specific skills, knowledge and experience (Reitz et al. 2014, Zibrowius 2012); and (iv) a lack of general cognitive skills and command of the host country language (Van Tubergen and Kalmijn 2009, Nordin and Rooth 2009). Ethnic wage and employment gaps are a particularly acute issue in the Estonian economy, given the historically large Russian minority. Earlier studies document the significant wage and employment disadvantages faced by the minority populations, mostly of Russian origin (Pungas et al. 2012, Toomet 2011, Tammaru and Kontuly 2011, Kroncke and Smith 1999). Over the last three decades, the wage returns for the ethnic Estonian population were continuously increasing, while ethnic minorities revealed no positive dynamics. This resulted in a dramatic wage disparity, employment gap, and the economic segregation of the majority vs. the minority population (Leping and Toomet 2008).

Studies II and III of this thesis focus on immigrant-native human capital and wage disparities in the context of 15 European countries, including Estonia. The human capital measure applied in these studies includes a canonical education component, methodologically novel measures of literacy and numeracy cognitive skills, as well as theoretically and empirically novel dimensions of task-specific human capital (Gibbons and Waldman 2004). The latter is approximated using on-the-job skill use in performing specific job tasks. Hence, the paper explores ethnic disparities in skill and task-specific domains of human capital, which have not been investigated before. It also analyses the extent to which they reflect the immigrant pay gap, providing policy suggestions on the issue of immigrant skill underuse in European countries.

The third research context – return migration – is gaining increasing attention in the literature. Central and Eastern European (CEE) countries have experienced a remarkable outflow of young and well-educated natives (Martin and Radu 2012, Kahanec and Zimmermann 2010, Brücker 2009). Estonia has one of the highest outflow rates in Europe (Zaiceva and Zimmermann 2016). Several studies have analysed the characteristics and post-migration occupational dynamics of return migrants relative to non-migrants (hereinafter stayers) in Estonia (Masso et al. 2014, Kauhanen and Kangasniemi 2013, Hazans and Philips 2009). Given the foreign country work experience, knowledge, skills and personality traits accumulated while abroad, the integration of return migrants and facilitating the efficient application of their foreign-acquired

human capital in the home country appears particularly important and challenging (Dustmann and Weiss 2007, Iara 2006). Identifying the actual human capital profile and mapping post-return employment-related challenges specifically for young returnees has not yet been investigated. These specific questions constitute the focal point of study IV.

As outlined in Table 1, the case of return migration is different from non-return migration in multiple domains. The differences in migration intentions largely determine selection into migration (Borjas 1987). Hence, return and non-return immigrants may initially have different human capital traits. Furthermore, returnees are analysed upon return to the home country, where their foreign labour market experience can appear as an investment in their own skills and knowledge, or the development of personal traits, such as self-confidence and a willingness to adapt to different cultural, institutional and social environments. Therefore, returnees, if positively selected in the first place, may be an advantaged group relative to stayers. However, years spent abroad might harm social ties, networks, as well as home country-specific human capital domains. These negative factors may offset positive labour market returns to accumulated skills and experience. Study IV explicitly addresses these questions and, relying on a canonical human capital measure (education and experience), explores how the labour market reacts to returnee-stayer human capital gaps.

Table 1. Conceptual framework of the thesis

Study	Focus	Human capital measure	Origin of the human capital gap
I	Males vs. females	Human capital is measured in terms of cognitive abilities in literacy, numeracy and problem solving, as well as formal education. The authors distinguish between gender-comparable and gender-unique human capital profiles. The latter is identified in terms of differences in the distribution of individual characteristics across men and women and gender-specific combinations of human capital traits (skills, education).	Due to the differences in employment decisions, labour market attachment, gender norm effects, particular labour-market generated skills, may be more often attained by men, while are mostly not attained by women. The gap may be a result of an occupational or industry sorting of men and women, yielding systematic gender gaps in on-the-job accumulated skills and knowledge, and thus the non-comparability of male and female human capital profiles.

Study	Focus	Human capital measure	Origin of the human capital gap
II III	Natives vs. immigrants	Human capital measure incorporates cognitive skills in literacy and numeracy domains, formal education and three dimensions of skill use at work, approximating task-specific human capital, namely, literacy (reading and writing), numeracy and information and communication technology skills (ICT).	Differences in educational, cultural, and economic backgrounds, as well as potential discrepancies in work experience and work culture across immigrants and natives may result in observable gaps in cognitive abilities. Discrepancies in skill-use components of human capital relate mostly to the host-country employment disadvantages. Immigrants may face restricted access to skill-requiring positions, experience difficulties when opting for promotions and career progression, or possess less bargaining power in job negotiations. These factors decrease possibilities of on-the-job skill use and result in systematic differences in task-specific human capital.
IV	Return migrants (returnees) vs. non-migrants (stayers)	Human capital is measured following the classical theories (Becker 1962), as a combination of education and work experience. Since actual years of experience are unobserved, the study relies on an implicit gap in labour market experience between returnees and stayers, resulting from the foreign labour market experience of returnees.	Foreign labour market experience provides a competitive advantage to returnees, relative to their peers who did not work abroad. Having all other traits comparable to stayers, return migrants will signal additional characteristics valuable for an employer, both cognitive (knowledge, skills, experience, <i>etc.</i>) and non-cognitive (determination, strength of will, open-mindedness, <i>etc.</i>). Moreover, foreign labour market experience is not only a positive signal, as it may be associated with some specific skills, valuable knowledge gained abroad and potentially valued on the home country labour market.

Since the thesis highlights human capital gaps in three setups, it makes it possible to test the association between individual human capital and labour market outcomes from different angles. Each study employs a slightly different human capital measure, capturing classical dimensions, such as education (all studies) and experience (study IV), as well as empirically novel indicators of cognitive abilities (studies I, II and III) and task-specific cognitive abilities (studies II and

III). Each background study focuses on specific measures of labour market disparities, namely wage gap (all studies) and occupational disparities (study III and IV) across counterfactual groups, specific for each study. While each paper in detail analyses one specific labour market group, the integrated findings show whether a strong association between human capital and wage/occupation disparity holds in diverse setups, under varying conditions and influences.

Aims and tasks of the research

While the relationship between individual competencies and wages, or occupational outcomes, appears intuitively clear, quantifying the actual extent of such a relationship is commonly challenging. Human capital measurement is the major reason. The literature applies various approaches to quantify human capital; however, the fact that a measure of cognitive abilities and task-specific skills, as well as non-cognitive traits is unavailable, reduces empirical measures of human capital to formal education, work experience, and, at best, language skills (Beyer 2016, Chiswick and Repetto 2001). This leaves other crucial dimensions of human capital, which are highly-rewarded by the labour market, unobserved. Eventually, drawing conclusions on labour market gaps in relation to human capital disparities is overburdened with unobservable and confounding effects. This is specifically the research gap this thesis aims to narrow down.

Hence, the overall aim of this thesis is to provide evidence on the role of previously understudied dimensions of human capital for the wage outcomes of labour market groups, characterised by significant and persistent within-group disparities. Specifically, men vs. women, natives vs. immigrants and returnees vs. stayers. The choice of the research focus groups allows us to explore the relationship between human capital dimensions and labour market outcomes in different settings. Following the aim, the research will suggest whether aspects of human capital, which were previously only discussed theoretically, and therefore empirically unobserved, are actually contributing to expanding or narrowing labour market outcome gaps within the focus groups. Hence, the empirical exercise of this thesis provides empirical verification for the theoretical and hypothetical discussions of earlier studies.

To fulfil the research aim, the thesis sets an overwhelming research task to identify and quantitatively measure the novel dimensions of human capital, as well as explore in detail the within-group disparities in the specified dimensions. While the analysis of labour market gaps will shed light on the actual role of these aspects of human capital in shaping wage profiles, in-depth exploration of the human capital disparities will reveal aspects and extents of differences within the focus groups. Analysis of human capital gaps *per se* is especially relevant, since it will allow us to map the factors that drive them, and investigate why those factors affect individuals within each focus group differently. This task is particularly relevant from the policy perspective. Tackling the gender- or migration-driven labour market gaps requires a deeper understanding

of the underlying reasons and their driving forces. Human capital gaps develop under certain influences, and the identification of those may help to, eventually, narrow down the disparities.

To fulfil the aims of the thesis, the following set of specific research tasks is addressed.

Theoretical and empirical background of the thesis (Chapter 1 of this thesis)

1. To provide a general overview of the literature on the gender- and migration-related human capital disparities, their factors and labour market implications in the case of each of the three labour market groups of interest.

Study I

2. To evaluate the gender gaps in terms of cognitive skills in literacy, numeracy and problem solving domains.
3. To quantify and qualitatively analyse the gender-specific combinations of cognitive skills.
4. To estimate the wage returns to gender-specific profiles and gender wage gap, accounting for gender-specific characteristics.

Study II

5. To evaluate the immigrant-native gaps in literacy and numeracy cognitive skills, as well as the disparities in skills use at work (i.e. task-specific human capital) in the pooled sample of 15 European countries.
6. To analyse the dynamics of immigrant cognitive skills over the years spent in the host country.
7. To measure the contributions of actual cognitive skills and their use at work (i.e. task-specific human capital) to the immigrant-native pay gap.

Study III

8. To evaluate cross-country differences in human capital profiles, measured on the basis of formal education and cognitive skills in literacy and numeracy domains, across immigrants and natives in 15 European countries.
9. To explore cross-country differences in the dynamics of the cognitive skills in immigrants over the years since migration.
10. To evaluate the cross-country variation in the unadjusted immigrant-native wage gap.

11. To evaluate the effects of cognitive skills and their use at work (i.e. task-specific human capital) in explaining immigrant wage disadvantage across the 15 analysed countries.

Study IV

12. To explore the selection of young return migrants relative to non-migrants (stayers) and current migrants.

13. To analyse the young return migrant wage premium once back in the home country and explore its dynamics over the years after returning.

14. To evaluate the hypothesis that selection patterns and wage premium dynamics differ across young and older return migrants in Estonia.

Research data and methodology

The analysis of human capital requires precise data on the human capital components, as well as wage returns, to evaluate the role of human capital in wage disparities. In each of the research contexts explored in this thesis, different aspects of human capital are investigated, and those largely guide the choice of background data and methods.

Studies I, II and III rely on the Survey of Adult Skills, collected within the Programme for the International Assessment of Adult Competencies (PIAAC), run by the Organization of Economic Co-Operation and Development (OECD). The survey is currently implemented in 24 countries, including 22 OECD member states. Despite the fact that the PIAAC dataset encounters several limitations, such as its relatively small sample size (approximately 4,000 to 7,000 respondents in each country) and relatively complicated technical structure, it has a number of strong advantages. First, it provides information on individual cognitive abilities in literacy, numeracy and problem-solving in technology rich environment domains. The cognitive skills are measured with tests in respective domains. Hence, PIAAC data provides a clean and precise measure of true abilities. Second, PIAAC allows us to link the cognitive test scores to a broad set of other background, educational and employment characteristics, as well as an extensive set of self-assessed questions related to current job and its content (e.g. on-the-job skill use, which is particularly relevant for studies II and III). Third, PIAAC data allows unbiased cross-country comparisons, since the survey was conducted in an identical way in all countries, with identical test tasks and background questionnaires. This benefits study II and III considerably, since they employ data from 15 European countries.

The PIAAC data has several technical features, which have to be accounted for. First, each skill domain is reported as a set of 10 plausible values. Generally, the methodological procedure suggested by the OECD (2013) implies

that all 10 plausible values should be used to correctly measure cognitive skills. The latter is especially relevant in the case of a small sample (e.g. immigrants). Following this argument, estimation procedures on studies II and III refer to a full set of plausible values, while study I relies on the first plausible value for each skill domain.² Second, to account for sampling errors and correctly estimate mean population values, a final population weight needs to be included in the estimation algorithm. Third, skill measurement errors are ruled out using 80 replication weights under the Jackknife replication methodology. The last two aspects are considered in studies I, II and III, yielding a large number of replications.³

Study IV relies on a different database, since the major focus is on return migrants and their foreign work experience as a human capital component associated with labour market returns. The empirical analysis within this paper is performed based on two sources of data: the Estonian Labour Force Survey (EE-LFS) panel data set for 2007–2013 and the Estonian Population and Housing Census (EPHC) conducted in 2011. The LFS data have been widely used in previous labour market research; however, it remains a rather novel data source in the context of return migration studies. Within the EE-LFS, return migrants are identified using the rotating panel nature of the data applying the approach similar to Hazans and Philips (2011). Each individual is surveyed for two consecutive quarters, and then after a two-quarter break again surveyed for two-quarters. The survey also includes information about the labour market status and country of employment one year before, which facilitates the precise identification of returnees, stayers and current migrants. The second more novel data from the EPHC enables the identification of a much larger number of return migrants. Since the original census data set does not include an earnings variable, the baseline data was merged with the Estonian Tax and Customs Office statistics on individual payroll taxes for 2006–2011. Linking the EPHC return migrant data with the Estonian Tax and Customs Office database on individual payroll taxes allows us to trace the dynamics of the wage premium to return migration over time. Covering the entire population of Estonia, the EPHC data captures all Estonians who were exposed to temporary labour mobility. However, the drawback of the EPHC data is that returnees are defined more

² First, the non-parametric decomposition technique used in Study I does not allow us to account for a set of plausible values. Second, male and female samples in study I are relatively large compared to the immigrants in the samples in studies II and III. Therefore, using the first plausible value only is methodologically safer compared to the case with small samples. However, to verify that the incorporation of the first plausible value does not yield estimation inconsistencies, a number of robustness checks was conducted. Additional robustness checks verified that there are no systematic differences in the estimation results with only the first plausible value compared to a full set of plausible values, or any other plausible value, other than the first one.

³ In studies II and III, each regression output incorporating skill measures as ten plausible values is a result of 810 replications.

broadly as those who live abroad in the last five years with the underlying reason for temporary mobility unknown.

The research methodology is shaped by the research tasks and background data. Table 2 summarises the methodological tools used in each of the studies, in light of the specific research questions. Generally, Study I employs a set of various analytical techniques, aiming to extract the gender-specific human capital and analyse its wage returns. First, Study I employs the \tilde{N} opo matching-based decomposition techniques (\tilde{N} opo 2008). The identification of a gender-specific profile relies on a matching procedure as part of the non-parametric wage gap decomposition, which allows us to distinguish between men and women with comparable sets of characteristics, and those with no counterparts in the opposite gender. \tilde{N} opo decomposition is the most suitable for this purpose, as it estimates a wage gap on a full distribution of control variables across genders. To better illustrate the advantages of non-parametric \tilde{N} opo decomposition, the classical Oaxaca-Blinder decomposition technique is also applied. To evaluate the wage returns to gender-specific profiles, two techniques are used. First, the study presents the usual multivariate ordinary least-squares (OLS) wage regressions, controlling for age, age squared, first generation immigrant status, formal education and three skill domains. Second, the gender wage gap on the entire wage distribution is analysed, applying a conditional quantile regression approach. The latter also helps to partly overcome the second limitation of the \tilde{N} opo procedure, which arises from the mean-value estimation of a counterfactual wage distribution.

Studies II and III employ similar analytical tools, with a difference in the underlying sample. Study II provides pooled-data evidence for 15 European countries (Belgium, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Slovenia, Spain and Sweden), while study III focuses on country-specific results and the exploration of cross-country differences. Both studies rely on multivariate regression analysis. For the cognitive skills analysis, given the cross-section data in hand, we cannot identify the pure time dynamics of individual skills. However, controlling for a broad set of characteristics allows us to separate the variation in cognitive skill level, to a large extent associated with years spent in the host-country. Similarly, the analysis of the wage gap employs a vast set of background, education and employment variables to ensure a non-biased estimation of the wage disparity.

The final study of this thesis employs a number of empirical tests aiming to (i) identify the selection of returnees, and (ii) quantify the wage premium to return. In order to investigate the patterns of selection to return, the binary choice (logistic) model is employed. The selection analysis considers three different selection patterns: who are the migrants coming back (returnee-migrant selection), who are the permanent migrants (migrant-stayer selection) and who are the returnees compared to stayers (returnee-stayer selection). The wage premium analysis includes several relevant dimensions, namely, (a) the identification of the effect of return migration on the wages of young people, applying

a Mincerian type wage regression with a logarithm of the average monthly wage as a dependent variable; (b) exploring the nature and composition of the identified wage premium, relying on a classical Oaxaca-Blinder decomposition; (c) the identification of the wage premium dynamics over time after returning, applying the classical Mincerian type regression, with a set of interaction terms between the years after return and a returnee dummy.

Table 2. Overview of the research methods used in the thesis

Study	Task	Data	Method
I	Task 2. To evaluate the gender gaps in cognitive skills in literacy, numeracy, and problem solving domains.	PIAAC data for Estonia	Descriptive analysis
I	Task 3. To quantify and qualitatively analyse the gender-specific combinations of cognitive skills.	PIAAC data for Estonia	Ńopo decomposition; Oaxaca-Blinder decomposition; descriptive analysis
I	Task 4. To estimate the gender wage gap, accounting for gender-specific characteristics, and wage returns to gender-specific profiles.	PIAAC data for Estonia	Multivariate OLS; conditional quantile regression
II	Task 5. To evaluate the immigrant-native gaps in literacy and numeracy cognitive skills, as well as the disparities in skills use at work (<i>i.e.</i> task-specific human capital) in the pooled sample of 15 European countries.	PIAAC data for 15 EU countries (pooled)	Multivariate OLS
II	Task 6. To analyse the dynamics of immigrant cognitive skills over the years spent in the host country.	PIAAC data for 15 EU countries (pooled)	Multivariate OLS
II	Task 7. To measure the contributions of actual cognitive skills and their use at work (<i>i.e.</i> task-specific human capital) on the immigrant-native pay gap.	PIAAC data for 15 EU countries (pooled)	Multivariate OLS
III	Task 8. To evaluate cross-country differences in human capital profiles, measured on the basis of formal education and cognitive skills in literacy and numeracy domains, across immigrants and natives in 15 European countries.	PIAAC data for 15 EU countries	Descriptive analysis; multivariate OLS

Study	Task	Data	Method
III	Task 9. To explore cross-country differences in the dynamics of immigrant cognitive skills over the years since migration.	PIAAC data for 15 EU countries	Multivariate OLS
III	Task 10. To evaluate cross-country variations in the unadjusted immigrant-native wage gap.	PIAAC data for 15 EU countries	Multivariate OLS
III	Task 11. To evaluate the effects of cognitive skills and their use at work (<i>i.e.</i> task-specific human capital) in explaining immigrant wage disadvantage across 15 analysed countries.	PIAAC data for 15 EU countries	Multivariate OLS
IV	Task 12. To explore the selection of young return migrants relative to non-migrants (stayers) and current migrants.	EE-LFS data	Binary (logistic) regression
IV	Task 13. To analyse the young return migrant wage premium once back in the home country and explore its dynamics over the post-return years.	EE-LFS and EPHC	Multivariate OLS (Mincerian type); Oaxaca-Blinder decomposition
IV	Task 14. To evaluate the hypothesis that selection patterns and wage premium dynamics differ across young and older return migrants in Estonia.	EE-LFS and EPHC	Binary (logistic) regression; Multivariate OLS (Mincerian type); Oaxaca-Blinder decomposition

Structure of the thesis

The thesis consists of four original papers, which cover the aforementioned research questions. The empirical studies are preceded by a thorough overview of the theoretical and empirical background for the research in Chapter 1. The findings of each paper are summarised in Chapter 3, with the presentation of the major findings along with the research tasks, discussion of research limitations and elaboration of some policy inferences.

Chapter 1 consists of several sections, which build up the theoretical and empirical basis for each of the four original papers of this thesis. The major purpose of Chapter 1 is to, first, give a general overview of human capital theories and their connection to the labour market, and discuss in detail the cases of each specific labour market group of interest. Therefore, section 1.1 is devoted to the general theories of human capital. Subsection 1.1.1 focuses on the classical approaches to human capital and covers the evolution of the notion of human capital from the early seminal papers by Schultz (1961, 1959), Becker

(1962) and Mincer (1962), to the later classical theories of firm-specific human capital (Parson 1972, Bodenhöfer 1967). The following subsection 1.1.2 introduces more recent theories of human capital. Specifically, the subsection discusses the foundations, benefits and analytical limitations of occupation- and industry-specific human capital (Parent 2000, Neal 1995, Shaw 1984). Next, subsection 1.1.2 introduces the most recent and rapidly developing theory of task-specific human capital (Gibbons and Waldman 2004). The overall theoretical foundations, discussed in section 1.1, are important for the overall framework of the thesis, since the human capital measures and definitions applied in each of the thesis papers rely on either classical theories (study I and IV), or a combination of classical and recent theories (studies II and III).

Since the underlying assumption of the whole thesis is a strong connection between human capital disparities and labour market gaps, the remaining parts of Chapter 1 present earlier theories and empirical evidence to support this assumption in the context of the three specific labour market groups of interest. In particular, section 1.2 focuses on human capital formation and disparities in the case of males vs. females (subsection 1.2.1), natives vs. immigrants and return migrants vs. stayers (subsection 1.2.2). While section 1.1 covers the general concepts and aspects of human capital, section 1.2 goes into the detail about the three labour market groups analysed in this thesis. Subsection 1.2.1 introduces dimensions and major factors of gender gaps in human capital, with a special focus on the human capital components covered in study I. Subsection 1.2.2 explores human capital gaps driven by migration and, as a special case, return migration. The subsection highlights major dimensions of human capital disparities, addressed in earlier literature, and relevant drivers of these gaps. From the research perspective, it is important to understand the drivers of human capital disparities, especially in the context of three groups analysed in this thesis. While empirical evidence on raw gaps provides a crude measure of the existing gap, an analysis of the factors shed light on the underlying mechanism of gap formation, and therefore areas which need particular policy attention and influence in order to narrow down the disparities.

Section 1.3 provides an overview of predominantly empirical literature on the role of human capital disparities in generating labour market disparities. Following the research focus of the thesis studies, the overview puts special emphasis on wage gaps. To keep the connection between section 1.2 and 1.3 clear, subsection 1.3.1 focuses on gender gaps in labour market returns and the role of specific aspects of human capital covered in subsection 1.2.1. Similarly, subsections 1.3.2 and 1.3.3 tackle, respectively, immigrant-native and returnee-stayers labour market gaps in relation to the human capital disparities discussed in subsection 1.2.2. The major dimensions of human capital gaps, their driving forces and labour market externalities across three researched labour market groups are summarised in Appendices A1 and A2.

Chapter 2 consists of four original studies. Study I focuses on the gender wage gap in Estonia in relation to gender-specific human capital profiles. The study relies on the Program of International Assessment of Adult Competencies

(PIAAC) data for Estonia and, first, explores the average gender disparities in cognitive abilities in literacy, numeracy, and problem solving domains. Second, as a major novelty, the study extracts gender-specific combinations of cognitive abilities and formal education (*i.e.* gender-specific human capital profiles). Third, the study explores the effect of those on the average gender wage gap, as well as the heterogeneity of effects along the wage distribution. The results of Study I suggest the non-negligible role of a male-specific combination of numeracy and problem solving skills in widening the gender pay gap.

Studies II and III rely on the same conceptual framework, postulating that immigrant-native human capital and wage gaps persist not only due to gaps in formal education and cognitive skills but also due to disparities in the use of those skills at work. The novelty of the paper is (i) the application of more precise measures of actual cognitive skills in literacy and numeracy domains, and (ii) the approximation of task-specific human capital with the on-the-job use of literacy, numeracy and ICT skills when performing actual job tasks. Study II relies on the PIAAC data from 15 European countries to derive the pooled-data-based results, while study III uses the same data source to conduct a cross-country comparative analysis. The pooled-data-based results suggest that the actual use of skills as an approximation of task-specific human capital matters relatively more for the wage returns of immigrants, compared to the net stock of cognitive skills. However, immigrant-native disparities in skill use persist even when net cognitive abilities of natives and immigrants are comparable. The cross-country evidence from study III generally verified the pooled data results; however, it revealed that the pattern of the relationship between skill- and skill-use-based measures of human capital and the ethnic wage gap in Estonia and Ireland is drastically different from the other countries analysed.

The final study, Study IV, explores return migration among young people, as a special case of labour mobility. Unlike studies II and III, study IV tackles the human capital and wage gaps across return migrants and their non-migrant peers in the home country. The human capital disparity within the analysed group originates from the work experience and associated productive skills gained abroad by the returnees. However, the years spent abroad may have a negative effect on earnings upon return, due to the drop-out effect, potentially weaker networks in the home country and lack of home country specific experience. Therefore, study IV aims to explore a non-trivial association between the human capital associated with return labour mobility and wages in Estonia. Study IV relies on Labour Force Survey (LFS) data for Estonia, as well as Estonian Population and Housing Census (EPHC) data, merged with the tax registry data on individual payroll taxes. The findings suggest that, on average, young returnees earn a positive wage premium from their foreign experience, which is especially pronounced for young female returnees.

Chapter 3 summarises and discusses the findings of each study. Section 3.1 provides a brief overview of the main findings. Section 3.2 relates the findings to the research tasks outlined in the Introduction. Furthermore, section 3.2 discusses major findings in light of potential factors and policy implications.

Finally, section 3.3 highlights and discusses major limitations of each study, which have to be taken into account when interpreting the results, as well as suggests a number of ideas and directions for further research, in light of the contributions and limitations of the given thesis.

Contributions of individual authors

Studies I, II and III are co-authored with Tiiu Paas. Both Tiiu Paas and Maryna Tverdostup contributed to formulating the research questions, describing the theoretical background of the studies and revising the manuscript throughout the publication process. Maryna Tverdostup was solely responsible for processing and preparing the database, choosing the research methodologies, conducting the empirical analyses, and writing the manuscripts in the case of all three studies. Maryna Tverdostup was also responsible for submitting studies I, II and III, correspondence with the journals and preparing the revised versions of the manuscripts.

Study IV is co-authored with Jaan Masso. Both Jaan Masso and Maryna Tverdostup were responsible for developing the research questions, initial database processing, choosing the research methodology, formulating the theoretical background of the study and revising the manuscript during the publication process. Maryna Tverdostup was solely responsible for finalising the database, conducting the empirical analysis, and writing the major part of the final manuscript.

The author is solely responsible for any omissions in this thesis.

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1. THEORETICAL AND EMPIRICAL BACKGROUND FOR THE RESEARCH

1.1. Human capital: theory and empirical measures

The concept of human capital refers to valuable capital, embodied in people. Over the last century, economic literature has widely recognised the paramount importance of human capital in a nation's development, growth and prosperity (Beach 2009). However, since the focus of this thesis is on individual level outcomes, this chapter will tackle the nature, formation, driving forces and labour market returns of human capital from the individual perspective rather than from perspective of the firm or national level. Although the major focus of this thesis is on the individual-level externalities of human capital gaps, it is nonetheless important to recognise that an effect of human capital extends far beyond individual labour market outcomes. Human capital is commonly recognised as a crucial factor of economic development and a determinant of long-term growth (Rocha et al. 2017).

1.1.1. Classical approach to the human capital

Classical human capital theory dates back to the 1950s and the seminal works by Schultz (1972, 1961, 1959), Becker (1964, 1962), Mincer (1962) and Kiker (1966). Over several decades, the literature has mostly focused on general purpose and firm-specific human capital. The earliest works (Becker 1964, 1962) addressed human capital in general terms, with an emphasis on various individual characteristics that directly reflect individual productivity. Schultz (1961) views human capital as a combination of skills, knowledge, and similar attributes that affect particular human capabilities to do productive work. Becker (1962) mostly emphasises the role of education and knowledge acquired while studying in shaping individual human capital. Mincer (1962) adds on-the-job training to the list of human capital attributes. Similarly, Marginson (1989) refers to human capital as knowledge and skills acquired through education and training, which will increase an individual's productivity at work. Hence, labour market experience and training were perceived as core ingredients of the individual human capital profile. In line with the classical theories, the OECD (2001) defines human capital as the "productive wealth embodied in labour, skills and knowledge".

Hence, the canonical theories of human capital emphasize the major role of education and the resulting skills as the main drivers of labour productivity (Tan 2014). However, several studies stress the importance of internalised individual characteristics, such as health, when evaluating individual human capital. In the early work of Schultz (1961), health was already considered one of the components of human capital. Mushkin (1962) specifically focuses on individual

health as a specific type of human capital investment that contributes to individual productivity and benefits the economy. Unlike health, non-cognitive skills were completely ignored in the early human capital theories (Becker 1964). However, non-cognitive traits appeared as a part of human capital profiles in later studies. For instance, Becker (1994) introduces punctuality and honesty, in line with education, training, skills and health. Nonetheless, Heckman (2000) and Heckman and Rubinstein (2001) made the major contribution to the human capital concept by stressing the paramount role of non-cognitive skills. Pioneered by Heckman and Rubenstein (2001), the concept of non-cognitive skills refers to a multidimensional set of personality traits, including self-control, persistence, self-confidence and communicational skills (Cunha et al., 2006, Heckman et al., 2006, Cawley et al. 2001). Moreover, recent studies argue that actual cognitive skills should be paid more attention within classical human capital theories. Hanushek and Woessman (2008) document that acquired skills matter more for individual labour market outcomes and growth than mere school attendance, therefore one has to account for cognitive skills when evaluating individual human capital and its effects on labour market performance.

Early theories already viewed human capital accumulation as a life-long process and pursued a concept of human capital investment. One of the first studies to raise the question of human capital investments was Schultz (1959). In the following study, Schultz (1961) analyses investments in human capital in the framework of classical capital formation and define five major investment dimensions: (1) health facilities and services, aiming to support and improve health; (2) on-the-job training; (3) formal education; (4) on-the-job study programmes; and (5) migration of individuals, in a search for better work opportunities. The latter study (Schultz 1972) also adds information and children (population) as other areas of human capital investment.

It is noteworthy that all the pioneering human capital theories explicitly emphasised the strong connection between human capital and the labour market, and therefore productivity appeared as a key characteristic. Among others, Schultz (1961), Kiker (1966), Romer (1989), and Rocha et al. (2017) stress that human capital is one of the most important inputs to economic growth and development. Human capital cannot be disconnected from the labour market and productivity, measured in terms of wage returns, which is the main quality indicator of individual human capital.

However, productivity as a key qualitative measure of human capital was questioned by signalling theory (Spence 2002, 1978). Unlike the classical theories of human capital, education is not viewed as a means to accumulate certain skills, which are valued by the labour market, but rather as an indicator of their certain innate characteristics, such as potential intelligence, dedication, time management skills, and ability to follow instructions. Psacharopoulos (1979) develops signalling theory further and distinguishes strong signalling, when education has no impact on actual skills, and weak signalling, when education both fosters higher skills and serves as a signal.

The theories of firm-specific human capital offer a different view on knowledge, skills and abilities as core human capital dimensions, defined by the early theories (Mincer 1962, Becker 1962, Schultz 1961). Although the roots of firm-specific human capital theory are in the early studies by Becker (1964) and Mincer (1962), the paper by Bodenhöfer (1967) was among the first to disentangle general vs. firm-specific on-the-job training. Bodenhöfer (1967) defined general training as that which increases productivity in many firms, while specific training will benefit only one firm, which provides this training. The bottom line in the study by Bodenhöfer (1967) is that on-the-job training is always specific, since any kind of occupational activity and training is adjusted to a particular firm, its legal form, job requirements, *etc.*

The concept of firm-specific human capital, as a broader perspective on firm-specific training, was formalised by Parsons (1972) and Donaldson and Eaton (1976). In these studies, certain skills and knowledge, acquired while working in a certain firm, foster higher productivity in this specific firm, while may be of less benefit in other firms. Importantly, Donaldson and Eaton (1976) argue that these specific skills *per se* are not valued by the labour market, and can generate positive returns only within the given firm. The meta-analysis by Crook et al. (2011) shows that human capital, and especially firm-specific human capital, is a core driver of a firm's performance. Therefore, employer investments in firm-specific human capital are viewed as important determinants of future business success.

Weiss (1995) also distinguishes between general and firm-specific human capital. General human capital refers to skills valued by many firms, while firm-specific skills yield a wage benefit only in the given firm. Topel (1990) stresses that specific skills are major drivers of earnings losses among displaced workers. Therefore, job separation yields losses for both employer and employee in the firm-specific human capital framework, since firm-specific skills investments are wasted and accumulated skills appear non-transferable (Carmichael 1983, Hashimoto 1981, Hashimoto and Yu 1980). Similarly, the theoretical work by Lazear (2009) refers to firm-specific human capital as a combination of skills, having different weights for the firm. Hence, human capital accumulated in one firm is typically lost value at another firm with different skill weights.

Therefore, the classical theories of human capital have developed rapidly and become enhanced over the last fifty years. They offer a solid conceptual framework, which covers various dimensions of individual human capital, their interrelations and spillovers, as well as their productivity and overall economic externalities. Although the classical theories stress the role of on-the-job training in the firm-specific human capital formation, they impose a rather restrictive view on the spillover effects of firm-specific skills. A firm-level perspective violates the fact that certain jobs and tasks are comparable across occupations and/or industries, and these specific abilities can be transferred across occupations and/or industries. Hence, the next subsection will focus on recent theories that conceptualise specific skills and abilities based on

occupations and industries, as well as based on specific tasks, regardless of occupations (industries).

1.1.2. Recent theories and measures of the human capital

Although the concepts of occupation- and industry-specific human capital appeared already in early work by Bodenhöfer (1967), they were not conceptualised until the 1990s. Earlier literature, focusing more on firm-specific skills (Bodenhöfer 1967), argues that industry-specific and occupation-specific training affects labour mobility in the same way as specific training for a single firm. Starting with the study by Neal (1995), the literature put more emphasis on industry- and occupation-specific rather than firm-specific human capital. Namely, Neal (1995) shows that firm-specific factors contribute little to the wage-tenure profile, while industry-level factors matter a lot.

The underlying idea of both industry- and occupation-specific human capital concepts is that human capital is specific to the nature of the work, not the firm (Gibbons and Waldman 2004). The literature defines occupation- and industry-specific human capital as a combination of skills, abilities and knowledge accumulated over the years of work in a given occupation or industry (Parent 2000, Neal 1995). Therefore, the majority of the empirical studies quantify specific human capital using years of experience in a certain occupation or industry. Unlike firm-specific human capital in its classical definition (Donaldson and Eaton 1976), occupation-specific human capital can be easily transferred across identical occupations in different firms and industries, while industry-specific human capital is applicable in any occupation and firm within a given industry. Hence, while firm-specific human capital was expected to reduce employee labour mobility (Jovanovic 1979, Donaldson and Eaton 1976, Parsons 1972), occupation- and industry-specific human capital investments do not restrict it, as skills and knowledge are valuable not only inside, but also outside the given firm.

However, despite occupation- and industry specific skills being more widely applicable than firm-specific, they still appear rather restrictive when it comes to labour mobility, cohort effects and job design. The labour market returns from occupation- and/or industry-specific human capital have been widely studied in the literature. The majority of studies report significant correlation between both occupation- and industry-specific tenures. The earliest studies on occupation-specific human capital (Shaw 1987, 1984) argue that investments in occupation-specific human capital are an important determinant of wages. Parent (2000) shows that wage growth is strongly related to work tenure with a specific employer. Weinberg (2001) shows that industry-specific skills create a barrier to inter-industry labour mobility. However, when moving within an industry, employees benefit from previously accumulated industry-specific skills and knowledge (Neal 1995, Carrington 1993). Similarly, Sullivan (2010) provides empirical evidence on occupation- and industry-specific human

capital, measured in terms of the corresponding work experience. Sullivan (2010) reports that both occupation- and industry-specific human capital are key determinants of wages.

Nonetheless, a number of empirical studies report a weak association between industry-specific profile and wages, while occupation tenure matters a lot in wage dynamics. Kambourov and Manovskii (2009), on the contrary, document that industry-specific tenure has little effect on wage growth when occupation tenure is accounted for. Thus, Kambourov and Manovskii (2009) suggest that occupation-specific experience and skills may be of prime importance for wage dynamics compared to industry-specific tenure. Similarly, Kletzer (1996) examines the role of transferable industry-specific skills on re-employment after displacement, and finds significant benefit only in certain sectors (trade and finance, service sectors). The transferability of skills across occupations was further explored by Gathmann and Schönberg (2010), finding that experience and abilities are more transferable across different occupations than previously considered. Moreover, with increasing tenure, the specificity of skills declines and they are even more portable across various occupations.

When analysing firm-, occupation-, and industry-specific human capital, it is important to acknowledge that all these are closely interrelated and, by nature, capture the same characteristic – work experience. The fundamental difference is in the construction and the scope of the applicability of each human capital profile. A firm-specific human capital profile allows a rather narrow application and overlooks (i) the potential heterogeneity of skills and the knowledge specificity of jobs within a firm, and (ii) the potential similarity of positions in terms of skill and knowledge demands across firms. Occupation and industry human capital profiles abstract from specific firms, which (i) allows us to make more general inferences about skills and knowledge, which may be comparable on the occupation and/or industry level, and (ii) ignore firm-specific features that may affect skills and knowledge accumulation, resulting in heterogeneity of human capital within an occupation and/or industry.

The most recent concept – task-specific human capital – offers much wider applicability. It goes into even more detail in defining specific human capital characteristics, and outlines human capital based on the actual work tasks. This makes a deeper look into skill profiles possible and ensures more precise comparability across firms, occupations and industries. Pioneered by Gibbons and Waldman (2004), the theory of task-specific human capital disentangles general vs. specific components of human capital, which jointly constitute the so-called effective human capital. General human capital corresponds to inner ability as a combination of skills, knowledge and competences. Specific human capital refers to the abilities and skills accumulated and developed through performing certain job tasks, and therefore, is also referred to as task-specific human capital (Gathmann and Schönberg 2010). These two dimensions of the human capital are tightly interrelated. Task-specific human capital is a crucial factor of the improvement of inner ability and an important determinant of labour market success.

Unlike firm-, occupation- and industry-specific human capital, the task-specific approach allows us to identify certain tasks within firms, occupations or industries, and therefore provides a much more detailed perspective. Therefore, while earlier studies document the difficulties involved in cross-occupation and cross-industry human capital transferability, the task-based approach can assess whether this difficulty is due to (i) the non-comparability of job tasks, or (ii) other cross-occupation, or cross-industry differences (*e.g.* job design). Furthermore, the task-specific approach allows us to identify how occupations are related to each other in terms of their skill requirements (Gathmann and Schönberg 2010). As discussed by Gibbons and Waldman (2006, 2004), task-specific human capital concerns learning-by-doing when performing certain job assignments. The resulting skills are useful for this particular task; however, they may also be transferred to other assignments. In contrast to classical firm-specific human capital (Lazear 2009), human capital accumulated in one job is a loss in other job only if the other job requires a different combination of skills. As long as the tasks are comparable across the jobs, task-specific human capital is perfectly transferable.

The results from the study by Gibbons and Waldman (2006, 2004) suggest that task-specific human capital are important in within-firm occupation mobility, promotions and job design. Similarly, Wasmer (2006) documents that specific skills are important factors of growth differences across European Union countries and the United States, since labour market frictions raise the returns on specific human capital investments relative to general capital investments. Gathmann and Schönberg (2010) employ the task-specific human capital approach to study the actual portability of skills, accumulated in the labour market. The study documents labour force mobility across occupations with similar skills requirements and shows that task-specific human capital is an important source of wage growth.

Hence, task-specific human capital is closely interrelated with occupation- and industry-specific human capital, as it also concerns the specific job performed. However, instead of focusing on the occupational and industrial specificity of the job, the theory focuses on task-specificity. Unger et al. (2011) document in their meta-study that task-related human capital is a strong determinant of business success and matters more for the performance, compared to general, non-task-related human capital investments. Schulz et al. (2013) report that task-specific human capital yields significantly higher employee remuneration and firm productivity compared to non-task-specific.

The recent theory of task-specific human capital provides an insight into the previously ignored fact that the majority of skills and knowledge are tightly related to specific tasks, and develop in the course of performing those tasks. The concept of task-specific human capital is especially relevant in the context of disadvantaged labour market groups. In particular, due to occupational gender segregation (Blau and Kahn 2017), females and males will possess observationally different occupation-specific human capital; however, the task-based approach will make it possible to look within occupations and explore

human capital heterogeneities based on actual tasks. As a result, gender skill profiles can be more directly compared. In the context of migration, discrimination and poorer access to certain positions (Barrett et al. 2006) result in occupational and industry segregation, similar to gender-driven segregation. Hence, task-based human capital assessment provides a more detailed and precise measure of the actual skill profile.

1.2. Human capital gaps across different labour market groups: dimensions and factors

1.2.1. Gender disparity in human capital

Dimensions of the human capital gaps

The male-female gap in human capital is widely documented in the literature (Polachek 2006, O’Neill and O’Neill 2006, Bertrand 2011). However, when evaluating the disparity in human capital, one has to account for various aspects of the human capital profile. Human capital is multi-dimensional and gender gaps are heterogeneous across different dimensions. Due to the focus on gender disparities, this subsection will focus on the human capital dimensions that are found to differ across men and women, namely: formal education, formal education major (*i.e.* focus area), cognitive skills, non-cognitive skills and work experience.

In past decades, female human capital investments have improved dramatically and the male-female gap, particularly measured in terms of formal education, has narrowed or even reversed (Becker et al. 2010, Goldin et al. 2006). In particular, Author and Wasserman (2013) find that females outscore males in terms of college degrees in 29 out of 34 OECD countries. Gemici and Wiswall (2014) show that, in the US, educational outcomes for females have improved on the extensive margin and the proportion of women graduating from college has raised almost fourfold over the years 1940–1980.

However, while the gender ratio of university graduates is tending to equalise, there are still persistent male-female gaps in aspects of human capital, other than degree of formal education. First, the actual content of education differs substantially across males and females, leading to the substantial gender differences in skills, abilities and training. Gemici and Wiswall (2014) find that college majors remain strongly gendered, with women obtaining degrees predominantly in the humanities, social sciences and teaching fields, while male graduates dominate in science, mathematics and engineering. The authors document that gender segregation in college majors weakened over recent decades; however, women are still only two thirds as likely as men to get a degree in a science or business field (Blau et al. 2014). Similarly, Polachek (1978) and Blau and Ferber (1992) document that there are sizeable gender differences in attended school courses, with the boys taking more mathematical and technical subjects, while the girls attend more philological disciplines.

Similarly, Ceci et al. (2014) document that girls are substantially less likely to enrol in STEM (science, technology, engineering, mathematics) majors.

The self-selection of males and females into different college majors results in (a) the accumulation of different skills for those men and women with initially gender-comparable skill profiles, and (b) the further divergence of skills for those with initially gender-specific skill profiles. In the first case, with men and women having comparable skills, the segregation of females in humanitarian subjects would develop their "soft" skills (literacy, reading, language skills), while men would generate "hard" skills (mathematical, technical skills) by taking science and engineering majors. As a result, the gender gap in terms of cognitive skills would emerge. In the second case, with a significant initial gender gap in skills, the segregation would further increase the male-female skill gap.

The gender imbalance in mathematical and technical skills has raised significant attention (Nollenberger et al. 2016, Palgin and Rufolo 1990, Marnane et al. 1995). There is extensive literature on early-age gender skill gaps. For instance, Machin and Pekkarinen (2008) document that school-aged boys achieve higher scores in mathematical scores in the PISA test. In line with this evidence, Ellison and Swanson (2010) report that this gap evolves during the early years of schooling. Similarly, Fryer and Levitt (2010) document that, in the US there are no mean gender differences in maths skills upon school entry, but the gap, disfavours girls, emerges over the following six years. The study by Dickerson et al. (2015) documents that primary school aged girls in 19 African countries achieve substantially worse maths test scores compared to boys. When considering the distribution of the maths test scores, Xie and Shauman (2003) and Ellison and Swanson (2010) show that among the students in the top five percent of the test scores, the male-female ratio is two to one.

The gender gap in mathematical and technical skills does not entirely smooth out in adulthood. As discussed above, the gender imbalance in mathematical ability develops over the school years, with the highest disparity in the upper quantiles of mathematical test scores. The recent body of literature, which relies on data from the Program of International Assessment of Adult Competencies (PIAAC), sheds more light on the persistence of the gender gap in adulthood. As discussed in Study I of this thesis, the gender gap in numerical and information and communication technology abilities is persistent among adults. As in the finding from young-aged cohorts (Ellison and Swanson 2010, Xie and Shauman 2003), the distributions of mathematical abilities differ across men and women, with a notable disparity in the high-scoring tail of the distribution. The evidence from an extensive literature review by Wang and Degol (2017) suggests that, despite general improvement in male-female cognitive gaps, substantial gender imbalance in STEM (Science, Technology, Engineering, and Mathematics) abilities remain.

However, the gender imbalance drastically differs when it comes to various verbal and literacy skills, both for the young and adults. The evidence for kindergarten-aged children by Tach and Farkas (2006) and Chatterji (2006)

suggest that boys, on average, have lower reading ability compared to girls. The studies by Guiso et al. (2008) and Machin and Pekkarinen (2008) document that based on the PISA test evidence girls outscore boys in the reading domain. Goldin et al. (2006) find that female high school students perform better than male students in most subjects and, particularly, in verbal tests. Similar evidence was reported for adult respondents. For instance, Hedges and Nowell (1995) report that females outperform males in reading comprehension, perceptual speed, and associative memory, while being outperformed in mathematical dimensions.

As discussed in the previous section, non-cognitive competencies and some certain psychological attributes are important aspects of individual human capital, which may differ drastically across males and females. The literature documents gender gaps in various non-cognitive competencies. Among the early-age gender gaps, DiPrete and Jennings (2012) highlight social and behavioural skills gaps, with girls possessing stronger social and behavioural skills profiles compared to their boy peers. Becker et al. (2010) document that the distribution of non-cognitive skills differs across men and women. Blau and Kahn (2017) discuss significant male-advantaged disparities in risk aversion and propensity to negotiate or compete. However, Blau and Kahn (2017) emphasise that females may have an advantage in other non-cognitive domains, such as interpersonal skills. Experimental studies have confirmed the important differences between men and women in individual leadership and competitiveness (Gneezy et al. 2003), as well as altruism and greed (Andreoni and Vesterlund 2001).

A large strand of the literature emphasises substantial gender gaps in personality traits, which largely shape individual human capital. Clearly, individual motivation is one of the major non-cognitive traits, which closely interrelates with other dimensions of human capital, such as education, cognitive abilities and work experience. Chevalier (2004) investigates gender disparity in motivation in the UK among recent graduates and finds a significant gap and a strong association with the gender wage gap. Mueller and Plug (2006) document that men and women are substantially different in such characteristics, as extroversion, agreeableness, conscientiousness, neuroticism and openness to experience. These traits are incorporated into the individual cognitive profile and, apparently, are reflected in labour market performance. Fortin (2008) analyses gender differences in self-esteem, external locus of control, the importance of money/work and the importance of people/family. In this way, the study tackles the gender gap in valuing money and work vs. valuing people, usefulness to society, and family. These non-cognitive dimensions closely relate to gendered preferences.

Finally, work experience was for decades considered one of the major human capital domains with the high male-female disparity. Apparently, work experience is strongly correlated with cognitive skills, since labour market participation fosters the accumulation of abilities. However, work experience by itself is still worth considering, as it conveys information about certain job- or

industry-specific skills, as well as non-cognitive traits developed over the years of employment. Blau and Kahn (2017) explore gender disparity in work experience in the US and document a significant decline in the male-female gap over the last two decades. Similarly, the studies by Gayle and Golan (2012), Blau and Kahn (2006), Blau and Kahn (1997) and O'Neill and Polachek (1993) document a decreasing gender gap in work experience over recent decades. The observed positive dynamics can be attributed to various factors, which will be discussed in detail in the following part of the subsection.

Factors of the human capital gaps

Since human capital development is a life-long process, its dynamics are shaped by numerous factors, and these factors may affect males and females differently. From the policy perspective, the key question is the “nature vs. nurture” origin of gender gaps, since the design and extent of policy interventions greatly depend on whether the gaps are due to inner ability, or external factors. Depending on the origin of the gender gap in human capital, the drivers of the disparity can be classified in several major groups: (a) schooling-related factors; (b) labour market related drivers; (c) overall economic and social factors; (d) cultural and family background effects; (e) individual (behavioural) factors. In the following, each of the groups will be addressed in detail.

a) Schooling-related factors

Schooling-related, along with family-related affects and individual characteristics (to be discussed later in this subsection), are the earliest effects children are exposed to. Consequently, the male-female disparity in human capital may appear already during the early stages of life as a result of schooling differences.

Among the major school-level factors discussed in the literature, teacher's differential treatment, biases and stereotypes are widely discussed. The pioneering study by Leinhardt et al. (1979) document that teachers treat male and female students differently, spending more cognitive time on mathematics tasks with boys and on reading tasks with girls. This differential treatments correlates with an observed gender gap in mathematics test scores. The bias from teachers in favour of boys is reported as one of the factors that deters girls from enrolling in mathematical subjects, and negatively reflects on girls' educational outcomes (Lavy and Sand 2015). The latter also largely explains girls having worse achievements in mathematical and technical subjects. Similarly, Dee (2005) and Carrell et al. (2009) report that students perform relatively better with a same-gender teacher, and given the dominance of female teachers, girls benefit more.

Among the education-related factors enforcing the gender gap in human capital, measured by the actual test scores and graduation rates, school quality is one of the strongest. However, there is a limited body of literature exploring the differential effects of schooling quality on boys and girls. The study by Author et al. (2016a) shows that quality of schooling is more consequential for boys, implying that boys will benefit relatively more from high-quality schooling, compared to girls.

b) Employment-related factors

The various dimensions of the gender gap in human capital can, to a certain extent, stem from the labour market. Based on the seminal work by Mincer and Polachek (1974), literature has focused on a number of important gender differences related to labour market commitment, working hours and employment interruptions. These factors reduce the expected future earnings of females and have a twofold reflection on human capital (Polachek 1975). First, they reduce female propensity to invest in their own skills and abilities due to low expected future earnings. Second, they decrease work experience and reduce job-specific human capital as other human capital components. Furthermore, job interruptions due to pregnancy and childcare may result in human capital depreciation, implying that acquired skills and abilities will be partly lost (Blau and Kahn 2017, O'Neill 2003). Hence, motherhood and labour market drop-out may result in human capital decline, as it appears complicated to maintain skills and abilities when separated from the labour market (Polachek 1981, Mincer and Polachek 1974).

Another factor, which has recently gained significant attention among scholars is increased gender segregation in occupations and industries. Discussed in detail by Blau and Kahn (2017), occupational segregation reduces the expected future earnings of females, since managerial and highly professional positions are dominated by males. The reduction of the occupational entry barrier is likely to provide an economic incentive for women to invest in higher education and skills training. On-the-job training was commonly viewed as a way to enhance skills and abilities and strengthen human capital, in particular, job-specific human capital. Gender differences in attending on-the-job training could potentially induce a disparity in skills and a lack of the cognitive abilities valued by the labour market (Blau et al. 2014, Becker 1993).

As with occupational segregation, labour market discrimination also affects the willingness of females to invest in their own human capital. There is a massive strand of theoretical and empirical evidence on gender discrimination in the labour market (Goldin 2014, Altonji and Blank 1999). Ceci and Williams (2011) provide a literature overview on the issue of gender discrimination in science and document that, despite significant gains, females are still facing biases when opting for positions in maths-intensive fields of science. The experimental evidence by Reuben et al. (2014) suggests a non-negligible effect of pure gender discrimination against female careers in science. Naturally, anticipating discrimination in the labour market reduces females' expectations about future earnings and career progression. As investments in human capital have lower expected returns for females, they discourage females from human capital accumulation, as compared to males. In terms of the work experience component of human capital, discrimination has an obviously negative effect, as it reduces access to certain jobs for females, increases their job-search time and periods of inactivity or unemployment.

c) General economic and social factors

Naturally, male-female gaps in human capital investments are largely affected by general economic and social indicators. Demographic literature attributes the increased educational attainments of women to contextual factors, such as social attitudes and norms, economic development and the educational system (e.g. Diamond et al. 1999, Jejeebhoy 1995). Furthermore, advancements in family planning and health programmes influencing fertility have substantially increased the likelihood of females pursuing higher education (Goldin and Katz 2002, Bhat 2002, Bledsoe et al. 1995, Subbarao and Raney 1993). Several studies document a significant positive effect of women's emancipation on the average human capital investments by females. For instance, Guiso et al. (2008) report a significant positive effect of female emancipation, political empowerment and economic activity rates on gender-based mathematics and reading skill gaps among schoolchildren. The improvement of household technologies is another noteworthy factor that increased labour market investments by women (Greenwood et al. 2005).

The role of educational and welfare policy reforms on female human capital is widely acknowledged in the literature. Drastic changes in education systems, which banned gender discrimination and enforced equal access and admission procedures in higher education, significantly affected female human capital accumulation (Blau and Kahn 2017). Education reforms, coupled with social transformations and an increase of gender-equality in society, were a strong driving force behind the enrolment of females in college and university. However, the consequences spread further than mere formal education and induced female cognitive skills improvement, and the development of important personal traits, such as self-confidence.

Reforms in the welfare state are another driving force narrowing the gender-based human capital gap. The most relevant for female human capital are childcare and motherhood related policies, as they largely determine labour market attachment and job interruptions for women. The role of various welfare reforms, including childcare provisions, was thoroughly analysed by Blundell et al. (2016). The study documents that welfare reforms change the incentive to obtain education, to work, and to accumulate human capital. The effect is particularly strong for women, since the reforms hedge them against labour market drop-out, provide childcare support and facilities. These foster female human capital accumulation in the labour market, and, importantly, increase incentives to develop skills and abilities, since their marginal labour market returns are increased by the reforms.

Nonetheless, the literature also documents that despite the average improvement in education level, in certain regions women are still investing less in their human capital due to the overall economic situation and health sector advancements (Fryer and Levitt 2010, Guiso et al. 2008, Hedges and Nowell 1995). For instance, Dickerson et al. (2015) document a significant regional heterogeneity in maths test scores across girls and boys in primary schools in Africa. Namely,

they document that in the regions with higher fertility rates, due to poorer access to fertility control, gender gaps in mathematical scores are more severe.

d) Cultural environment and family background effects

The literature emphasises the non-negligible effect of culture on gender gaps in education- and skill-measured human capital. Guiso et al. (2008) document that the mathematics skill gap is non-significant in countries with gender-equal cultures. The study by Pope and Sydnor (2010) show a significant variation in the mathematics test scores across the US, which is correlated with the level of gender equality in the states. Similarly, Hyde and Mertz (2009) find strong positive correlation between a country's 2007 Gender Gap Index (GGI) and the country's female representation at the International Mathematical Olympiad. In line with these findings, the recent study by Nollenberger et al. (2016) reports the performance of girls in mathematical tests to be strongly related with their cultural background, approximated by their parents' country of origin. Second-generation immigrant girls, whose parents come from more gender-equal countries, attain better scores in mathematical tests, compared to those from a less gender equal-background.

Stereotypes and gender identity are commonly viewed as important drivers of gender gaps, especially in cognitive skills and formal education, as well as career choices (Correll 2001). Gender stereotypes are strongly interrelated with culture; therefore, at the country level, the binding power of stereotypes and the strength of gender identity prescriptions correlate with the level of gender equality in society. Naturally, in more gender-equal countries, female investments in their own human capital are supported, and these societies foster women's education and skills' advancement. However, even in gender-equal countries, the stereotype that men are better than women in mathematics can persist and, eventually, decrease female confidence and deter their investments in their own maths skills (Niederle and Vesterlund 2010).

As reported in the experimental study by O'Brien and Crandall (2003), gender stereotypes related to mathematics tests have a particularly strong impact on females, even if they appear independently of the societal or family environment. Inducing the stereotypical threat in a lab environment reduced female mathematics test performances drastically. Furthermore, Spencer et al. (1999) illustrate that the negative gap in mathematical test performance is mitigated whenever the norm is not enforced. However, in the non-lab setting, the prevalence of men among maths school teachers and professors reinforces even further the stereotype that women are less able to comprehend mathematics (Dee 2005). The stereotypes can also originate from the family, as Jacob (1991) documents that mothers' endorsements of this specific stereotype undermines their daughters' confidence in their own mathematical abilities. Hence, these studies confirm that cultural environment and the existence of gender stereotypes related to differences in innate abilities largely shape female human capital investments.

Family background is commonly viewed as an important factor of changing education attainments among males and females. Namely, Van Hek et al. (2015) document that, in Denmark, parental education is gender specific, with the mother's education affecting the girls' educational level, and the father's education benefiting boys. Author et al. (2016b) report that early-age gender differences in discipline and test scores, as well as the older-age gender gap in school graduations is greater for economically disadvantaged families. This suggests that girls from poorer families are worse-off in terms of human capital (*i.e.* education and skills) accumulation, than otherwise similar boys.

However, not only is family wealth important, especially for early-age investments in human capital. A number of studies document that parental support and appraisal determines their children's confidence in their own abilities and, consequently, their propensity to develop and own skills and invest time and effort in education (Jacobs 1991). Similarly, Bhanot and Jovanovic (2005) argue that parental perceptions matter a lot for children's long-term educational achievements, measured using mathematics and reading scores, as well as their own self-perceptions. Johnston et al. (2013) document the exceptional importance of the intergenerational transmission of gender role attitudes on human capital formation. Parental gender stereotypes could be another factor, reflecting on the young-age human capital investments and, ultimately, skill profiles. To explore this argument, Bhanot and Jovanovic (2005) analyse associations between parents' intrusive support in home assignments, as an implied transmission of their stereotypical beliefs about mathematics and the perception of mathematics abilities in girls. Furthermore, Bleeker and Jacobs (2004) document that maternal stereotypes have a long-run effect on their children's abilities to succeed in mathematics and significantly affects their future career choices.

e) Individual (behavioural) factors

The individual-level factors shaping individual human capital can vary from objective nature-determined factors to subjective valuations of the subject's own ability and differential preferences. Apparently, in the context of the male-female human capital gap, one has to acknowledge potential biological differences. The paper by Spelke (2005) sheds light on the role of genetic differences in explaining gender gaps in certain domains of cognitive skill. Specifically, Spelke (2005) discussed, first, that an inherently greater interest in objects rather than people exists among male infants; second, gender-specific profiles in numeracy lead to a greater aptitude for mathematics; third, males exhibit a higher dispersion of performance in quantitative abilities, so that larger numbers of men have unusually high scores, driving the average estimate of male numeracy upwards.

Gender differences in preferences appears to be one of the core drivers of male-female gaps in human capital investments and, consequently, labour market outcomes. Wiswall and Zafar (2018) attribute the gender gaps in investments in education and skills to individual preferences for job attributes. The

study reports significant heterogeneity in job preferences, with women valuing work flexibility and job stability, while men have stronger preferences for jobs with earnings growth prospects. This gap in preferences largely shapes human capital investments, as individuals adjust in anticipation of certain future job choices. Gemici and Wiswall (2014) also document that the preference for making a home has a strong impact on college enrolment. Women are found to derive higher utility from staying at home, which increases the opportunity cost of going to college, and subsequently reduces female readiness to invest in education.

Individual preferences do not necessarily relate to the opportunity cost of education. A number of studies report gender gaps in preferences for certain types and fields of undergraduate degrees. For instance, in the analysis of gender gaps in undergraduate majors, Gemici and Wiswall (2014) report that the preference for different majors, not skills, is the core driving force behind gender segregation and the male-female gap in undergraduate majors. Turner and Bowen (1999) show that the relative attractiveness of different majors for men and women, as well as gender-specific labour market expectations account for a major part of the gender gap in the choice of academic majors. The meta-study by Else-Quest et al. (2010) suggests that boys have significantly more positive attitudes than girls, which could result in higher aspirations for mathematical disciplines.

Males and females may have different non-monetary costs associated with going to university, as girls find schooling less unpleasant than boys, and, as a result, females are more likely to attain a formal higher education, which goes in line with recent trends (Becker et al. 2010, Goldin et al. 2006). However, Goldin et al. (2006) suggest that, despite girls having lower non-monetary costs associated with going to university, boys gain a larger benefit from a higher education. Hence, once enrolled in college, males are more likely to accumulate more human capital in both extensive and intensive margins.

Apparently, investments in individual human capital are strongly related to a number of personal traits, in addition to preferences. Gender differences in competitive behaviour and responses to competitive environments is one of the major drivers of gender disparities in the labour market, and human capital investments (Niederle and Vesterlund 2010). Hakim (2007) documents that gender difference in life and career goals are the most persistent drivers. Naturally, when men and women have different priorities related to career and family, this will be reflected in the first place in their human capital investments. A strong effect of overconfidence and competitiveness was experimentally analysed by Reuben et al. (2017). The study documents that males are, on average, overconfident and significantly more ready to compete compared to females. The latter traits reflect on (a) expected earnings, which, in turn affect their readiness to invest in their own human capital; and (b) human capital directly, due to greater confidence in their own abilities and potential.

1.2.2. Human capital disparities driven by migration

Dimensions of the human capital gaps

Migration is essentially associated with human capital differences. Permanent migration from the host-country perspective, as well as return migration from the source-country viewpoint results in a heterogeneity of human capital profiles across labour market groups. Since in the second case, return migrants and returnees are sharing the home country, their human capital gap is mostly attributed to the foreign experience accumulated by the returnees. However, immigrants and natives are two distinct labour market groups, as they are coming from different backgrounds and may be drastically different in their set of characteristics, due to differences in economic, social, educational, cultural and other factors. Therefore, this subsection will predominantly focus on the case of permanent migration from a host country perspective.

The question of immigrant assimilation and labour market success are tightly linked to their human capital profile, being the focus of a large strand of literature over recent decades (e.g. Funkhouser and Trejo 1995, Borjas 1992 and 1987, Chiswick 1986). Reitz et al. (2014) report that the lower value of immigrant human capital appeared to be the biggest issue in the labour market integration and economic success of immigrants in Canada. The common approach to evaluating the quality of immigrant human capital is to compare their educational profile to that of natives. In terms of formal education, the composition of immigration flows varies across host countries and cohorts. Reitz et al. (2014) document that in Canada since mid-1990s, the share of immigrants with high (university) education has risen. However, the share of highly educated immigrants started to fall again from 2005. Similarly, Barrett et al. (2006) document that immigrants in Ireland are notably well-educated. Amuedo-Dorantes and De la Rica (2007) find, on the contrary, a continuously decreasing share of highly educated immigrants, and an increasing percentage of immigrants with primary education or less.

However, approximating immigrant quality with mere formal education may yield two potential caveats. First, higher education degrees among immigrants and natives are not directly compared, particularly if the immigrants acquired their formal education in their home countries. This issue was explicitly addressed by Friedberg (2000), arguing that source country education may be not equivalent to that of the host country. One reason for that is simply that the quality of education in the host and home countries differs. Similarly, Aydemir and Skuterud (2005) emphasise that when analysing education credentials, it is important to consider where they were acquired. Sweetman (2004) explores the role of the quality of education held by natives and immigrants by analysing young immigrants, who received their education in the host country, versus those who hold a diploma from the home country. The results suggest substantial differences. Hence, the quality of schooling, even in the case of formally identical degrees, may differ across immigrants and natives (Green and Worswick 2012).

Second, even if formal degrees are perfectly comparable across immigrants and natives, they still do not reflect actual competences and abilities to a full extent. Individual abilities go far beyond formal education, they develop and multiply in the labour market through on- and off-the-job training (Mincer 1962). Barrett et al. (2006) argue that unlike natives, immigrants may lack specific types of education, rather than mere formal degrees. Reitz (2001) discusses that in Canada employers may have certain educational prerequisites and specific qualifications for various types of jobs, including the licensed trades, professions and, in some cases, semi-professions. Therefore, to measure the true migration-driven gap in human capital, multiple aspects have to be considered.

One of the most pronounced immigrant-native gaps can be seen in the disparity between actual skills. While non-recognition of immigrant human capital may reduce the human capital perceived by employers and does not necessarily reflect the actual size of the gap, the true skill disparity still persists. The literature discusses various dimensions of immigrant-native skill gaps. Friedberg (2000) documents that immigrants lack country-specific skills, reflecting the abilities that are valued and demanded by the labour market. Ferrer and Riddell (2008) suggest that most human capital has a country-specific component, shaped by local knowledge of institutions, culture, customs and the establishment of networks. Hence, Zibrowius (2012) suggests that immigrants, especially newly arrived, often lack country-specific human capital, such as information about customs and traditions, and about labour market institutions and regulations. Reitz et al. (2014) suggest that even well-educated and high-ability immigrants often lack some specific knowledge or skills required in the Canadian labour market. These skills dimensions are unrelated to formal education, and therefore the immigrant-native gap persists irrespective of formal qualification.

The immigrant-native gap in language proficiency has long been considered one of the major human capital discrepancies across immigrants and natives. Numerous studies documented significant language command gaps associated with migration (Van Tubergen and Kalmijn 2009 and 2005, Portes and Rumbaut 2006). Chiswick and Miller (2003) document significant language gaps across the native and immigrant population in Canada. Similarly, Beyer (2016) reports that the language proficiency of immigrants in Germany still remains low. Obviously, improving their command of the host country language to the level of natives requires considerable investment, unless the immigrants are coming from a source country that shares the same language. However, in the context of migration studies, mere command of the local language already refers to intermediate levels of proficiency, sufficient for doing certain jobs and communicating in everyday contexts.

Another well-documented discrepancy is the immigrant-native literacy skill gap. While language knowledge reflects pure language command, literacy captures more aspects. For instance, the PIAAC survey defines literacy as “understanding, evaluating, using, and engaging with written text to participate

in society, to achieve one's goals, and to develop one's knowledge and potential" (OECD 2013, p.3). Hence, immigrant literacy also reflects their willingness to use language skills to succeed in the labour market. In line with the language gap, the literacy disadvantage of immigrants is widely documented. Ferrer et al. (2006) report that in Canada, native-born literacy skill distribution stochastically dominates the distribution of immigrants. Importantly, when controlling for level of formal education and years of labour market experience, the gap remains significant. Hence, the gap reflects a pure difference in ability, uncorrelated with immigrant-native gaps in education credentials or other observable characteristics. Using the same International Adult Literacy Survey, Bonikowska et al. (2008) also document that immigrants in Canada attain lower literacy test scores. This result suggests that immigrants possess less skills that are usable in the Canadian economy.

More evidence on the ethnic skill gaps in verbal, technical and mathematical domains is presented by Nordin and Rooth (2009). Their evidence suggests that second-generation immigrant men in Sweden perform much worse in cognitive tests compared to natives. Importantly, Nordin and Rooth (2009) document the largest cognitive skill gaps for second-generation immigrants of southern European or non-European ethnicity. The PIAAC-based evidence from Batalova and Fix (2014) explores immigrant-native gaps across several skill domains in the US. Specifically, they report that immigrants have significantly worse skills in literacy and numeracy domains. Similarly, Smith and Fernandez (2017) rely on the PIAAC data and report significant immigrant-native gaps in both literacy and numeracy domains in the US and Canada. In line with this result, Bussi and Pareliussen (2015) document that PIAAC-measured skills in literacy, numeracy and problem-solving in technology rich environments are substantially worse among immigrants relative to natives in Sweden. Hence, the empirical findings suggest that besides the quality of formal education and host country specific skills, on average, immigrants also lack pure cognitive competencies.

Finally, another important human capital dimension, which is imbalanced across immigrants and natives, is work experience – specifically in the host country. As discussed by human capital theories (Becker 1964, Mincer 1962, Schultz 1959), work experience is a crucial component of human capital. Productive skills, knowledge and abilities develop through on-the-job training and shape occupation-, industry- and task-specific human capital profiles (Lazear 2009, Gibbons and Waldman 2004, Neal 1995). Various cross-country differences, including economic, social and cultural aspects, may reflect on job content and requirements; therefore, on-the-job accumulated human capital may differ across countries, resulting in an objective immigrant-native disparity in the quality of work experience (Galarneau and Morissette 2004).

Factors of the human capital gaps

Along with different dimensions, the immigrant-native human capital gaps can also be of different origin. Specifically, gaps relative to natives can be either initially present at the moment of migration, or can emerge (expand further)

over the stay in a host country. This is a fundamental difference in migration-driven human capital analysis, relative to gender-driven. Due to various exogenous factors, such as home country economy and education system, immigrants may be initially disfavoured, relative to natives. Moreover, because the migration decision is endogenous, the relative quality and skill profile of immigrants may be affected by a certain selection pattern. Therefore, when exploring the factors of immigrant human capital disadvantage, it is important to acknowledge whether this affected human capital before or after migration.

a) Selection and sorting

One of the major determinants of immigrant ability and skill is self-selection into migration. Specifically, skill selection defines who, in terms of education and abilities, is migrating. The phenomena of immigrant skill selection was first introduced by Borjas (1987). In his influential papers, Borjas (1992, 1987) employs the canonical skill selection model by Roy (1951) and shows that immigrant wage differentials in host countries are negatively related to inequalities in home countries and are positively affected by source country average income. Hence, the evidence from Borjas (1999, 1992, 1987) suggests that immigrants from poor and economically unequal countries are negatively selected in terms of their skills and abilities, while immigrants from relatively wealthy and developed source countries are positively selected. Therefore, the skill selection process identifies (i) which skill-types in people are moving, and (ii) how drastic their skills and abilities gap will be relative to the native population upon arrival in the host country.

The theoretical and empirical results of Borjas (1999, 1992, 1987) are widely confirmed in the literature. Antecol et al. (2003) document that immigrant skill composition is strongly determined by the source country, rather than the economic condition and integration policies of the host country. Similarly, the follow-up paper by Borjas (2008) explores the case of Puerto Rico and reports that the in-flow of immigrants to the country is, on average, more educated and skilled, compared to the outflow of emigrants. This result goes in line with the selection model predictions. Liebig and Sousa-Poza (2004) explored self-selection from the source-country side, finding that highly-educated individuals generally have stronger incentives to migrate. However, these incentives decline with an increase of wage returns to education in a home country. Grogger and Hanson (2011) and Belot and Hatton (2012) find that educational selectivity is positively associated with sharing a common language, common culture, colonial legacies, and physical distance, which are more important drivers of educational selectivity compared to pure wage returns or immigration policy.

Sorting immigrants into host countries has also gained significant attention. While selection captures home country characteristics, sorting reflects host-country attributes, which attract certain types of immigrants. Beine et al. (2011) document that the distance to an OECD host country matters for education selection and sorting into host country. In particular, highly educated immigrants are more prone to migrate to distant countries. This finding raises the

question of the role of moving costs, suggesting that low educated immigrants have higher moving costs, and therefore select into proximate countries. The study by Belot and Hatton (2012) focuses on both host and home country factors shaping education selection into migration. Grogger and Hanson (2011) explored the role of the relative wage gap for immigrants of different education backgrounds, finding that the absolute immigration gap is highest for skilled immigrants. Therefore, sorting immigrants can be explained by a pure wage gap, without reference to poverty constraints. Hence, selection and sorting largely determine the immigrant human capital profile upon arrival in the host country.

b) Source vs. host country acquired human capital

The literature generally agrees that one of the core factors behind immigrant-native human capital disparity is the origin of the human capital. Besides selection into migration, as discussed above, the source country of the human capital determines (i) the transferability of immigrant human capital (Chiswick 1987); and (ii) the actual quality and extent of their skills and abilities, largely shaped by home country economic, social and cultural factors.

The argument that schooling acquired domestically and in the foreign country differs, and therefore is valued differently was first raised by Chiswick (1987), and subsequently by Fishelson (1980). However, Friedberg (2000) presented one of the first studies to explicitly address the gap in labour market returns associated with the origin of the human capital. The paper documents that the country of the origin of the human capital drives the actual human capital gap, since the natives have country-specific skills and information that the immigrants lack. This gap in skills and abilities may reflect differences in school quality across countries, and the non-comparability of study curricula and formal study requirements across home and host countries. This mismatch is largely attributed to the home country characteristics. As discussed in subsection 1.3.1., overall economic and social indicators, as well as cultural values, affect individual human capital. Therefore, the composition and quality of the human capital profile of immigrants is largely dependent on the economic, societal and cultural factors they were exposed to before migration. Among the first studies to stress the paramount importance of the home country in successful social and economic integration was by Borjas (1987). As discussed by Green and Worswick (2012), the home country largely determines the human capital profile, including the cognitive skills of immigrants.

Furthermore, source-country affects not only the actual skill profile and accumulated knowledge, but also the extent to which those can be transferred to the host country. In line with this argument, Green and Worswick (2012), in their theoretical model of post-migration immigrant human capital dynamics, assume that the source country determines both the transferability of schooling (formal education) and actual ability (skills). The concept of human capital transferability was introduced by Chiswick (1978) and has gained significant research attention since then. Further studies by Chiswick et al. (2005) and

Duleep (2007) employ the concept of skills transferability and document that immigrants with low-transferable human capital have a higher propensity to invest in their skills over time in a host country, and therefore catch-up with the natives. Hence, this evidence suggests that home country background, which yields low-transferability of human capital, benefits skill accumulation in the host country. Similarly, Duleep and Regets (2002 and 1999) document that immigrants with low skill transferability are more prone to enrol in education when in a host country and invest in their human capital.

Home country culture may also reflect on human capital investments. One of the most pronounced relations is between ethnic culture and host country language command. Tubergen and Kalmijn (2008) suggest that immigrants, who strongly identify themselves with the culture of their home country, are more likely to rely on their mother tongue and less prone to invest in learning the host country language. Cultural forces appear very strong when it comes to the assimilation of female immigrants originating from countries with strong gender norms. Nollenberger et al. (2016) document that mathematics test performance among second-generation immigrant girls is strongly dependent on gender equality in the parents' home country. Girls coming from families that originate from more gender equal countries, on average, achieve higher scores in mathematics tests. This evidence suggests that the effect of home country culture will be even stronger among the first-generation immigrants.

c) Host country employment factors

Immigrants' investments in human capital are strongly dependent on the expected economic returns of these investments. The costs of human capital investments are usually embodied in the price of additional education and the opportunity cost of working fewer hours, as well as individual learning ability (Chiswick and Miller 2007). Hence, with human capital investments being costly, immigrants calibrate them according to expected labour market returns from the additionally acquired skills and abilities (Tubergen and Kalmijn 2009). Naturally, the economic returns are shaped by the labour market and, in particular, occupational, career and wage growth prospects. Stevens (1992) reports that possibilities to use the native language negatively reflects on immigrants' propensity to invest in the host country language.

Hence, persistence and further widening immigrant-native human capital gaps can stem from the labour market disadvantages of immigrants, as they reduce the expected economic returns. The literature discusses numerous labour market disadvantages, which may persist despite immigrant skill improvement. Labour market discrimination is the most widely analysed. Immigrants may face either statistical or taste discrimination (Brekke and Mastekaasa 2008, Arrow 1973). Among others, Skuterud (2010) documents that discriminatory disadvantage on the host country labour market persists even for third and higher generations of immigrants. Lack of knowledge about the quality of education in the immigrants home country and his/her actual skills results in systematic undervaluing of immigrant abilities. Under statistical discrimination,

human capital investments are expected to increase the expected economic returns, since education and training obtained in a host country will serve as a signal of immigrant ability and increase the employers' assessment of immigrant human capital (Green and Worswick 2012). However, the discrimination may be purely taste-based. Under taste discrimination, investments in human capital will not improve the expected economic returns and the costs of investments will turn into pure losses. Therefore, labour market discrimination is an important factor, affecting not only employment and wage prospects for immigrants, but also their human capital investments.

Labour market discrepancies may also affect immigrant skills directly. While discrimination affects skills and abilities indirectly via human capital investment decisions, certain labour market disadvantages may have a direct negative effect on immigrant skills. Occupation-qualification mismatch is one of the core drivers of immigrant skill downgrading. The issue of immigrant overqualification is studied in numerous host countries, with the absolute majority of the findings suggesting that occupation-qualification mismatch is a severe problem. Eckstein and Weiss (2004) document that the first jobs immigrants get in Israel imply a substantial occupational downgrading, yielding substantial underuse of immigrant competencies. Chiswick and Miller (2010) report that immigrants face significant occupation-qualification mismatch in Australia, and their formal educational credentials are commonly undervalued. Similarly, Dustmann et al. (2013) report a substantial overqualification of immigrants based on their formal educational attainments. In line with these findings, Wald and Fang (2008) and Reitz et al. (2014) provide evidence of immigrant overqualification and skills underutilization in Canada.

Occupation-qualification mismatch itself may be a result of labour market discrimination. However, there might be various other reasons behind it. Minns (2005) stresses that formal visa and work permit rules may be responsible for education-occupation discrepancies on the Irish labour market. Highly-skilled immigrants might be forced to accept work permits for low-skilled jobs, in order to reside in the host country. Barrett et al. (2006) document that occupational downgrading is especially common for highly educated immigrants in Ireland. They suggest that immigrants that have recently arrived can lack local labour market knowledge and so accept jobs below those appropriate to their skill levels, which results in observed occupation-qualification mismatch. Regardless of the nature of the mismatch, its effect on immigrant skills and abilities is commonly negative. If occupation-skill discrepancy persists, it may depreciate the original skills and abilities, as they remain underused. For human capital to develop and enhance, it has to be actively used at the workplace. Therefore, underuse of skills only further widens the immigrant-native abilities and experience gaps.

d) Host country factors other than employment

Immigrant integration is not only affected by labour market related factors. Various policy actions aiming to facilitate immigrant integration and human

capital accumulation have been paid special attention in the literature. One major dimension of policy interest is immigrant language proficiency. As discussed above, immigrants are strongly disadvantaged when it comes to host country language command (Beyer 2016, Chiswick and Repetto 2001). Hence, numerous policy actions aim to facilitate local language proficiency among immigrants (Anniste and Tammaru 2014). Triadafilopoulos (2011) discusses various immigrant integration policies pursued in European countries, including mandatory programmes of local language acquisition.

Several integration policies developed in the EU have tackled skills other than local language. Among others, the Finnish Active Labour Market Policy (ALMP) is one of the active restructuring labour market programmes. The ALMP integration policy implies a sequence of training and other activities designed specifically for each unemployed immigrant given his/her available skills and experience so that the training would be the most suitable for each immigrant (Sarvimäki and Hämäläinen 2016). Hence, ALMP is one example of a policy programme aiming to develop diverse immigrant skills in the most efficient way, with the highest expected future return. Similar to Finland, several policy programmes have tackled the skill gaps of immigrants in Canada. The programmes were design to fill the gap in immigrant abilities, which may arise from foreign-acquired education or experience (Reitz et al. 2014).

The host country environment has been found to affect language acquisition for immigrants. Raijman et al. (2015) find that living in a language-intensive community fosters the acquisition of language skills. Tubergen and Kalmijn (2009) discuss individual- and societal-level factors that affect Dutch language command for immigrants in the Netherlands, finding that the language intensity of the surroundings matters. Furthermore, Tubergen and Kalmijn (2009) report that language use is strongly correlated with language skill, as it enhances and strengthens language ability through speaking and regular practice. Similarly, Chiswick and Miller (1996) document that greater exposure to the host country language positively relates to immigrant language proficiency.

e) Individual factors and preferences

When immigrants initially have lower human capital endowments, a number of individual characteristics will largely determine their post-migration human capital investments and narrow the immigrant-native human capital gap. One of the individual-level factors addressed by the literature is speed of host country adaptation, measuring how quickly the foreign-born learns the language, realises their human capital and integrates into society (Chiswick and Miller 2012, 2003 and 2002, Eckstein and Weiss 2004). Individual learning ability and willingness to learn is another personal trait that affects the improvement of immigrant skills and abilities over time in a host country (Duleep and Regets 2002). Individual habits developed through past studying and work experience may greatly facilitate the learning of destination-country skills (Duleep and Regets 2002).

An immigrant's age at migration is another non-negligible factor, which affects human capital investments in the host country. A number of studies suggest that age-at-migration affects, first, the amount of human capital accumulated in the home country, as younger migrants will have less working experience from the home country, and, second, the time available to generate the labour market returns to host country human capital investments. These two factors jointly affect the host country human capital investment decisions of younger and older immigrants (Schaafsma and Sweetman 2001, Friedberg 2000). In line with this argument, Green and Worswick (2012) document that older immigrant cohorts invest less in human capital, and therefore the human capital gap is the highest for older immigrants. It is worth noting that Nordin and Rooth (2009) discuss the important role of family and neighbourhood characteristics, that may affect immigrant human capital investments, and specifically language acquisition. In particular, Nordin and Rooth (2009) document that for second-generation male immigrants in Sweden, the role of family may be paramount in shaping their substantial verbal skill gaps.

Friedberg (2000) suggests that even when investing in their own human capital upon arrival in the host country, immigrants may still gain less from this compared to natives due to the natives' superior language proficiency and other country-specific knowledge, which enables them to learn and train more productively. Language learning ability may also correlate with general knowledge and skills (Heckman 1976). Hence, well-educated individuals may pursue a more efficient and productive language learning technique, which will allow them to reach greater language proficiency faster, compared to the less educated (Dustmann 1997). Given that immigrants are often low-qualified, they may face a systematic disadvantage when learning the host country language.

Migration intentions are important in human capital investment decisions among immigrants. Among others, Bijwaard (2010) stresses that decisions and, potentially, human capital investments, differ a lot across temporary and permanent immigrants. Dustmann (1997) discusses that incentives to invest in skills in the host country language are directly related to the duration of the host country stay. The longer the immigration tenure, the greater the incentive to invest in the language. In line with this argument, Geurts and Lubbers (2017) document that immigrants that change their intention to stay in the Netherlands from temporary to permanent experience a large increase in Dutch language proficiency. Similarly, Van Tubergen (2010) reports that permanent settlement largely determines their language investment.

Special case: return migration

By its nature and driving forces, return migration is a special type of labour mobility. While subsection 1.2.2 focused on immigration from a host country perspective, it compared immigrants to natives and revealed the immigrant-native human capital gap and its drivers. However, migration is often temporary by nature. Temporary migration may take various forms, including: (1) seasonal migration, frequently observed in agriculture and the service sectors; (2)

circular or repeat migration, which involves back and forth moves between the home country and one or more destinations; and (3) return migration, when a stay abroad is followed by permanent resettlement in the home country (Martin and Radu 2012). The International Migration Outlook (OECD 2017) states that all types of temporary migration concern a non-negligible share of overall migration flow in the last decades.

However, while seasonal and circular migration mostly do not assume employment in the home country in-between migration spells, return migration implies that returnees enter the home country labour market after resettlement. Hence, the question of their assimilation in the home country labour market is strongly dependent on their human capital and specifically their distinct traits compared to peers who did not migrate.

A number of studies document increasing return migration flows. The study by Glytsos (1988) reports that out of one million Greek emigrants in West Germany between 1960 and 1984, 85% gradually returned home. Similarly, Dustmann (1996) documents that a considerable share of immigrants in Germany tend to return to their home country. In line with this evidence, Warren and Peck (1980) find that throughout the 1960s, about one third of all immigrants to the US re-emigrated. Jasso and Rosenzweig (1982) provide a comparable estimate of return migration rates for 1908–1957.

Over recent decades, return migration has become particularly topical in the context of CEE countries (Martin and Radu 2012, Hazans and Philips 2011). The case of CEE is particularly relevant given the rapid increase of East-West migration flow since the 1990s (Brücker 2009). While it was long been assumed that migration is mostly driven by permanent settlement intentions, a number of more recent studies argue that a considerable share of labour migrants prefer a temporary stay abroad, followed by a return to the home country (Zaiceva and Zimmermann 2016). Among others, Kahanec and Kureková (2016) document significant out-migration, followed by a return in Slovakia.

Naturally, return migration results in a heterogeneity of human capital between those who worked abroad and those who did not. The disparity originates from the foreign labour market experience. Dustmann and Weiss (2007) discuss that among the major intentions of temporary (return) migrants is to accumulate human capital, which will later benefit them on the home country labour market. Therefore, even if returnees were *ex ante* different from their peer-stayers, due to selection into migration and into return, *ex post* they will have an even more pronounced human capital difference relative to stayers. Naturally, the actual value added from the foreign labour market stay in terms of their individual human capital profile is strongly dependent on the actual employment and occupational profile while abroad, as well as the overall characteristics of the host country, such as the level of economic development, exposure to technological change, and other factors.

However, a number of studies suggest that return migration is always rationalised in terms of its future home country benefits. Dustmann and Weiss (2007) argue that the migration decisions of those planning to return later is

based not only on current and future circumstances in the host economy, but also on expected future returns to foreign-acquired skills and experience in the country of origin upon resettlement. Therefore, if the expected return to human capital acquired in the host country is higher at home, it may trigger a resettlement. Dustmann and Weiss (2007) stress that human capital accumulation motives are particularly important for students and emigrants from countries in the process of industrialisation. The knowledge and skills acquired in the industrialised host country increase the returnee's productivity only slightly in the host country but may yield high returns in the home country. The theoretical model developed by Dustmann and Weiss (2007) also assumes the transferability of foreign experience to be an important motive to re-immigrate. Hence, those who decide to return are most likely to have transferable and valuable foreign-acquired skills once they resettle. The latter yields superior human capital for returnees compared to stayers.

While Dustmann and Weiss (2007) elaborate a theoretical model of return migration, a number of recent empirical studies focus on the specific human capital characteristics of returnees and returnee-stayer heterogeneity of human capital. The selection into migration, coupled with formal labour market experience are two major factors shaping the returnee-stayer human capital gap. Selection of returnees has gained significant attention over recent years, as it determines the initial human capital gap relative to stayers and current migrants. A vast body of studies documents that returnees are positively selected with respect to their initial human capital, measured by formal education (Kahanec and Zimmermann 2010). Among others, Hazans and Philips (2011) report that in the Baltic states return migrants are on average more educated than stayers. Masso et al. (2014) further support this evidence with their analysis of Estonian returnees. In line with these results, Martin and Radu (2012) report that Hungarian returnees are relatively more educated compared to stayers at the moment when they re-enter the domestic labour market. Smoliner et al. (2012) find that returnees in Central European countries possess on average higher education than stayers. Similarly, Kureková and Žilinčíková (2018) document that returnees in Slovakia are positively selected on education relative to stayers.

Evidence on the positive selection of returnees from current migrants further supports the literature on the human capital benefits for returnees (De Haas et al. 2015). Along with positive selection, actual foreign job experience can further widen the returnee-stayer human capital gap and enrich the profile of returnees with skills and competencies unattained by stayers. Iara (2006) provides partial evidence on international skill diffusion among young return migrants and CEE countries. The study suggests that return migrants upgrade their skills by learning on the job, especially in the host countries with higher technological development. They later subsequently bring accumulated human capital to the home country, and contribute to know-how, skills diffusion and economic catching-up of the home country. Smoliner et al. (2012) argue that staying abroad results in accumulating knowledge and absorbing certain experiences and values. These positively distinguish returnees from stayers.

However, another strand of literature suggests that foreign experience is not necessarily associated with skills improvement and acquisition. Several papers have documented that return migration could be associated with a failure to succeed on the host country labour market; therefore, returnees are selected from economically less successful individuals (Pungas et al. 2012). In this case, foreign experience does not necessarily benefit the human capital profile of returnees and foreign experience may not necessarily be associated with higher competencies. Similarly, Currie (2007) finds that Polish returnees widely refer to limited employment possibilities as a major reason for a return from the UK.

All in all, the empirical evidence provides mixed evidence on returnee selection and post-return human capital disparities relative to natives. The major factor, which affects the *ex ante* returnee-stayer human capital gap is selection into return migration. While the main determinant of skills and abilities accumulation in returnees while abroad is employment success while in the host country. Even if returnees are positively selected from stayers, limited employment opportunities and overqualification in the host labour market may have insignificant, or even negative consequences for returnee human capital. Hence, temporary employment mobility will not yield any positive externalities on individual skills and knowledge, and furthermore, can even downgrade them.

1.3. Human capital gaps and labour market across different labour market groups

This section tackles the labour market gaps, mostly measured in terms of wage rate, across three major characteristics of interest: males and females, immigrants and natives, return migrants and stayers. The detailed overview of empirical literature across the three aforementioned groups will shed light on the role specific human capital gaps discussed in the previous section in relation to employment and wage gaps.

1.3.1. Males vs. females

Starting from Becker's (1964) classical human capital theory, scholars attributed a large part of the gender gap in employment and wages to the gender gap in human capital. Since most of the studies show a labour market disadvantage for women relative to men, gender gaps in human capital are mostly disadvantageous for females. In particular, gender imbalances in certain human capital domains are mostly associated with the better human capital outcomes for males, and therefore also their higher earnings (Polachek 2006). However, in the modern world, the latter is not entirely true. As discussed in the previous section, females outperform males in a number of human capital dimensions (formal education, literacy, certain non-cognitive skills). Hence, the relevant question to ask is not who, men or women, have more or better human capital,

but rather, who has an advantage in the specific human capital characteristics valued by the labour market.

Since the gender imbalances are heterogeneous across various aspects of human capital, there is no clearly advantaged or disadvantaged group in terms of human capital because males and females attain different education and skill profiles. Therefore, it is important to identify which human capital components yield the highest labour market returns. Therefore, the relative dominance of males or females in these specific domains contributes to their higher earnings. And if men possess a more valuable human capital profile, the gender pay and employment gaps escalate.

Therefore, in the most recent studies of wage disparities in the context of human capital, the key focus is on the broad definition of human capital with an emphasis on cognitive and non-cognitive abilities as well as their combinations (Blau and Kahn 2017, Grove et al. 2011, Goldin et al. 2006).

a) Formal education, choice of major and labour market gaps

Formal education has long been viewed as one of the key determinants of labour market success (Schultz 1995, Mincer 1974, Becker 1964). The major reason why specifically education has raised such attention, and not skills and abilities, is the availability of formal education data, the ease with which it can be assessed and the consistency in cross-subject and cross-country comparisons.

As discussed by Wasserman (2013), Becker et al. (2010) and Goldin et al. (2006), the gender ratio in college (or university) education has equalised, and in some countries even reversed. The recent study by Blau and Kahn (2017) document that the gender gap in formal education raised the gender wage gap in the US in 1980. However, the improvement of women's educational outcomes by 2010 increased relative wages for women, and thereby narrowed the gender wage gap. However, the explanatory power of formal education decreased from 27% in 1980 to 8% in 2010. This finding suggests that the role of a pure education measure in gender wage determination is declining. Similarly, Cha and Weeden (2014) report that despite tremendous improvement in educational attainments, gender wage gap convergence slowed in the 1990s and nearly stopped in the 2000s.

The slow-down in wage returns to education is attributed to the concave relationship between schooling and earnings (Colclough et al. 2010). Therefore, the relative increase in the wage rate associated with an increase in formal education is diminishing, with the highest wage growth in the lower part of the distribution (for low- and medium-educated individuals). The diminishing returns to education is strongly related to gender segregation in occupations and industries (Blau and Kahn 2017). Excluding highly-qualified women from male-dominated jobs (occupations, industries) results in an oversupply of available workers in female-dominated jobs (occupations, industries), which eventually cause the average earnings in female-dominated jobs to decline and average wage returns to educational attainments to be suppressed (Blau and Kahn 2000).

Another factor, which may contribute to the diminishing returns to education is gender difference in job preferences (Lips 2013). Preferences for part-time work and jobs with greater flexibility among women has long been acknowledged in the literature (Blau and Kahn 2007 and 2017). The preference for part-time work may be due to family-level factors, such as responsibility for making a home, and gender stereotypes (Bertrand et al. 2015). Nonetheless, even highly educated women may deliberately choose part-time work, and disproportionate shares of men and women working part-time would increase the gender pay gap and depreciate wage returns to education.

However, all of the aforementioned factors refer to the between-occupation gender wage gap and education. Several studies document that even within-occupation, the higher formal education among females does not contribute to reducing the pay gap, and in some cases even further increases the gap (Anspal et al. 2015b, Christofides et al. 2013, Lo Sasso 2011). Bobbitt-Zeher (2007) document that even when men and women have similar educational credentials, gender pay disparity persists. Hence, the decreasing role of formal education, as a human capital component, in explaining the gender pay gap goes in line with the increasing importance of factors such as occupational segregation, labour market selectivity, gender preferences, favourable supply-demand shifts and, importantly, previously unobservable cognitive and non-cognitive abilities (Blau and Kahn 2006).

Despite a relative improvement, the gender gap in college (university) majors persists (Blau and Kahn 2017, Bronson 2015, England and Li 2006), especially in STEM (science, technology, engineering and mathematics) majors. In terms of earnings, college (university) majors have primary importance, as they reflect the actual content of studies and identify the individual skill profiles (Altonji et al. 2012).

One of the pioneering empirical studies by Angle and Wissman (1981), exploring the role of college majors in the gender pay gap, documents that the gender difference in college majors accounts for one-third of the total pay gap in the US. In line with this study, the importance of college majors for future earnings was recognised by Daymont and Andrisani (1984), reporting that college majors are an important factor in understanding the earnings gap between young men and women. The strong explanatory power of the college major in gender wage gap analysis was also documented by Black et al. (2008). Naturally, the gender imbalance in college majors largely enforces gender segregation in the labour market (Blau and Kahn 2017). Beede et al. (2011) reported that females occupy only 25 per cent of STEM occupations. Hence, with males holding more college degrees in majors associated with higher earnings, gender segregation in high-earning positions persists, as does the gender wage gap.

b) Cognitive skills and labour market gaps

As discussed by Heckman and Rubinstein (2001) and Hanushek and Woessmann (2008), the role of cognitive skills in the labour market is paramount. Empirical evidence suggests that over the past three decades, labour market

returns to cognitive skills have significantly increased (Jacob 2002, Murnane et al. 1995, Levy and Murnane 1992). Acemoglu and Autor (2011) emphasise the pivotal role of skills in the labour market and develop a theoretical model to trace the interrelation between earnings and employment distribution in advanced economies and combinations of worker skills, job tasks, technologies, and altering trading opportunities. Apparently, composition and level of cognitive abilities are reflected in wages. Acknowledging non-cognitive dimensions is particularly important in the context of gender wage and employment disparities, due to the systematic gender differences in several cognitive skills domains.

As discussed in subsection 1.2.1, males are, on average, outperforming females in mathematical and technical skills domains. In the context of labour market disparities, the gender gap in mathematical test scores is of special interest because it was documented to be a good predictor of wages (Anspal 2015c, Murnane et al. 1995, Paglin and Rufolo 1990). Despite the fact that the magnitude of the effect of mathematical performance on labour market earnings varies from study to study, the consistently positive effect is widely documented (e.g. Hanushek et al. 2015, Altonji and Blank 1999, Murnane et al. 1995). Hanushek et al. (2015) additionally explored problem-solving in technology rich environments and document it to be less strongly interrelated with wages compared to numeracy. Hence, male advantage in numeracy may translate into systematically higher wages and, consequently, magnify the gender pay gap.

Unlike numeracy, literacy and reading abilities are, on average, higher among females. However, Niederle and Vesterlund (2010) emphasise that, unlike mathematical test scores, verbal test scores serve as a bad predictor of future earnings. Similarly, Jolliffe (1998) and Moll (1998) perform analyses of wage returns to cognitive skills and find that when evaluating mathematical and reading skills separately mathematical skills matter more for income. Relying on the PIAAC data, Hanushek et al. (2015) document that numeracy yields higher wage returns compared to literacy, which is consistent with other studies. These findings suggest that literacy and verbal abilities, although an important component of the individual human capital profile, have less effect on wage levels. Having higher numeracy scores, as opposed to literacy, is more strongly associated with the wage rate. Therefore, despite females outperforming males in numerous other cognitive and non-cognitive skills, on average lower numerical ability offset the positive effect of these skills and largely drive the male-female earnings gap. Therefore, a mere stock of cognitive abilities is not yet a sufficient indicator of high earning potential. The labour market attaches different value to different cognitive domains, and therefore, on average, certain skills generate higher wage returns compared to other abilities.

However, the male-female gap in the cognitive domain may arise not only because males outperform females in one skill dimension, but they are outperformed by females in another. The gender gap in cognitive dimensions can appear because of specific combinations of cognitive skills, viewed as a unified gender skill profile. This argument is developed in Study I of this thesis and

relies on earlier evidence of comparability problems in regard to skills across genders (Heckman et al. 1997). A number of empirical studies confirmed that certain combinations of skills are more prevailing among men, while other are more common for women (Anspal 2015a and 2015b, Ńopo et al. 2012). There is still a limited research in this area; however, existing studies suggest that gender-specific combinations of skills and abilities are important factors to consider in wage gap analyses.

c) Non-cognitive skills and labour market gaps

The recent trends in gender pay gap dynamics suggest that the non-cognitive dimensions of human capital may be strong drivers of gender pay disparity, which were previously underestimated. The increase in unexplained gender pay gaps motivated scholars to look beyond education and cognitive skills and account for soft skills or non-cognitive traits (Fortin 2008, Duncan and Dunifon 1998, Murnane and Levy 1996). As discussed in the previous section, non-cognitive abilities include various behavioural and personality traits, which may drastically vary across males and females, and relate to wage disparity.

One of the most recent studies to empirically account for the effect of behavioural and personality traits on earnings was a study by Bowles et al. (2001). Similarly, Kuhn and Weinberger (2005) conducted an empirical analysis of the role of leadership in wage determination. The results suggest that males earn a significant positive premium on leadership skills, and the potential gender difference in this specific human capital aspect can broaden the wage gap.

Among other non-cognitive characteristics, scholars emphasised such behavioural aspects as self-esteem and an external locus of control as an opposite to the leadership trait. A number of empirical studies addressed the role of self-esteem and the locus of control on earnings, finding both a positive relationship between self-esteem, and a negative relationship between the external locus of control, and the wage rate (Manning and Swaffield 2008, Waddell 2006, Heckman et al. 2006, Osborne Groves 2005). Fortin (2008) explores the role of four non-cognitive traits (self-esteem, external locus of control, the importance of money/work, and the importance of people/family) on the gender wage gap among young workers in the US. In contrast to studies by Manning and Swaffield (2008), Waddell (2006), Heckman et al. (2006) and Osborne Groves (2005), she finds more pronounced gender gaps in the importance of money/work and the importance of people/family dimensions. These are reported to strongly associate with wages and the gender pay gap.

While the male-female disparity in leadership and self-esteem, as well as the association of these traits with wages is intuitive, the gender imbalance in other behavioural aspects is not so self-evident. To shed more light on this issue, Mueller and Plug (2006) explored the association between extroversion, agreeableness, conscientiousness, neuroticism, openness to experience and earnings. The underlying argument of the study was an observed gender difference in the aforementioned personality traits and their potential association with wages. The authors document that among these traits, agreeableness has the major

influence on the gender pay gap, with men being rewarded for stronger non-agreeableness.

Hence, the non-cognitive traits differ across men and women due to psychological and biological factors, as well as societal and family influences. On the one hand, men on average possess a set of qualities, like higher self-esteem, stronger leadership, and non-agreeableness, which are positively reflected in their earnings and widen the gender pay gap. On the other hand, females are found to have on average better social skills and discipline, which are positively reflected in their employment and wages (Jacob 2002).

d) Experience and labour market gaps

For many decades, labour market experience was viewed as a core determinant of wage and employment outcomes (Mincer and Polachek 1974). Gender gaps in labour market experience were viewed as a major driver of the gender wage gap. Driven by traditional gender roles and gendered preferences, females were traditionally considered to deliberately accumulate less work experience, as they have stronger attachment to the family and home (Polachek 1981). Since labour market experience is commonly viewed as a proxy for productivity, on average, the shorter work experience of females is translated into the anticipated lower productivity of women. The latter, apparently, translates into the gender wage gap.

A number of studies document that the recent decline in the gender gap is largely attributed to work experience convergence (O'Neill and Polachek 1993). Olivetti (2006) shows that not only did the net work hours of women in the US increase, but the relative returns to experience in women also increased more than relative returns for men. Goldin et al. (2006) explores labour market participation and increasing experience among women from a historical perspective, documenting positive dynamics, strongly correlated with earnings.

However, the growing importance of occupation and industry-specific skills, as well as task-specific human capital provides a novel context to the issue of work experience and the gender wage gap. Occupation and industry segregation (Blau and Kahn 2017), due to gendered preferences, tastes, abilities or discrimination, leads to males and females possessing different occupation-, or firm-specific abilities (Lazear 2009, Zangelidis 2008). Sullivan (2010) analyses the causal effect of firm tenure, occupation and industry-specific work experience on wages. The findings indicate that these characteristics are the major determinants of wage rates, while the general experience (not necessarily related to currently occupied position) is weakly associated with earnings. Selection into specific occupations implies gender segregation into job tasks, which increases gender gaps in task-specific human capital (Gibbons and Waldman 2004). Hence, work experience is tightly related to task-specific human capital, which by itself, and in combination with occupation- and industry-specific experience is documented to be an important determinant of wages.

Therefore, disproportional distribution of men and women into these specific human capital components enforces a persistent gender pay gap, since transition

from female- to male-dominated occupations and/or industries is difficult for females. And even if it happens, stronger profile of males in specific experience, abilities and skills demanded by this occupation and/or industry will yield a wage disadvantage for females.

1.3.2. Immigrants vs. natives

Unlike gender-based disparities, quantifying the extent to which the immigrant-native human capital gap translates into a wage gap involves a more subtle approach. The major reason is that immigrants face various biases and prejudices, making it difficult to disentangle which part of the labour market disadvantage originates from the true human capital gap, and which is a mere result of discrimination against or bias towards immigrants. The following part of the subsection will focus on both non-recognition and pure human capital gap effects in labour market outcomes, with a special emphasis on the latter.

a) Non-recognition of immigrant human capital and labour market gaps

The issue of the non-recognition of the human capital attributes possessed by immigrants in a host country is commonly addressed as one of the major reasons behind immigrant overqualification and wage penalty (Ferrer et al. 2006). Reitz (2001), in a study of the Canadian labour market, discusses various forms of non-recognition, and finds that it relates not only to formal mistrust, but also (i) the non-recognition of various professional and trade credentials by local licensing bodies or employers; (ii) the non-recognition of foreign occupational credentials and experience in non-licensed fields; and (iii) discounting foreign-acquired skills not specifically credentialised, but considered relevant for the given position.

Apparently, non-recognition always reduces an immigrant's employment prospects and wage returns. Friedberg (2000) stresses that non-recognition is a serious issue on the Israeli labour market, since employees tend to undervalue education and experience acquired elsewhere. This enforces wage and occupational penalties for immigrants. Similarly, Green and Worswick (2012) show that immigrants in Canada face substantial statistical discrimination, which results in depreciated returns to the foreign country labour market experience. Eckstein and Weiss (2004) document that, upon arrival in the host country, immigrants receive no wage returns to the imported human capital, which goes in line with evidence of the non-recognition of schooling acquired abroad.

Non-recognition of foreign credentials by employers does not necessarily reflect the true human capital disadvantage of immigrants. Potential employers may simply find it difficult to evaluate foreign educational credentials and work experience compared to those acquired in the host country (Duleep and Regets 2002). Discriminatory attitudes towards immigrants as discussed in subsection 1.2.2. could also reinforce non-recognition and result in the persistent undervaluation of the foreign-acquired education and work experience credentials

held by immigrants. Unless discrimination in the labour market is persistent, non-recognition of immigrant human capital decreases over the time spent in the host country, as employers start to trust immigrant competence (Eckstein and Weiss 2004, Borjas 2000, LaLonde and Topel 1997). Naturally, part of this improvement is due to the accumulation of host country labour market experience, which generates higher wage returns and serves as a positive signal for employers.

b) Actual disparities, non-transferability of human capital and labour market gaps

In addition to the non-recognition of human capital attainment, immigrants face labour market disadvantages due to the lack or non-transferability of knowledge, skills and abilities. The literature commonly distinguishes between the labour market consequences of: (i) the non-transferability of foreign acquired education, skills and experience, and (ii) the mere lack of the aforementioned credentials and competencies. The major difference is that, in the case of non-transferability, immigrants may have the same schooling or work experience as natives; however, the actual skills they yield are different across natives and immigrants. The mere education, experience or skill gaps refer to the observable difference in the amount and quality of these attainments across immigrants and natives. However, both amount and quality discrepancies negatively reflect on wages and other employment outcomes.

The labour market consequences of the non-transferability of immigrants' skills has gained significant attention in the literature. The reason for that is the low wage returns to education among immigrants and the skills acquired in the home country, mostly, as a result of initially poor skill transferability (Chiswick and Miller 2009, Friedberg 2000). Therefore, a large strand of the literature argues that immigrants' earnings in the host country should be analysed in the context of life-long human capital accumulation, as this makes it possible to account for the initial non-transferability of skills and to trace the wage dynamics as immigrant skills become more portable (Borjas 1999, Duleep and Regets 1997). The study by Friedberg (2000) documents that immigrants in Israel are earning lower wage returns to skills and experience gained abroad. The major line of argument suggests that non-transferability is the key reason why foreign experience is undervalued on the Israeli labour market. Similarly, Chiswick and Miller (2008) document substantially worse wage returns to schooling among immigrants compared to natives with the same credentials in the US, with the major part of this disadvantage arising from the poor transferability of foreign-acquired education. Similar conclusions were derived by Green and Worswick (2012) in Canada.

Hence, the non-transferability of immigrant credentials largely reflects the actual discrepancies in the content and often also the quality of formal education, as well as differences in type and content of job experience. Amuedo-Dorantes and De la Rica (2007) analyse immigrants in Spain across several age cohorts, gender groups and countries of origin, documenting that post-migration wage advancement is the slowest for immigrants originating from African

countries. The underlying reason is the lowest transferability of skills received in Africa, due to the drastic differences between African and Spanish education systems. In line with this result, Haley and Taengnoi (2011) document that country of origin determines how transferable immigrant skills are on the US labour market, finding the highest transferability of skills acquired in Japan and English-speaking developed countries. Hence, immigrants from these countries are earning wages which completely correspond to their skill profile. However, non-transferability reflects on wages not only through a lack of specific skills and training. Ferrer and Riddell (2008) suggest that differences in the institutional setting, culture and customs may reflect on host country valuation of human capital accumulated abroad. Therefore, immigrants from countries with similar institutional structures, cultural values, traditions and comparable levels of development are expected to do relatively better in the host country labour market. However, even those from institutionally and culturally different home countries are gradually closing the wage gap if they accumulate host country specific skills, abilities and integrate into the institutional and cultural landscape of the host country.

The non-transferability of source country labour market experience is another well-documented driver of worse employment outcomes for immigrants. Lack of host country labour market experience is commonly viewed as a major factor of the wage disadvantage for immigrants. Reitz et al. (2014) document that the lack of local work experience among immigrants is a common concern of employers in Canada. Eventually, this reflects on employment prospects, as well as wages. Moreover, Reitz et al. (2014) indicate that over the recent decade labour market valuation has shifted from the formal education of immigrants to local language knowledge and work experience in specific occupations that are currently in high demand. This finding is also supported by the evidence on immigrant wage gap heterogeneity across various fields of specialisation (Galarneau and Morissette 2004), and the position of immigrants in the wage distribution, which may reflect occupational selection (Lehmer and Ludsteck 2011). Therefore, these findings identify the increasing importance of transferable work experience in narrowing immigrant-native wage differentials. And, furthermore, the literature highlights the paramount importance of transferable experience, which corresponds to the demands of the host labour market.

However, the labour market disadvantages of immigrants may arise due to factors other than poor transferability of education and experience. Empirical research has shown that race-based differences in the quantity and quality of schooling account for a substantial part of the immigration-based wage gap (Card and Krueger 1992, Duncan et al. 1984, Smith and Welch 1977, 1986). As documented by Amuedo-Dorantes and De la Rica (2007), differences in human capital transferability across different source countries are largely a result of home-host-country gaps in educational standards and quality. Sweetman (2004) reports substantial immigrant-native disparities in returns to local- and foreign-acquired education. However, when considering young immigrants, the relative quality of their home country education does not affect their later wage out-

comes and does not generate the pay gap, relative to natives. This finding suggests that the actual difference in the quality of foreign and host country schooling reinforces immigrant labour market gaps.

However, disparity in formal education is only a rough approximation of actual skills and ability gaps. Immigrants, especially recent ones, may not be able to make full use of their educational attainments as they may lack complementary skills, like language, knowledge of the host country labour market and information about the job-search channels (Eckstein and Weiss 2004). According to Barrett et al. (2006), occupational gaps among highly educated immigrants in Ireland suggest that controlling for mere education leaves out a number of important determinants of employment and wages. Specifically, unobserved language command and other cognitive skills may explain why education has relatively weak explanatory power. Hence, formal education in immigrants alone will not yield wage returns identical to otherwise similar natives. In this case, accounting only for the education gap in immigrant-native wage gap analysis will leave a broad set of confounding disparities unobserved.

Hence, the recent literature on immigrant labour market disadvantages draws more attention to the role of actual cognitive abilities. Incorporating actual cognitive skills into analyses of labour market disadvantages among immigrants has several major advantages. Skills precisely reflect true ability, and therefore the effects of the non-transferability of skills or non-conformity of foreign and local education are less relevant.

One of the most well described human capital dimensions is host country language proficiency. The role of command of the local language in immigrant wage improvement and career development has been widely addressed in the literature (Shields and Price 2002, Dustmann 1994). Earlier studies report a positive association between command of the host country language and wage outcomes (Van Tubergen and Kalmijn 2009, Chiswick and Repetto 2001). Anniste and Tammaru (2014) document that host country language proficiency is a strong driver of social, cultural and economic integration. Chiswick and Miller (2003) find that the earnings of immigrants in Canada are strongly related to proficiency in the official languages. Furthermore, Chiswick and Miller (2003) document that improvement in language command enhances the returns from pre-migration schooling and labour market experience. Beyer (2016) reports that good German writing skills reduce the pay gap between native and foreign born in Germany by one-third. Shields and Price (2002) report that immigrants proficient in the host country language have higher status jobs and higher wages compared to their peers with a poor command of the local language.

Besides directly affecting wages and employment outcomes, host country language command may help immigrants to acquire information about the host country labour market, and to improve their job and career opportunities (Dustmann 1997). Host country language command also affects social integration – it facilitates the creation of social networks, which are known to be an important job-search channel (Lai et al. 2017, Behtoui 2008). Therefore, investments in

the host country language may have multidimensional reflections on the employment prospects and wage dynamics of immigrants.

Along with language skill, the dimension of cognitive abilities have also been widely discussed in the content of immigrant-native wage gaps. Nordin and Rooth (2009) document that cognitive skill (verbal, technical and mathematical) gaps in second-generation immigrant men in Sweden completely explain their wage gap. It is important to note that research indicates that the verbal skill gap is a major driver of immigrant-native wage disparity. However, poorer cognitive skills in immigrants is not associated with their employment gap. Similarly, Ferrer et al. (2006) and Bonikowska et al. (2008) report that the observed immigrant-native gap in literacy in Canada largely explains the ethnic pay gap. Importantly, both studies accounted for the comparability of immigrants and natives in terms of formal education and other observable traits. Smith and Fernandez (2017) use PIAAC data for the US and Canada to explore the relationship between the immigrant-native wage gap and human capital traits such as: (i) education, measured as years of schooling, and (ii) cognitive skills in literacy and numeracy domains. The results reveal that the immigrant-native skill disparity in the US fully explains the wage gap, while immigrants in Canada with schooling and observed cognitive skills at the level of natives, still face a wage penalty.

Hence, these results suggest that the mere non-recognition and non-transferability of formal educational credentials do not drive immigrant-native pay disparity. The actual discrepancy in cognitive abilities plays a role in immigrant pay disadvantages. Due to measurement problems, cognitive skills are often unobserved, and therefore the extent and exact dimensions of immigrant-native gaps in actual abilities are still understudied. However, even when certain domains of cognitive abilities are accounted for, the immigrant wage penalty may persist (Smith and Fernandez 2017). This guides us toward the conclusion that either certain important non-cognitive and cognitive traits are left unobserved, or there are other factors (e.g. discrimination, limited access to rewarding positions, occupation-qualification mismatch, underutilisation of skills at work), which reinforce the wage penalty regardless of the true abilities.

All in all, immigrant-native gaps in cognitive skills, coupled with formal education and labour market experience, provide the clearest, yet not exhaustive, case studies of the human capital disparities. Due to numerous discrepancies – such as the non-recognition and non-transferability of education and experience and the non-conformity of local and foreign acquired education – using aggregated measures of human capital (i.e. formal education or work experience) to tackle immigrant-native gaps may be misleading. In order to assess the pure ability gap, one needs to rely on actual cognitive skills and language measures, and therefore isolate the effects of labour market biases and specific dimensions of human capital, such as knowledge of host-country institutional settings and labour market structures. Particularly in the context of wage and occupation-qualification match analysis, the level of education or work experience in immigrants tells us little about actual proficiency and skills,

and may provide misleading evidence of the wage gap or the employment success of immigrants.

1.3.3. Return migrants vs. stayers

The returnee-stayer human capital gaps and associated labour market disparities are strongly dependent on the returnee selection and their employment success in the host country. Hence, the post-return home labour market reintegration of returnees is largely shaped by their human capital profile and relative human capital advantage over stayers. Since evidence on returnee selection and host country employment varies, empirical evidence on the returnees' wage and employment benefits upon return is also mixed.

One strand of the literature documents the relative benefit of foreign employment in the home labour market. Positive selection and successful employment abroad yield human capital advantages for returnees relative to stayers, due to the returnees' foreign work experience and skills gained abroad. Return migration may yield competences and knowledge valuable in the home country, resulting in stronger and a more diverse human capital profile of returnees relative to stayers. Human capital value-added associated with return mobility is often documented to benefit returnees in terms of wage returns and career progression.

Iara (2006) shows that returnees and stayers are rewarded for different human capital characteristics. The study reports an average wage premium to foreign work experience of around 30% and the premium is predominantly due to the actual foreign experience. Iara (2006) documents that CEE labour markets do not reward language skills acquired abroad or general experience gained in other CEE countries. The higher returns are associated with work stays in Western European countries, which is consistent with an assumption that a major wage premium to return is associated with productive skills and knowledge accumulated while abroad. Similarly, Kureková and Žilinčíková (2018) find that, based on online CV data, foreign work experience benefits young returnees in Slovakia. They appear more attractive to employers, even despite returnee average desired wage being higher compared to natives.

The resettlement analysis of Hungarian returnees also reports significant and positive wage premiums to foreign labour market experience (Martin and Radu 2012). It is worth noting the analysis by Co et al. (2000), which found that male Hungarian returnees do not experience a significant wage premium to foreign experience, while the female returnee wage premium over female stayers is as high as 67%. This suggests that return migration may facilitate narrowing the gender wage gap. In the case of Polish returnees, Tomescu-Dubrow (2015) documents that working abroad for at least two months reflects positively on individual wage profiles and the likelihood of becoming self-employed upon return.

A better wage profile is not the only positive labour market externality of return migration documented in the literature. A number of studies focused on employment probability, occupational mobility, likelihood of starting own business as other labour market outcomes largely affected by foreign labour market experience. For instance, Martin and Radu (2012) find that returnees are relatively more likely to start their own business upon return compared to stayers. Naturally, savings accumulated while working abroad, as well as interpersonal skills and risk-taking attitudes, play a major role here.

However, foreign labour market experience does not always benefit returnees. One factor disavouring the re-assimilation of immigrants into the home country labour market is drop-out due to the foreign labour market stay. For instance, Barcevičius et al. (2012) document that young return migrants especially often face difficulties when reintegrating into the home labour market, due to the gap in career development. Young returnees in particular, if they have little home country experience related to their qualification, may yield negative externalities from a foreign labour market stay for later reemployment at home and related wage returns. Another well-documented driver of poor assimilation after resettlement is negative selection from the host country employment. In particular, returnees who experienced an occupation-qualification mismatch and occupied positions below their actual qualification while abroad, do not benefit from foreign employment to the same extent as their peers who succeeded in finding a job that matched their qualifications (Voitchovsky 2014). In this case, returnees could benefit more if they would have stayed in the home country labour market.

Moreover, employers may have biased attitude toward returnees due to various factors. Masso et al. (2014) document that employers in Estonia may not like return migrants due to their higher expected wages and likelihood of going abroad again in the future. Similarly, Barcevičius et al. (2012) report that Polish returnees may face discrimination because they are perceived as failed migrants. However, this perception differs across different groups of returnees. In particular, employers may value the foreign experience of highly-educated returnees relatively more, as it signals additional human capital and knowledge gained abroad. While in the case of low-educated individuals, return mobility may be perceived as a failure to succeed in the host country labour market. In this case, foreign experience will yield different wage and employment returns to high- and low-educated returnees upon their resettlement to a home country. In line with this argument, Vavrečková and Baštýř (2009) document that Polish returnees with tertiary education encounter better career opportunities compared to returnees with non-tertiary education.

Hence, a number of empirical studies document non-significant or even negative wage and employment effects of return mobility upon re-entering a home labour market. Among others, Masso et al. (2014) find no significant association between foreign experience and post-return upward occupational mobility. Moreover, the study documents a negative effect for female returnees, as they are less likely to experience upward career progression after return

compared to female stayers. Masso et al. (2014) suggest the short nature of labour migration and occupational downgrading while abroad to be the major factors of the observed phenomena.

All in all, the patterns of labour market returns to foreign experience vary. While highly-educated returnees are found on average to benefit from their foreign experience, low-educated return migrants may experience further wage and occupation downgrading upon resettlement. Moreover, post-return labour market integration may be challenging for young returnees, as they may lack pre-migration home labour market experience, and thus may lack social ties and networks, which are beneficial for home country job searches and network building (Smoliner et al. 2012).

The overview of the literature on: (i) gender-, (ii) migration-, and (iii) return-migration-related human capital and labour market disparities, generally suggests that multiple factors play a role in shaping within-group human capital gaps and the association between human capital and labour market is not obvious. The classical and more recent human capital theories highlight various aspects of human capital, which are of prime importance, including task-specific cognitive skills and non-cognitive abilities. However, empirical evidence on those is largely missing, due to the difficulties arising when trying to measure these human capital domains. Similarly, the literature highlights a number of contextual factors, which largely affect the association between human capital and wage rates. Among these, preferences and norms in the gender context, motivations and feelings of social inclusion in the migration context, and employer perceptions and attitudes in the context of return migration. Due to the same measurement issue, the empirical assessment of these appears to be a considerable challenge.

2. EMPIRICAL STUDIES

3. DISCUSSION AND CONCLUSIONS

3.1. Summary of the studies

Study I. Gender-specific human capital: identification and quantifying its wage effects

This paper focuses on the gender wage gap in Estonia in the framework of individual human capital. The main contribution of the study is its novel approach to the role of human capital in gender wage disparity. First, the study relies on the PIAAC database, which makes it possible to measure individual cognitive abilities in literacy, numeracy, and problem solving in a technology rich environment. This is one of the first studies to incorporate specific skill dimensions in the gender wage gap analysis. Second, the study applies a combination of several methodological approaches to identifying the role of human capital in wage inequalities. Namely, the research focuses on gender-specific combinations of skills and formal education, referred to as gender-unique human capital. Relying on a Ñopo-type decomposition methodology (Ñopo 2008), the paper extracts and explicitly analyses gender-unique profiles. Consequently, this is the first study to empirically analyse the characteristics and wage returns to gender-specific human capital.

The study documents substantial gender differences in net cognitive skills, as well as male- and female-specific profiles. The results show that a subsample of unique males have cognitive abilities at a level that females mostly do not reach. In particular, the results reveal that male-unique human capital is to a large extent embodied in individual and combined outstanding numerical and problem-solving abilities. This is a strong competitive advantage for males often not achieved by females. Female-specific human capital is dominated by high formal education, while in all three cognitive skill domains, females achieve lower scores. It is important to note that the male-specific profile is characterised by lower educational attainment combined with outstandingly high cognitive skills, suggesting an imperfect correlation between skills and formal education.

One of the major questions addressed by the study, the role of gender-specific profiles in shaping the gender wage gap, was explicitly addressed using a classical multivariate OLS regression and a conditional quantile regression. Generally, the gender-specific profile yields higher earnings for both men and women relative to the gender-comparable profile. However, the wage gap analysis reveals that the average gender wage gap in the sample of men and women with gender-specific profiles is greater, compared to the sample of men and women with gender-comparable profiles. Furthermore, the gender wage gap analysis on the entire earnings distribution reveals significant variation across gender-specific and gender-comparable sub-samples. The results reveal an even larger “glass ceiling” effect for females with characteristics not observed among males, compared to those “matched” to males in terms of skills and education.

A detailed analysis of gender-specific profiles, coupled with the gender wage gap inferences, suggests that skills are valued on the labour market more than formal education, hence men's better numeracy and problem-solving abilities help them to attain higher wages, despite having lower formal education. Therefore, from the individual perspective, investments in education are sometimes underused, since, by itself, higher formal education does not yield superior earnings. These findings indicate that cognitive skills and their combination differ a lot across men and women, suggesting that this gender disparity evolves through labour market experience, as well as due to other factors not related to initial human capital investments but measured by formal education.

Study II. Immigrant-native wage gap in Europe: The role of cognitive skills and their use at work

This study performs an analysis of the immigrant-native wage gap and factors behind it. The research relies on earlier empirical and theoretical evidence on the role of human capital in labour market disparities for immigrants. Earlier literature discusses the differences in human capital attainments across immigrants and natives as one of the major drivers of the observed differential in earnings. Due to a lack of empirical data, the majority of the earlier studies employ very rough measures of human capital, approximated using formal education and, at best, host country language command.

The study contributes to the labour market literature by incorporating cognitive skills in literacy and numeracy domains to approximate individual human capital. Moreover, the human capital measure includes self-reported frequencies of on-the-job skill use to approximate a task-specific human capital. The skill use measures include literacy (reading and writing), numeracy, and information and communication technology dimensions. Hence, from the human capital theory perspective, the methodological contribution of the paper is a multi-dimensional measure of human capital. It incorporates both aspects of classical theory, such as education and cognitive skills, as well as dimensions inspired by novel theoretical approaches, such as on-the-job task-specific skills.

The study addresses three major research questions based on pooled PIAAC data from 15 European countries (Belgium, Czech Republic, Denmark, Estonia, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Slovenia, Spain, and Sweden). The methodological strength of the paper is in the application of the estimation procedure suggested by the OECD for a PIAAC-based analysis. In particular, the study relies on a full set of ten plausible values for each skill domain and applies Jackknife replication methodology to correctly estimate standard errors with 80 replication weights, as well as population weights for precise mean values estimations.

First, the research focuses on immigrant-native cognitive skill gaps, finding in line with earlier studies (Bonikowska et al. 2008), that immigrants attain lower average scores in both literacy and numeracy domains. However, cognitive abilities are relatively dynamic and strongly related to the labour market,

unlike formal education. Hence, immigrants may tend to improve their skills over time in the host country, leading to a gradual cognitive skills convergence across immigrants and natives (Chiswick et al. 2005). Immigrant cognitive skills dynamics in the host country constitutes a second focal point of the study. The analysis of post-migration literacy and numeracy skills dynamics in immigrants reveals dramatic gaps in both skills upon arrival. However, the findings suggest significant positive skill dynamics over the years in the host countries only among those immigrants with the highest educational attainments (tertiary, bachelor's, master's or doctoral level). Low and medium educated immigrants are less prone to improve their skills over time in the host country. Moreover, the data in hand leaves the possibility that the cognitive skill dynamics is to some extent attributed to the change in the composition of immigrants over years with respect to their country of origin, as well as non-cognitive skills.

The next, most important research question concerns the role of immigrant-native disparities in cognitive skills and skill use in explaining ethnic pay gaps. The results reveal that, while controlling for literacy and numeracy skills (in addition to demographic, education, and employment characteristics) reduces the pay gap, they are not yet enough to fully explain the residual pay gap. This evidence reasserts that immigrants, having the same cognitive skill levels, demographic characteristics, education, and ISCO category as natives, still earn less. However, once the analysis accounts for the use of all skills at work in the wage regression, no statistically significant gap in earnings across immigrants and natives remains. The results are stable across education groups, supporting the assumption that despite similar cognitive skill levels, background traits and employment profiles, immigrants use skills at work less frequently than natives. This, eventually, results in less task-specific human capital accumulated by immigrants and lower earnings.

Hence, the findings, on the one hand, assert that highly educated immigrants are prone to develop and improve their skills over time spent in a host country. On the other hand, we document that immigrants, even when attaining skills comparable to natives, less frequently use them at work, regardless of their education level. Hence, even with comparable net skills, immigrants tend to develop less task-specific human capital through on-the-job skill use. However, once immigrants reach a skill use level similar to natives, the wage penalty becomes insignificant. This suggests that even among immigrants with low and medium education, applying skills at the same level as natives yields wage levels comparable to the native-born.

Study III. Skills heterogeneity and immigrant-native wage gap in the European countries

This study relies on the same conceptual framework as study II, albeit to pursue different objectives. The major focus of study III is to explore in detail immigrant profiles, their skills and related wage gap for each country individually. Hence, the main output of the study is PIAAC-based descriptive and wage gap profiles for immigrants in 15 European countries (Belgium, Czech Republic,

Denmark, Estonia, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Slovenia, Spain, and Sweden).

First, the study refers to the descriptive profile of immigrants in each of the analysed countries. The paper shows that the demographic and employment characteristics of immigrants are relatively homogeneous across countries. The study does not observe any significant selection on the basis of age, gender or marital status; however, selection based on higher education is significant. The study finds that in the majority of the analysed countries, immigrants have a higher education degree more often than natives with the only exceptions being Spain, Slovenia and Italy. The average employment rate varies considerably across countries; however, there is no systematically higher unemployment rate among immigrants in the majority of the analysed countries. The only exceptions are Denmark and Sweden, which have higher employment rates among natives, and Italy, where more immigrants than natives are employed. However, the study finds systematic differences in occupation profiles, with more natives holding high-level positions. In line with the findings from the pooled-data in study II, there are systematic immigrant-native gaps in literacy and numeracy cognitive skill dimensions, as well as the intensity of literacy, numeracy, and ICT skill use, and therefore, task-specific human capital.

Second, the paper explores immigrant cognitive skills over the years spent in the host country. The study only finds a positive and statistically significant association between skill levels and years spent in the host country in the Nordic countries (Denmark, Finland, Norway, Sweden). This finding could reflect the relatively stronger host country support for the integration and social and labour market assimilation of immigrants. Third, and most importantly, the study investigates wage gap patterns across the analysed countries. Generally, the results indicate the substantial variation in the magnitude of the immigrant-native wage gap and explanatory factors. The common feature for most of the countries is that controlling for skill level and, most importantly, intensity of skill use at work largely explains the economic and statistical significance of the wage gap.

However, the wage gap analysis reveals drastic cross-country variation in immigrant wage performance. Notably, Great Britain and Slovenia are the only countries where the unadjusted wage gap (controlling only for demographic profile) is insignificant and economically very small. Estonia and Ireland, on the contrary, are the only countries in the sample, where the wage penalty of around 10% persists even when controlling for both skill levels in literacy and numeracy domains, as well as task-specific skills measured on the basis of skill use at work. This suggests that immigrants in these countries are potentially different from their peers in other countries in a number of unobserved characteristics. Furthermore, immigration history and path-dependence could be factors that explain the persistent pay gap, especially in the context of Estonia.

Therefore, on the one hand, the findings confirm that immigrants in the Nordic countries are prone to develop and improve their skill profile over the time spent in the host country. This finding goes in line with earlier studies

suggesting increased human capital investment, mostly through acquiring skills in demand and highly valued in the host labour market, as well as improvements in command of the host country language. Consequently, immigrants tend to gradually catch up with natives. But, on the other hand, study III documents that, even when attaining skills comparable to natives, immigrants less frequently use them at work. Acknowledging this difference in the wage analysis turns the immigrant-native pay gap statistically insignificant in all countries except Estonia and Ireland, and therefore suggests that the disparity in skill use at work plays an important role in explaining immigrant-native pay disparity.

Study IV. The labour market performance of young return migrants after the crisis in CEE countries: The case of Estonia

The final study of this thesis focuses on young return migrants in Estonia and identifies their profile and wage returns to foreign labour market experience. The case of young return migrants is particularly relevant for Estonia. With the highest rate of return migration in Europe (Zaiceva and Zimmermann 2016), returnees constitute a sizeable labour market group that possesses specific skills, abilities and knowledge accumulated while abroad. These may potentially be highly valued by the labour market; however, dropping out of the home labour market may yield negative externalities, which could offset the positive returns to foreign experience. Hence, the question of young returnee selection and post-return wage returns are the focal issues covered in study IV. Apparently, the case of young returnees may be substantially different from older returnees, and so the paper explicitly addresses cross-age-group heterogeneity.

The analysis relies on two data sources. First, the Estonian Labour Force Survey (EE-LFS) panel data for 2007–2013, allows to precisely identify returnees who were working abroad, using the rotating panel nature of the data. The second data source is the Estonian Population and Housing Census (EPHC) from 2011 merged with the Estonian Tax and Customs Office database on individual payroll taxes, which enables us to identify a much larger number of return migrants and trace the dynamics of the wage premium to return migration over time. A shortcoming of the database is the unknown reason for the foreign labour market stay (may not necessarily be employment).

The first part of the analysis relies on the EE-LFS and focuses on identifying key determinants of young return migrants and the selection to return patterns. The main question in this is who the young Estonian returnees are, and how they differ from permanent migrants and stayers. The results suggest that return migrants are significantly different to both current migrants and stayers. Young returnees are found to be mostly men, predominantly employed in the service sector and relatively younger than those who have never worked abroad. However, when compared to current migrants, returnees are more often female and tend to re-enter the domestic labour market at an older age. Educational selection reveals interesting insights, since, when compared to stayers, returnees more often possess a higher education degree. However, relative to current

migrants, selection reveals bi-modal distribution patterns (positive selection on both lower and higher education) are only detected in the total sample, and not specifically for returnees.

Study IV also reports significant differences in employment patterns across returnees, stayers and current migrants. The occupational profile of young returnees appears to be generally worse compared to stayers, but much better relative to permanent migrants, suggesting that returnees were experiencing a significant occupation-qualification mismatch on the host country labour market. In line with this result, returnees are less likely to report overeducation relative to current migrants.

The second part of the analysis tackled the wage premium to return migration and its dynamics. The overall wage premium results, based on EE-LFS data, reported a significant wage premium to return migrants once back in Estonia, but the returns are uneven across education groups. The study reports a 15.4% wage premium to return in the 15–24 year age group, and 12.6% among respondents aged 25–35 years. To examine the returnees wage premium in detail and to identify the major determinants of returnee-stayer wage gap the study employs a classical Oaxaca-Blinder decomposition. In the young group (15–35 years), the unexplained gap remains high, implying that there are important determinants other than demographic background, education, occupation and industry, which are not captured by the model. These potentially include actual skills and abilities gained abroad, as well as the signalling effect of the foreign experience.

The final question addressed by study IV is the post-return wage premium dynamics. Relying on EPHC data, the study documents that the wage premium to return varies drastically across age groups. Namely, a statistically significant positive premium for young returnees appears after three years of re-entering the domestic labour market and grows over subsequent years. However, older returnees experience the highest premium immediately on return and by the third year since returning the premium is already approximately two times smaller and becomes statistically insignificant four years after returning.

Hence, the results of study IV document that young return migrants constitute a special group on the Estonian labour market. They are significantly different from both stayers, current migrants from the same age group, as well as return migrants from older age groups in both observable characteristics and post-return labour market performance. Overall, the results indicate that specifically in the young group foreign labour market experience could be beneficial for wages, as they realise their skills and competencies gained abroad, yielding a positive wage premium. Return migration yields positive externalities for the well-documented gender wage gap, as the study reports that foreign labour market experience narrows the gender pay gap among young Estonians.

3.2. Discussion of the results

All in all, the results of the thesis indicate that associations between human capital attainment and labour market returns are not obvious, and are largely determined by specific factors and influences present for certain labour market groups. The research tasks and hypotheses, addressed by the studies, rely on earlier empirical and theoretical inferences. However, the results of this thesis suggest that associations between wage returns and human capital are more complex and could be largely affected by factors beyond the labour market. In certain cases, especially in the gender wage gap context, human capital components were found to have a limited explanatory power. However, disparities identified across different labour market groups allow us to better understand the underlying differences between men and women, natives and immigrants, and returnees and stayers. Furthermore, the empirical identification of the novel human capital components allows us to quantify the effects of previously unobserved human capital traits and identify the relative importance of those in generating the labour market disparities.

In the following, the results of each study are discussed in light of potential explanations and policy implications.

Gender wage disparities and human capital (study I)

The results of study I not only shed light on basic differences, but also the non-comparability of certain male and female human capital characteristics, and how these are reflected in the labour market. While most of the earlier literature documents substantial gender gaps in average cognitive skills, study I finds that the gender gap in cognitive skills is a matter of the non-comparability of the combined human-capital-related characteristics, not only raw average gaps in individual traits. The results suggest that this specific non-comparable combination of cognitive skills, attained mostly by men, is highly valued by the labour market, and is associated with a superior wage premium among men. Therefore, the better earning profile of men, in spite of their lower formal educational attainments, may not only originate from a believed higher self-confidence in bidding for a wage, it may also arise from a combination of higher numeracy and problem-solving skills, which were usually not controlled for in the analysis due to a lack of empirical evidence regarding individual competencies.

The substantial gender gaps in cognitive abilities and superior male competencies in numeracy and problem solving could also have multiple causes. Since cognitive skills are developed and multiplied through on-the-job training, one intuitive explanation of females not attaining high numeracy and problem-solving skills is the gender gap in labour market participation and commitment. Unlike formal education, cognitive abilities are tightly related to years of work experience, as well as actual job characteristics. The substantial gap in the cognitive abilities of females, in spite of their better educational profile, is to a large extent attributed to a gender difference in acquiring, developing and utilising skills.

However, provided the generous welfare system, maternity benefits and social security in Estonia, study I suggests that women are more likely to experience work interruptions. This, eventually, reduces labour market commitment and restricts on-the-job skill accumulation. Furthermore, regaining human capital after a spell of inactivity may require greater effort, resulting in skill “drain” relative to males, who are less prone to labour market inactivity. However, labour market interruptions among women may simply be a family decision, given that females have a relative advantage in home production compared to males.

Another focal point of Study I is the gender wage gap. The evidence of a higher gender wage gap associated with female-specific profiles, relative to female-male-matched, suggests that investments in formal education do not yield a significant wage premium. This indicates that formal education is not valued in the labour market to the same extent as actual cognitive skills. In the case of Estonia, explanations of the observed situation could also be related to labour market frictions. Due to substantial temporary and permanent outmigration of highly competent Estonian men (Zaiceva and Zimmermann 2016, Hazans and Philips 2011), skilled males face lower competition on the domestic labour market compared to Estonian females. Another potential explanation relates to gendered occupation segregation (Blau and Kahn 2017). The persistent gender pay gap associated with female-specific profiles may arise from the employment characteristics of women with female-specific profiles. Namely, females with a female-unique profile may select into occupations with low wage mobility and more restricted options for career progression. Given that a female-specific profile is dominated by high educational attainments, such occupations may include school education, or healthcare sectors.

The results of study I suggest that men’s and women’s human capital profiles cannot be directly compared, as particular characteristics are exclusive for a certain gender. Ignoring this notion leads to methodological issues, such as the overestimation of discriminatory labour market effects and thus imprecise wage inequality estimation. However, even when accounting for gender-specific human capital, as a combination of cognitive skills and education, the unexplained fraction of the pay gap remains high. This result, on the one hand, confirms that cognitive skills, as crucial human capital dimensions, are not sufficient to explain the gender pay gap (in line with Anspal 2015b).

On the other hand, the results, generally, support an assumption that human capital, and particularly, cognitive skills, are important determinants of labour market returns. However, accounting for both cognitive skills and formal education revealed rather weak correlation between formal degree and actual skills. This supports the previous discussion on skills formation and development, suggesting that labour market experience forms a major contribution to the skill profile. Formal education by itself does not yield a strong skills profile, hence, higher wage returns for males are largely explained by the wage premium to their cognitive competencies.

Immigrant-native wage gaps and human capital (studies II and III)

The focal point of studies II and III is immigrant-native human capital, measured on the basis of cognitive skills and task-specific human capital, and wage disparities. Relying on the same theoretical framework, study II presents aggregated results for 15 European countries, while study III conducts a more detailed cross-country assessment. Hence, study II develops and tests the methodology on the pooled sample, with a number of additional robustness checks, while study III explores cross-EU heterogeneity in immigrant skills dynamics and related wage gap patterns.

The results of both studies are not entirely in line with the research hypotheses (see Table 3) and, thus, need to be discussed in detail, in light of the methodological and data limitations. The first set of findings tackles the immigrant-native cognitive skills profile and observable immigrant-native difference in literacy and numeracy skills. Study II documents significant ethnic disparity in both domains, supported by the cross-country evidence from study III. The results go in line with the hypothesis and earlier literature, suggesting that immigrants are indeed equipped with lower cognitive competencies for numerous reasons. Among others, differences in educational, cultural and economic background and discrepancies in earlier work experience, which translated into skill gaps, *etc.*

The next research inference relates to the immigrant-native gaps in task-specific human capital, measured in terms of skills use at work. While study III reports adjusted immigrant-native gaps in cognitive skills use at work, study II documents gaps adjusted for observable demographic, employment and cognitive characteristics. The results in both studies report substantial immigrant-native disparities in skill use. Less frequent skill application of immigrants can be attributed to several factors. First, immigrants may have more restricted access to skill-requiring positions, which are more likely to generate higher wage returns than jobs with low skill involvement. Second, immigrants may face difficulties when opting for career progression more often than otherwise similar natives. Third, the immigrant population may have less bargaining power in job and wage negotiations, and therefore may be relatively less willing to compete for challenging and rewarding positions. Moreover, immigrants may have less motivation to invest effort into a job due to realised labour market difficulties and low expectancy of further career development. These labour market disadvantages can stem from factors such as a lack of social networks in a host country, non-acquaintance with the institutional setting of a host country labour market, and various cultural barriers. As a result, immigrants experience poor social and cultural assimilation, which reflects on their labour market performance and success.

The third focal point of studies II and III is the dynamics of immigrant cognitive abilities over time in the host country. Study II reports pooled results and only finds positive literacy and numeracy skills dynamics over post-migration years among highly-educated immigrants. This can to some extent be explained by the relatively higher occupational and wage rewards to human

capital investments among highly educated immigrants. Furthermore, migration intentions may vary across immigrant education levels. Highly-educated immigrants may have permanent migration intentions more often than low-educated, motivating them to integrate into the host country labour market and society and, hence, improve their own skills. Moreover, as the source country of formal education is not observed, there may be potential selection, with immigrants receiving higher education degrees in the host country more often than low or medium education.

Study III, by contrast, abstracts from educational heterogeneity, and explores host country specific skills dynamics, finding a positive association between years in a host country and cognitive skills only in Denmark, Finland, Norway and Sweden. The observed skills dynamics may relate to the relatively stronger host country support for immigrant integration, social and labour market assimilation, especially in Nordic countries. The number of state programmes are also implemented to improve immigrant qualifications and equip them with skills needed by the host labour market, including language command and job-specific training (Sarvimäki and Hämäläinen 2016). Nordic countries may also differ in terms of immigrant selection. Given their economic success, strong welfare and social support, Nordic countries may attract more immigrants with permanent settlement intentions and stronger commitment to human capital investments.

The final and most important research point relates to the immigrant-native wage gap, its magnitude and the role of cognitive aspects of human capital. The research explores the nature of the wage gap via the step-wise inclusion of control variables. The pooled-data estimates from study II document a statistically and economically significant immigrant-native pay gap when only demographic traits are taken into account. However, country-specific results from study III reveal that the raw wage gap in the UK and Slovenia is insignificant and economically very small. This suggests that immigrants and natives have comparable profiles that are valued equally by the host labour markets.

Both studies report limited evidence of the explanatory power of cognitive skills in wage gap analysis. Relying on the pooled data, study II indicates that having actual cognitive skills in literacy and numeracy identical to natives does not yield comparable wage returns for immigrants. Cross-country estimates from study III suggest similar implications. The underlying argument is that an improvement in immigrant competencies may not immediately yield an easier job entry, career progression or wage growth. The studies suggest that several labour market disadvantages may restrict human capital application, despite skills advancements. Potential factors that deter on-the-job skill application among immigrants, and hence the accumulation of task-specific human capital, include lower bargaining power in job negotiations, non-acquaintance with the institutional settings of the host country labour market, weaker social ties, unfair treatment due to employer statistical or taste discrimination, social and cultural integration barriers at the workplace, and others (Lai et al. 2017; Quillian 2006).

Hence, studies II and III incorporate measures of self-reported frequencies of skill use at work, which largely reflect actual on-the-job skill application when carrying out tasks, and hence reflect skill improvement and accumulation. Study III reports that once literacy, numeracy, and ICT skill use at work are accounted for in wage regressions, along with actual skill level, no statistically significant gap in earnings across immigrants and natives remains in any country except Estonia and Ireland. These findings prove that despite similar cognitive skill level and background traits, in most of the analysed countries, immigrants and natives apply their skills at work to different extents, yielding a difference in their wage returns. The case of Estonia and Ireland may be considerably different from the other European countries due to several factors. First, both countries have a rather specific immigration history. In the case of Estonia, path-dependence could also play a role in shaping the labour market integration of current immigrants. Second, the definition of immigrants, applied in the PIAAC data, selects different people into the samples of immigrants. In the context of Estonia, immigrants, identified as those born abroad could include both children of previously displaced Estonians that have returned to the country after the restoration of independence, as well as the minority population. Therefore, while the sample of immigrants captures predominantly economic migrants in the other countries, the Estonian and Irish samples may encounter different types of movers.

The general findings of studies II and III, on the one hand, confirm that highly educated immigrants are prone to develop and improve their skills over the time spent in a host country. This result goes in line with earlier studies documenting human capital increases in the immigrant population, mostly through acquiring skills demanded and valued on the host country labour markets. At the same time, we find no positive catch-up dynamics among immigrants with lower and medium education, suggesting that this group requires particular policy attention and interventions targeting their skill development. However, the positive dynamics may be tightly related to the host country, since statistically significant catch-up rates are documented only for Nordic countries. On the other hand, we document that immigrants, even when attaining skills comparable to natives, less frequently use them at work regardless of their education level or the host country. However, once immigrants reach a skill use level similar to natives, the wage penalty becomes insignificant in almost all the analysed countries. This suggests that even among immigrants with low and medium education, applying skills at the same level as natives yields wage levels comparable to the native-born.

Therefore, the disparities in skill use at work play an important role in explaining the immigrant-native pay gap, indicating that immigrants are not yet sufficiently well assimilated in the European labour markets. Possible difficulties in labour market entry and in obtaining complex and challenging positions, to a large extent, explain the weak assimilation of immigrants. The implementation and development of policy measures should consider that human capital improvements alone are not sufficient to ensure immigrant labour market

integration, as several labour market disadvantages persist. Further policy measures should consider these indications, and that the role of immigrants and their labour supply is increasing remarkably in European societies. However, while there are various state-level programmes fostering immigrant training and additional education, the actual application of skills has been paid very little research and policy attention. Ethnic disparity in cognitive skills use, on the one hand, reflects the lower employment prospects, job access, and potentially, lower motivation to exert effort and use skills at work among immigrants, which are then reflected in lower earnings. On the other hand, this finding implies limited opportunities for immigrants to develop task-specific human capital through on-the-job skills use. Hence, restricted on-the-job skill use results in immigrant-native task-specific human capital gaps, which strongly relate to other skill dimensions and reinforce the ethnic wage gap.

Returnee-stayer wage disparities and human capital (study IV)

The results of study IV yield several important insights and policy perspectives from the research. The contribution of the research reported in the paper stems from its special focus on young return migrants. First, young returnees are the most numerous group in the overall return migration flow, and second, they are the most sensitive in terms of later labour market integration. The policy interest in the questions addressed in the paper is straightforward, as Estonia experiences the highest share of return migration in Europe (Zaiceva and Zimmermann 2016). The demographic and educational profiles of returnees, as well as the observed determinants of their post-return assimilation, such as the wage premium to return, would help to better identify the specificity and issues of their post-return assimilation to the home country labour market. Moreover, young returnees are one of the most dynamic, well-educated and highly-skilled labour market groups, and so they embody considerable potential, which needs to be efficiently utilised. Therefore, their employment success is of high importance for overall labour market equality and performance.

The question of selectivity to return is of major importance in the context of the wage assimilation of returnees. The returnee-stayer selection suggests who is going to work abroad, while returnee-migrant selection identifies who, among those currently abroad, is more likely to come back to Estonia. Combining the results from two selection patterns helps to shed light on “brain drain” vs. “brain gain” in the Estonian labour market.

The selection analysis identifies several important patterns. The analysis of education selection, being of prime importance from the labour market perspective, disclosed a positive selection relative to stayers, implying the outflow of highly educated Estonians. However, relative to permanent migrants, young returnees revealed no significant selection. This result suggests that temporary migration may be driven by the desire to find a better use of the degree acquired on the foreign labour market offering higher wages. Coupled with inferences from gender selection, the results of study IV imply that mostly young, well-educated men are moving to work abroad. However, once abroad, women are

more likely to return to Estonia, which is supported by the returnee-migrant selection analysis. This result is consistent with earlier studies on the low labour supply of young, highly-educated men on the Estonian labour market, due to high outmigration both temporary and permanent (Hazans and Philips 2011).

Positive age selection relative to current migrants suggests that older people are more likely to return home than stay working abroad, which is potentially strongly related to retirement and the associated benefits in the home country. Moreover, while still young, people are more prone to work abroad with the aim of gathering savings and accumulating foreign labour market experience to benefit later in the home country, in their older years gathering experience becomes less important and accumulating savings could remain the sole motive.

Selection based on employment variables sheds light on returnee employment success. The study documents that young return migrants are relatively disfavoured compared to stayers, as on average, they are less likely to occupy medium and high-level positions. At the same time, young return migrants in the returnee-migrant framework are positively selected with respect to occupational level. Hence, the occupational profiles of migrants are better in Estonia after return than while abroad. These findings are in line with a well-documented occupational downshifting among CEE migrants (Masso et al. 2014), and overall underperformance on foreign labour markets (Joonas et al. 2014). Consequently, return migrants less often report themselves as overeducated compared to current migrants.

The results of the returnee-stayer wage gap analysis reveal that the wage benefit from solely employment-induced temporary mobility (EE-LFS-based results) yields positive wage returns related to additional human capital accumulated while abroad. However, the premium clearly decreases with the returnees' age, with the youngest return migrants experiencing the highest wage premium. However, the study documents that this result relates to the estimated educational profile of the returnees. The results suggest that young people's educational attainment might have been better if they had not worked temporarily abroad. Foreign work experience increases their wage relative to stayers; however, this may come at the cost of longer studies and a stronger educational profile. But to test this assertion, one needs more detailed data on the labour market trajectories of young people.

The composition of the wage gap and returnee wage premium revealed that factors not captured by our models had considerable effect. The high unexplained share of the wage gap, especially among young respondents, suggests that there are unobserved effects, strongly benefiting returnees relative to stayers. Among such factors, cognitive and non-cognitive skills, training, abilities and knowledge gained abroad are the major factors. Apparently, positive signalling associated with working abroad plays a notable role. Unfortunately, the data in hand does not allow us to seize the role of various cognitive and non-cognitive traits in shaping the wage premium for returnees. Furthermore, it is impossible to disentangle the wage returns to pure skills and experience from the mere signalling.

Moreover, the results based on EPHC data revealed that the wage premium to return dynamics differs significantly across age groups. We find that a statistically significant positive premium for young returnees appears on three years after return, while for the older cohort the highest premium is documented immediately on returning, with a drastic decrease in the following years. Therefore, the results of the analysis based on the EE-LFS and EPHC data sets report different wage premium profiles for young returnees. This difference could arise from the variation in the underlying definition of returnees. The EE-LFS sample captures only employment-related return mobility. Hence, EE-LFS returnees are more likely to accumulate foreign labour market experience and related human capital traits, which yield higher wages. The EPHC sample, on the contrary, uses a broader definition and incorporates all types of reasons for migration, and therefore the EPHC-based returnees do not necessarily accumulate additional productive human capital. The latter is especially relevant for young people, who may stay abroad due to studies, which also yield knowledge accumulation, albeit not associated with valuable foreign work experience. Therefore, when the returnee sample also includes those respondents staying abroad due to reasons other than employment, the return to these foreign stays will be lower for young people relative to the older cohort.

Another important implication of the wage analysis arises from the exploration of gendered returns. The results provide evidence of the positive effect of temporary migration in reducing the wage disparity of young men and women in the Estonian labour market. Study IV documents that return migration has smaller positive effects on men compared to women. This finding is particularly important in the Estonian context due to the remarkable gender pay gap. Hence, foreign employment yields certain characteristics and experience for females, which is highly valued on the home country labour market. It appears reasonable to assume that signalling has a strong effect in the case of women, as foreign labour market experience may signal such qualities as self-confidence, determination and willingness to take a risk, which are often found to be weaker among females compared to males (Blau and Kahn 2017).

All in all, the results of study IV contribute to previous empirical findings regarding the post-return labour market performance of return migrants and wage returns to the human capital accumulated while abroad. As an issue of increasing interest, the post-return labour market assimilation of young return migrants requires in-depth understanding of their human capital profiles and post-return performance. The results suggest that young returnees are generally well-educated, and coupled with specific skills, experience, and knowledge accumulated abroad, the human capital profiles of returnees are particularly valuable for the Estonian labour market. Moreover, the positive implications of return mobility for the gender pay gap in Estonia further support the necessity to foster the return and successful labour market assimilation of young well-educated Estonians.

Table 3 provides an overview of the main results of the studies, along with the research tasks outlined in the Introduction. Table 3 also presents the initial

research hypotheses and highlights whether they were supported or not by the analysis in the thesis.

Table 3. Research tasks, hypotheses and results

Study	Tasks and hypotheses	Result
I	Task 2. To evaluate the gender gaps in terms of cognitive skills in literacy, numeracy and problem solving domains. <i>H1.</i> Men and women have significantly different skills profiles.	Supported
I	Task 3. To quantify and qualitatively analyse the gender-specific combinations of cognitive skills. <i>H1.</i> Male-specific combination of skills is embodied in high numeracy skill combined with high problem solving ability. <i>H2.</i> Female-specific human capital is shaped by high literacy skill combined higher formal education.	Supported Not supported
I	Task 4. To estimate the wage returns to gender-specific profiles and gender wage gap, accounting for gender-specific characteristics. <i>H1.</i> The gender wage gap among men and women with comparable characteristics is smaller than among those having men- and women-specific profiles. <i>H2.</i> There are no systematic differences in wage gaps along the distribution of wages, associated with gender-specific profiles. <i>H3.</i> Male-specific profile yields higher wage returns, compared to female-specific one.	Supported Not supported Supported
II	Task 5. To evaluate the immigrant-native gaps in literacy and numeracy cognitive skills, as well as the disparities in skills use at work (i.e. task-specific human capital) in the pooled sample of 15 European countries. <i>H1.</i> Immigrants attain substantially worse scores in both literacy and numeracy domains. <i>H2.</i> Immigrants apply their skills significantly less than otherwise comparable natives.	Supported Supported
II	Task 6. To analyse the dynamics of immigrant cognitive skills over the years spent in the host country. <i>H1.</i> Immigrants reveal the highest skills disadvantage in the first year upon arrival. <i>H2.</i> Immigrants' cognitive skills in both literacy and numeracy domains tend to improve over years spent in the host country.	Supported Not supported
II	Task 7. To measure the contributions of actual cognitive skills and their use at work (i.e. task-specific human capital) to the immigrant-native pay gap. <i>H1.</i> Improvement of cognitive skills alone is not sufficient to fully eliminate the immigrant-native wage gap. <i>H2.</i> Immigrant-native gap in skill use at work largely explain wage disadvantage of immigrants.	Supported Supported

Study	Tasks and hypotheses	Result
III	<p>Task 8. To evaluate cross-country differences in human capital profiles, measured on the basis of formal education and cognitive skills in literacy and numeracy domains, across immigrants and natives in 15 European countries.</p> <p><i>H1.</i> Immigrants attain lower cognitive skills in literacy and numeracy in all analysed countries.</p> <p><i>H2.</i> Immigrants attain lower degree of cognitive skills use at work in all analysed countries.</p>	<p>Not supported</p> <p>Supported</p>
III	<p>Task 9. To explore cross-country differences in the dynamics of the cognitive skills in immigrants over the years since migration.</p> <p><i>H1.</i> Immigrants reveal positive cognitive skills' dynamics over post-migration years in all analysed countries.</p>	<p>Not supported</p>
III	<p>Task 10. To evaluate the cross-country variation in the unadjusted immigrant-native wage gap.</p> <p><i>H1.</i> There is substantial variation in the raw immigrant-native pay gap across analysed European countries.</p> <p><i>H2.</i> The smallest immigrant-native pay gaps are documented in the countries with the smallest cognitive skills gaps.</p>	<p>Supported</p> <p>Not supported</p>
III	<p>Task 11. To evaluate the effects of cognitive skills and their use at work (i.e. task-specific human capital) in explaining immigrant wage disadvantage across the 15 analysed countries.</p> <p><i>H1.</i> Cognitive skills provide limited explanation to the immigrant-native wage gaps in all analysed countries.</p> <p><i>H2.</i> Simultaneously controlling for skills and their use at work largely explains immigrants' wage disadvantage in all analysed countries.</p>	<p>Supported</p> <p>Not supported</p>
IV	<p>Task 12. To explore the selection of young return migrants relative to non-migrants (stayers) and current migrants.</p> <p><i>H1.</i> Young return migrants are significantly different from both stayers and current migrants.</p> <p><i>H2.</i> Selection into return from current migrants is different compared to selection into return from stayers.</p> <p><i>H3.</i> Return migrants are relatively more educated and younger, compared to both stayers and current migrants.</p>	<p>Supported</p> <p>Supported</p> <p>Not supported</p>
IV	<p>Task 13. To analyse the young return migrant wage premium once back in the home country and explore its dynamics over the years after returning.</p> <p><i>H1.</i> Young returnees earn insignificant wage premium upon return.</p> <p><i>H2.</i> The wage premium to return migration increases over post-return years.</p>	<p>Not supported</p> <p>Supported</p>
IV	<p>Task 14. To evaluate the hypothesis that selection patterns and wage premium dynamics differ across young and older return migrants in Estonia.</p> <p><i>H1.</i> Older returnees have different socio-demographic profile, compared to young returnees.</p> <p><i>H2.</i> Older returnees experience different dynamics of wage premium to migration.</p>	<p>Supported</p> <p>Supported</p>

3.3. Limitations and suggestions for future research

The studies presented in this thesis encounter a number of limitations. This section discusses major shortcomings associated with each of the thesis studies. While the acknowledged limitations do not affect the consistency and stability of the findings, they need to be considered when interpreting the results. Furthermore, they suggest a narrative for further research, which will be discussed in this section.

Gender wage disparities and human capital (study I)

The major limitations of Study I are related to the database used for the analysis and the methodological approach. The PIAAC data has a strong advantage of providing the actual cognitive skills scores for adult respondents. So far it has been the only European database measuring cognitive competencies of the adult population. However, the first limitation relates to the procedure for measuring the test scores and the PIAAC design. Obviously, a test-based cognitive skill measure may not reflect the whole scale of individual ability, as the tasks may target some specific aspects of the literacy, numeracy and problem-solving domains, while ignoring other dimensions. Moreover, the respondents did not necessarily exert maximal effort in solving the test tasks, since correct solutions were not monetarily incentivised. However, the latter limitation, if valid at all, is not expected to yield correlated deviations, due to high sample randomisation. Another shortcoming of the PIAAC data, especially relevant in the context of Study I, is the fact that work history was not available. Since the PIAAC data do not observe years of labour market experience or employment spells, the analysis does not account for gender differences in labour market experience. Hence, despite the study having controlled for current occupation and industry, as well as for on-the-job training, the actual association between work experience and skill profile cannot be analysed. However, all in all, the benefit of the PIAAC data clearly dominates over its weaknesses, as it is the best available European database of adult abilities. Nevertheless, it is important to acknowledge that the aforementioned limitations are relevant for all PIAAC-based studies.

The methodological limitations of Study I predominantly relate to the non-parametric $\tilde{\text{Nopo}}$ -type decomposition. First, non-parametric decomposition faces high-dimensionality concerns, implying that matching is based on multiple parameters and the greater the number of characteristics, the more unlikely it is to find a match. In light of this limitation, the main analysis accounts only for traits most relevant from the human capital perspective (age, immigrant status, formal education and three skills domains). These characteristics are assumed to largely reflect human capital, and since the aim is to identify gender-specific human capital profiles, it makes no sense to include variables unrelated to human capital in the matching algorithm. Second, due to the technical features of the $\tilde{\text{Nopo}}$ decomposition, the full set of ten plausible values

cannot be incorporated in the analysis. Therefore, the main empirical analysis includes only the first plausible value of each skill domain, supported by additional robustness checks.⁴

Other acknowledged limitations of Study I relate to the empirical results. First, the decomposition analysis (based on Ñopo and Oaxaca-Blinder decomposition techniques), even when controlling for cognitive abilities, leaves a remarkable share of the gender pay gap unexplained. However, this finding is in line with earlier studies (Anspal 2015a and 2015b) and is largely associated with the unobserved effects of discrimination, non-cognitive abilities, gender preferences, *etc.* Moreover, in terms of gender gaps in cognitive abilities, the data in hand do not allow us to separate the effects of nature vs. nurture on cognitive skills formation among males and females.

Therefore, the results and current limitations of Study I suggest that future analysis of the gender pay gap should shed more light on the factors, which so far remained unexplained. Specifically, in the gender wage gap context, there are other unobserved factors that reinforce the wage gap and which are unrelated to the labour market and human capital theories. One of the strongest factors are gender norms and related behavioural prescriptions (Bertrand et al. 2015). From the methodological perspective, the assessment of a gender pay gap should account for psychological factors and family-level motives, as they may play a significant role in labour market decisions and, hence, earnings. For instance, gender preferences for home vs. labour market production, as well as for the types and characteristics of job, largely reflect on human capital investments, employment, and consequently, earnings. Furthermore, the question of nature vs. nurture remains highly relevant. To disentangle the effect of the two, one needs to go beyond the standard framework of empirical labour market studies and investigate the biological and psychological background, as well as develop the relevant theoretical foundations.

Immigrant-native wage gaps and human capital (studies II and III)

Since studies II and III rely on the same PIAAC database, they encounter similar data-related limitations. However, because of the different focus group (immigrants vs. natives), different data shortcomings come into play. The biggest limitation of the PIAAC data, in the context of migration studies, is the non-availability of the country in which formal education was obtained. Accounting for education origin would have made it possible to isolate the part of the gap arising from the actual differences in educational standards and curricula across host and home countries. Furthermore, the years of actual schooling are not included in the PIAAC survey, resulting in another limitation for the analysis, since the actual duration of studies matter a lot for skills

⁴ The robustness check revealed no systematic differences across decomposition results, taking all ten plausible values into account one-by-one.

accumulation,⁵ especially in the case of enrolment in studies without graduating, and may drastically differ across immigrants and natives.

As the analysis relies on broadly defined self-reported questions to derive skill use levels, several limitations have to be recognised. First, respondents may misreport their actual skill use. Since each question applies to both the characteristics of a job and individual effort, we can expect response biases to go both ways. Generally, respondents are expected to have a greater propensity to over report their true effort at work, rather than under report it, as they may wish to appear more skillful in the eyes of an interviewer. Although, some workers may report lower skill use frequencies, for instance, if respondents are employing different types of skills simultaneously and put less emphasis on a certain domain. Furthermore, since background questions and ordinal answers are quite broad, respondents may reply with less precision, which yields higher standard errors. Since both highlighted issues do not imply correlated deviations, they should not bias the estimates.

In terms of the methodological approach and empirical findings, several limitations arise, especially in the context of post-migration skills dynamics. The major limitation to be acknowledged relates to the cross-section data. First, there may exist a sizeable cohort effect (Borjas 1985 and 2015). Immigrants arriving now may be substantially different from earlier cohorts. Moreover, the data in hand leaves the possibility that cognitive skill dynamics is, to some extent, attributed to the change in the composition of immigrants over years with respect to their country of origin. The lack of data on source country is one of the major drawbacks. Several studies have documented substantial changes in the source country composition of immigrant flows over recent decades, and associated changes in the human capital profile of immigrants (Antecol et al. 2003). Hence, incorporating the home country effects could potentially explain the skill dynamics in more detail. Another correlated factor could be non-cognitive skills, as they may be strongly related to cognitive traits. The association between non-cognitive traits, such as self-confidence, diligence and sense of purpose, have an intuitively strong relationship to cognitive abilities. Since the studies do not control for those, the estimated coefficients of the skills dynamics should be interpreted with caution.

The cross-country results presented in Study III reveal important insights about the skills dynamics and immigrant-native wage gap in Estonia. Negative dynamics of cognitive skills and significant immigrant-native wage gap even after controlling for skills and their use at work may largely relate to (i) the peculiarity of the immigrant sample in Estonia, and (ii) the specificity of the PIAAC test in Estonia compared to other EU countries. In terms of sample specificity, immigrants are defined as people born abroad. Given the sizeable

⁵ The formal requirements in terms of the duration of studies needed to obtain a degree in a specific field may vary across countries. Medical doctors could be one example, where the number of education years and specific content of the overall programme differs across European and non-European countries.

Russian minority in the country, a lot of Russian-origin respondents may identify as immigrants, although they have lived in Estonia for decades. In addition, ethnic Estonians may still appear as immigrants, if they were born outside Estonia.⁶ In terms of test specificity, Estonia was one of the test countries, where it was possible to conduct the survey in Estonian and Russian. Therefore, the literacy skill of those who did the test in Russian is not identical in terms of labour market valuation as for those who conducted the test in Estonian. Obviously, the Russian language may provide value added in terms of wages; however, only when it comes as a second language for respondents who are fluent in Estonian. Concerning the respondents who did the test in Russian, it is quite likely that the choice of language is motivated mostly by poor knowledge of Estonian, and to a less extent, by strong ethnic identification. Unfortunately, the non-availability of the test language variable does not allow us to investigate the Estonian immigrant sample in detail and disentangle the factors explaining the peculiar skill dynamics and wage gap findings.

In light of the research limitations associated with studies II and III, several research narratives are relevant for the future. First, the role of source country (region) and varying home country selection patterns needs to be accounted for, mainly because the source country and human capital composition of migration flows has changed dramatically over recent decades. Second, an explicit analysis of gender aspects may reveal important implications. Studies II and III report gender-pooled findings; however, the literature discussed certain gaps in labour market integration and performance of male and female immigrants. Third, the non-cognitive aspects of human capital need to be addressed. Non-cognitive abilities largely moderate the cognitive traits and the use of cognitive skills at work. Importantly, non-cognitive abilities, such as self-confidence and internal locus of control, were found to be significantly associated with occupation progression and wage rates. Therefore, immigrant-native disparities in non-cognitive abilities have to be theoretically and empirically investigated. Fourth, and most important, the Estonian case requires further research attention. Specifically, in the context of defining immigrants in Estonia and distinguishing between different groups of the foreign- and home-born population, and accounting for ethnicity and nationality.

Returnee-stayer wage disparities and human capital (study IV)

When discussing the results of Study IV, it is important to acknowledge several general and database-specific limitations. The major limitation relates to the identification of returnees in the EE-LFS and EPHC samples. The structure of the EE-LFS data does not allow us to disentangle long-term migration from short-term mobility (commuting, circular migration). Hence, the return migrants may have a multiple return history. Moreover, long-term migration may be underestimated, as EE-LFS data only covers two years of employment history.

⁶ The statement mostly concerns Estonian people who were forced to move away from Estonia during the Soviet occupation in the 1940s through to the 1980s.

The major limitation of the EPHC data is the definition of returnees. Since the EPHC questionnaire does not specify explicitly the reasons for living abroad, the returnee sample includes those staying in a foreign country due to reasons other than work (e.g. studies, family reunion, other reasons). Therefore, temporary migration identified using the EPHC dataset is not only associated with employment. Nonetheless, both databases provide a reliable and relatively rich source of data for return migration studies, especially, when it comes to the analysis of selection on observable characteristics and post-return wage profiles. Another shortcoming related to the structure and content of the data is the fact that cognitive and non-cognitive skill domains are unavailable. Apparently, cognitive skills are strongly correlated with formal education; however, education degree does not perfectly reflect ability. The limitation is particularly valid for young returnees who used to work abroad, as their foreign experience has resulted in specific skills, knowledge and non-cognitive traits developed abroad. These are in no way captured by formal education, especially if the degree was obtained before the mobility.

The major methodological limitation of the study relates to self-selection into migration and, later, into return. Study IV does estimate three binary selection models (returnee-stayer, returnee-migrant and migrant-stayer), controlling for a large set of background and employment traits. However, this does not rule out the selection effects completely. Therefore, the selection results need to be interpreted with caution, keeping in mind that the paper provides only suggestive evidence. Furthermore, one needs to acknowledge that when analysing the wage outcomes of returnees vs. stayers, the data on merely successful cases are used. Namely, the data observes only successful matches, when actual wage of returnees satisfies their reservation wage constraint. Other returnees who earn less than stayers might have benefits from returning home other than their wage rate (i.e. reunification with a family, etc.). Moreover, due to a higher reservation wage, some returnees may stay out of the labour market. Hence, observing only the wage rates of currently employed returnees may provide a biased picture of successful reintegration.

Therefore, the results of Study IV suggest that further research should focus on (i) methodological advancements and (ii) background data improvements. First, the self-selection issue needs to be addressed; for instance, by applying the Heckman selection model. Second, potentially strong endogeneity concerns and omitted variable bias, induced by the non-availability of cognitive and non-cognitive abilities, suggests the need to collect further data (i.e. conducting surveys and questionnaires among returnees, applying registry data). Third, given the evidence that the post-return wage premium tends to evolve over the years after reintegration, wage dynamics should be traced over a longer period than five years. The registry data on employment and wages may have considerable benefits in this respect, as it allows us to follow both employment (career) dynamics and wages.

All in all, the results of the thesis point toward a number of important aspects for future research. Most importantly, the results from the four empirical case

studies revealed that the association between human capital and the labour market is not always in line with, or is weakly explained by existing theories. This suggests that the theories behind human capital and the labour market need to be developed further, accounting for the most relevant factors. These relevant factors are largely identified by the data and the empirical studies included in this thesis. First, the theories about the role of human capital on the labour market need to incorporate productive human capital (i.e. dimensions which are actively used on the labour market and are generating positive wage returns). Formal education and the net stock of skills do have their value, however, from the labour market perspective, and what matters most is how efficiently and how fully this knowledge and these skills are used at work.

Second, the theories have to take into account various contextual factors. Ignoring the role of preferences in the gender pay gap context, or the role of taste discrimination in the migration case leads to oversimplified theoretical models, which weakly represent reality. The findings of the thesis, particularly in the gender pay gap context, clearly indicate that the unobserved factors largely distort the association between human capital (cognitive skills) and wages. Hence, to better understand the role of pure human capital in shaping the wage returns of men and women, one needs to recognise the confounding effects which are largely unobserved and need theoretical grounding. Therefore, while the empirical case studies provide important input for understanding the current state of the world, developing the background theories would contribute to understanding the actual factors shaping this current context, the nature of the factors and the associated mechanisms.

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ANNEX

Annex A1. Summary of the literature on gender, human capital and labour market

Dimension	Immigrants' gap	Factors	Reflection on labour market
<p>Formal education (level, years of schooling)</p>	<p>The gender gap narrowed down (Becker et al. 2010, Goldin et al. 2006), and even reversed in favour of females (Gemici and Wiswall 2014).</p>	<ul style="list-style-type: none"> - Schooling-related factors: children perform better with same-gender teacher, thus, female dominance in school education should benefit girls (Carrell et al. 2009, Dee 2005). - Economic and social factors: advancement in the educational systems, which banned gender discrimination and enforced equal access and admission procedures in higher education improved females' education (Blau and Kahn 2017); various welfare reforms, including a childcare provision, increased female incentives to obtain education (Blundell et al. 2016); advancements in family planning and health programs influencing fertility (Goldin and Katz 2002), as well as improvement of household technologies (Greenwood et al. 2005) foster female education. - Cultural and family effects: gender equality and weak gender stereotypes enforce females' educational achievements (Nollenberger et al. 2016); parental education affects children, with mother's education affecting girls' educational level, and father's education benefiting boys (Van Hek et al. 2015); family welfare affects boys and girls education differently, with girls having stronger negative influence (Author et al. 2016b). 	<p>Labour market may value foreign education less, compared to local, due to non-recognition (Duleep and Regets 2002), which reflects pure discrimination and mistrust, as well as due to non-transferability (Chiswick and Miller 2009, Friedberg 2000), implying that skills developed abroad are less applicable in a host country. However, explanatory power of formal education has decreased, implying that immigrants' formal education, by itself, will not yield wage returns identical to otherwise similar natives (Barrett et al. 2006). The latter is due a number of important human capital traits (actual quality of skills and experience), not reflected by education.</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
		<ul style="list-style-type: none"> - Individual factors: preference for home vs. work production has a strong impact on college enrolment (Gemici and Wiswall 2014); gender gap in non-monetary costs, such as relative satisfaction and joy of studying, may favour girls and drive their enrolment rates up (Becker et al. 2010, Goldin et al. 2006). - Schooling-related factors: teachers' bias towards boys' superior ability in STEM may deter girls from entering the field (Lavy and Sand 2015). - Cultural and family effects: gender identity perceptions and gender stereotypes are documented to affect females' educational and future career choices, and, thus university majors (Correll 2001). - Individual factors: choice of study major can relate to gendered preferences for future job attributes and characteristics (Wiswall and Zafar 2018); a pure taste for different college majors may matter in differential major choices across men and women (Gemici and Wiswall 2014); relative attractiveness of specific majors may differ for men and women, resulting in gender gap in attitudes and actual choices of majors (Else-Quest et al. 2010). 	
<p>Contents of education (university / college major)</p>	<p>University (college) majors remain strongly gendered. Women hold more degrees in humanities, social sciences, while men in STEM majors (Blau et al. 2014, Ceci et al. 2014).</p>		<p>Host country non-recognition of foreign education quality and lack of trust in immigrants' human capital results in wage disadvantage and occupation-qualification mismatch (Duleep and Regets 2002). However, origin of education largely determines its quality and valuation in the host labour market (Haley and Taengnoi 2011, Amuedo-Dorantes and De la Rica 2007). Actual quality of schooling is an important factor inducing non-recognition of human capital and yielding wage penalty for immigrants (Sweetman 2004). Field of education may also affect immigrant-native wage gaps, with the lowest gap in technical and engineering majors (Galarnau and Morissette 2004).</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
Work experience	<p>Male-female gap declined significantly (Blau and Kahn 2017), with female's average work experience increasing over last two decades (Gayle and Golan 2012, Blau and Kahn 2006).</p>	<ul style="list-style-type: none"> - Employment-related factors: job interruptions due to pregnancy and childcare negatively reflect on accumulated experience (Blau and Kahn 2017, O'Neill 2003); discrimination and job entry barrier negatively affect females' work experience accumulation (Goldin 2014, Reuben et al. 2014), while occupation and industry segregation disfavour accumulation of occupation- and industry-specific experience in male-dominated fields (Blau and Kahn 2017). - Economic and social factors: advancements in family planning (Bhat 2002, Bledsoe et al. 1995), female emancipation (Guiso et al. 2008) affect females' work experience accumulation positively; childcare- and motherhood-related state-level policies foster females' labour market attachment (Blundell et al. 2016). - Cultural and family effects: level of gender equality and persistence of stereotype threat (Nollenberger et al. 2016), as well as intergenerational transmission of gender stereotypes and roles (Johnston et al. 2013) largely affect females' employment decisions, on-the-job skills accumulation. - Individual factors: gender difference in competitive behaviour and responds to competitive environments largely affect female experience on intensive and extensive margins (Niederle and Vesterlund 2010); gender gap in preferences for home vs. work production determines the extent of labour market commitment and largely explains females' disadvantage in work experience (Blau and Kahn 2017). 	<p>Lack of host country labour market experience is a strong driver of immigrants' wage gap (Reitz et al. 2014). Non-recognition, undervaluation of immigrants' foreign-acquired experience results in wage penalties and restrict employment opportunities of immigrants (Borjas 2000). Non-transferability of immigrants' experience results in wage penalty (Friedberg 2000).</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
Cognitive skills: mathematical, technical, verbal and literacy abilities	<p>Gender gap in mathematics favouring males appears already in early age (Fryer and Levitt 2010, Machin and Pekkarinen 2008). The gap persists in adult age, with females, on average, underperforming in STEM abilities (Degol 2017, Ellison and Swanson 2010). Females, on average, outperform males in verbal skills, both at early age (Guiso et al. 2008, Goldin et al. 2006), and in adult years (Nowell 1995)</p>	<ul style="list-style-type: none"> - Schooling-related factors: differential treatment by teachers, encouraging and supporting predominantly boys' mathematical abilities (Lavy and Sand 2015, Leinhardt et al. 1979); quality of schooling is more consequential for boys, implying that boys will benefit relatively more from high-quality schooling, compared to girls (Author et al. (2016a). - Employment-related factors: low expected future earnings due to various factors, including discrimination (Goldin 2014, Altonji and Blank 1999), occupation and industry segregation (Blau and Kahn 2017) deter females from investments in own skills (Polachek 1975); job interruptions due to pregnancy and childcare may result in human capital depreciation (Blau and Kahn 2017, O'Neill 2003). - Economic and social factors: higher cognitive achievements of women are fostered by female emancipation, political empowerment and economic activity rates (Guiso et al. 2008), as well as welfare reforms, specifically those related to childcare provision and hedging women against labour market drop-out (Blundell et al. 2016). - Cultural and family effects: females achieve higher mathematical abilities when exposed to gender-equal culture (Nollenberger et al. 2016, Pope and Sydnor 2010, Hyde and Mertz 2009, Guiso et al. 2008); but even in the gender-equal countries, the stereotype that men are better than women in mathematical abilities can persist and decrease females' investments in own math skills (Niederle and Vesterlund 2010); 	<p>Lack of host country specific skills and knowledge is the major driver of ethnic wage gap and, unless taste discrimination persists, the immigrant-native specific skills gap narrows down over time in a host country (Ferrer and Riddell 2008). Measurable ethnic disparities in cognitive skills (verbal, technical, mathematical) generate immigrant-native pay disparity (Smith and Fernandez 2017, Nordin and Rooth 2009).</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
		<p>stereotype threat reduces females' mathematics skills' investments and performance (Bleeker and Jacobs 2004, O'Brien and Crandall 2003); parental perceptions (Bhanot and Jovanovic 2005), as well as inter-generational transmission of gender stereotypes and roles (Johnston et al.2013) matter a lot for children's long-term educational achievements, measured by mathematics and reading scores.</p> <p>- Individual factors: gender gaps in cognitive skills may be related to biological differences (Spelke 2005); gendered preferences for home vs. work production, may negatively affect females' investments into own skills (Blau and Kahn 2017); gendered life goals also strongly relate to incentives to invest in skills, with women having stronger priority for household (Hakim 2007).</p>	

Dimension	Immigrants' gap	Factors	Reflection on labour market
<p>Non-cognitive skills, preferences and personality traits</p>	<p>Among the early-age gender gaps, girls possess stronger social and behavioural skills profiles (DiPrete and Jennings 2012). In adult age, females have stronger risk aversion and lower propensity to negotiate or compete (Blau and Kahn 2017, Gneezy et al. 2003), however women possess richer interpersonal skills (Blau and Kahn 2017). Females are found to have lower motivation to pursue career (Chevalier 2004), lower self-esteem and stronger preference for people/family, as compared to money/work (Fortin 2008).</p>	<p>- Economic and social factors: females' self-confidence is positively affected by the improvement in educational system, which allowed gender-equal access to education and banned gender discrimination (Blau and Kahn 2017). - Cultural and family effects: gender identity, stereotypes prescribing certain behavioural patterns drastically affect females, their confidence and determination (Niederle and Vesterlund 2010); family influences, particularly parents' endorsement of of gendered stereotypes undermines their daughters' confidence in own abilities (Niederle and Vesterlund 2010); however, parental support and appraisal strengthen their children' confidence (Bhanot and Jovanovic 2005). - Individual factors: gender gaps in non-cognitive traits may largely relate to biological factors (Spelke 2005); gender gap in priorities and career ambitions may reflect on females' willingness to compete, bargain and keep determination when (Hakim 2007), thus, priority for home production may weaken females' non-cognitive traits important for employers.</p>	<p>Language command has positive association with wage outcomes and negative with immigrant-native pay gap (Van Tubergen and Kalmijn 2009, Chiswick and Repetto 2001). Furthermore, language proficiency fosters economic and social integration, opens new employment possibilities, helps to build up work and private networks (Lai et al. 2017, Beyer 2016, Chiswick and Miller 2003, Dustmann 1997).</p>

Annex A2. Summary of the literature on immigration, human capital and labour market

Dimension	Immigrants' gap	Factors	Reflection on labour market
<p>Formal education (level, years of schooling)</p>	<p>Immigrants are, on average, holding lower education, than natives (Reitz et al. 2014, Chiswick 1986). But, average education of immigrants have mostly improved over recent decades (De la Rica 2007, Barrett et al. 2006).</p>	<ul style="list-style-type: none"> - Selection and sorting: average educational profile is largely determined by selection into migration (Belot and Hatton 2012, Grogger and Hanson 2011, Borjas 1999). - Origin of human capital: immigrants coming from relatively poor countries with weaker education systems, are more likely to hold lower education degree, relative to natives (Friedberg 2000). 	<p>Labour market may value foreign education less, compared to local, due to non-recognition (Duleep and Regets 2002), which reflects pure discrimination and mistrust, as well as due to non-transferability (Chiswick and Miller 2009, Friedberg 2000), implying that skills developed abroad are less applicable in a host country. However, explanatory power of formal education has decreased, implying that immigrants' formal education, by itself, will not yield wage returns identical to otherwise similar natives (Barrett et al. 2006). The latter is due a number of important human capital traits (actual quality of skills and experience), not reflected by education.</p>
<p>Quality (contents) of education</p>	<p>The quality of schooling, even if holding formally identical degrees, may differ across immigrants and natives (Green and Worswick 2012), due to (i) actual differences in home and host countries education systems, curricula (Friedberg 2000); (ii) different skills associated with certain degree/diploma in host and home countries (Reitz 2001).</p>	<ul style="list-style-type: none"> - Selection and sorting: immigrants holding certain majors may self-select into host countries (Borjas 2008). - Origin of human capital: education, acquired in a source country, may yield different content and/or lower quality, as well as imply different and/or less skills, relative to identical host country degree (Green and Worswick 2012); formal education credential may be undervalued due to mere non-recognition, or lack of knowledge about the actual quality of schooling (Eckstein and Weiss 2004); formal education credential may be undervalued due to mere non-recognition, or lack of knowledge about the actual quality of schooling (Eckstein and Weiss 2004). 	<p>Host country non-recognition of foreign education quality and lack of trust in immigrants' human capital results in wage disadvantage and occupation-qualification mismatch (Duleep and Regets 2002). However, origin of education largely determines its quality and valuation in the host labour market (Hailey and Taengnoi 2011, Amuedo-Dorantes and De la Rica 2007). Actual quality of schooling is an important factor inducing non-recognition of human capital and yielding wage penalty for immigrants (Sweetman 2004). Field of education may also affect immigrant-native wage gaps, with the lowest gap in technical and engineering majors (Galarneau and Morissette 2004).</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
Work experience	Formally identical work experience of immigrants and natives may be qualitatively different, due to differential job requirements, contents and procedures in home and host countries (Galarneau and Morissette 2004).	<ul style="list-style-type: none"> - Origin of human capital: work experience accumulated in home country may be of different type, quality, skill-requirements and skill-intensity, compared to host country experience (Green and Worswick 2012). - Host country employment factors: statistical and taste discrimination can deter immigrants from work experience accumulation in a host country, widening immigrant-native gap even further (Skuterud 2010, Brekke and Maste-kaasa 2008, Arrow 1973); formal immigration procedures in a host country can restrict immigrants' employment opportunities, especially if high-skilled migrants may be forced to accept visas for low-skilled jobs (Minns 2005); non-recognition of work experience gained abroad results in perceived (not necessarily actual) immigrant-native gap in quality and valuation of experience (Green and Worswick (2012). 	Lack of host country labour market experience is a strong driver of immigrants' wage gap (Reitz et al. 2014). Non-recognition, undervaluation of immigrants' foreign-acquired experience results in wage penalties and restrict employment opportunities of immigrants (Borjas 2000). Non-transferability of immigrants' experience results in wage penalty (Friedberg 2000).

Dimension	Immigrants' gap	Factors	Reflection on labour market
<p>Cognitive skills (literacy, numeracy) and specific skills</p>	<p>Immigrants generally have lower literacy, verbal, technical and mathematical skills, compared to natives (Bussi and Pareliussen 2015, Nordin and Rooth 2009, Bomikowska, et al. 2008, Ferrer et al. 2006). Immigrants are often lacking country-specific skills (knowledge, abilities), reflecting the abilities that are valued and demanded by the labour market (Zibrowius 2012, Riddell 2008).</p>	<p>- Selection and sorting: immigrant-native skill gap upon arrival is largely shaped by migration (Belot and Hatton 2012, Antecol et al. 2003).</p> <p>- Origin of human capital: home country determines transferability of immigrants' skills to the host country (Freidberg 2000, Chiswick 1987); home country acquired education may imply different types and extents of skills, compared to host country degree (Green and Worswick 2012); however, if immigrants have initially less, or low-transferable skills, they are more prone to develop them over time in a host country (Duleep 2007); cultural background can also affect cognitive skills directly, for instance, mathematical abilities of females originating from gender-unequal cultural backgrounds (Nollenberger et al. 2016).</p> <p>- Host country employment factors: job entry barriers, discrimination, employers mistrust in immigrants abilities reduce employment opportunities of immigrants and induce occupation-qualification mismatch, resulting in (i) inability to improve skills via on-the-job training, (ii) further depreciation of existing skills (Reitz et al. 2014, Chiswick and Miller 2010).</p> <p>- Host country factors other than employment: integration policies may facilitate improvement of immigrants' abilities (Sarvimäki and Hämäläinen 2016).</p>	<p>Lack of host country specific skills and knowledge is the major driver of ethnic wage gap and, unless taste discrimination persists, the immigrant-native specific skills gap narrows down over time in a host country (Ferrer and Riddell 2008). Measurable ethnic disparities in cognitive skills (verbal, technical, mathematical) generate immigrant-native pay disparity (Smith and Fernandez 2017, Nordin and Rooth 2009).</p>

Dimension	Immigrants' gap	Factors	Reflection on labour market
Language command	Immigrant-native gap in host country language command is, commonly, large and significant and, albeit it gradually narrows over years since immigration, it always persists to certain extent (Beyer 2016, Van Tubergen and Kalmijn 2009, Portes and Rumbaut 2006).	<p>- Individual factors and preferences: age-at-migration largely affects (i) amount of human capital accumulated in the home country, (ii) investments into human capital in host country (Schaafsma and Sweetman 2001, Friedberg 2000), thus, younger immigrants are more prone to catch-up with natives.</p> <p>- Host country factors other than employment: host country integration policies matter a lot for language acquisition, specifically, numerous policy actions aim to facilitate immigrants' local language proficiency (Anniste and Tammaru 2014, Triadafilopoulos 2011); host country environment, living in a language-intensive community, exposure to host country language matters a lot for immigrants' language proficiency (Raijman et al. 2015, Chiswick and Miller 1996).</p> <p>- Individual factors and preferences: speed of host country adaptation and learning is found to affect immigrants' language acquisition (Chiswick and Miller 2012, 2003 and 2002); family and neighbourhood characteristics, that may affect immigrants' language acquisition (Nordin and Rooth 2009); general knowledge and skills also affect language acquisition (Heckman 1976), thus degree of language command may relate to education (Dustmann 1997); migration intensions largely shape propensity to acquire host country language, with high learning likelihood of immigrants planning to stay longer or permanently (Geurts and Lubbers 2017, Bijwaard 2010).</p>	Language command has positive association with wage outcomes and negative with immigrant-native pay gap (Van Tubergen and Kalmijn 2009, Chiswick and Repetto 2001). Furthermore, language proficiency fosters economic and social integration, opens new employment possibilities, helps to build up work and private networks (Lai et al. 2017, Beyer 2016, Chiswick and Miller 2003, Dustmann 1997).

SUMMARY IN ESTONIAN – KOKKUVÕTE

Inimkapital ja tööturu erinevused

Motivatsioon ja kontseptuaalne idee

Viimastel aastakümnetel on inimkapitalist saanud üksikisikute tööturuedu määrav tegur ning üldiste majandustulemuste oluline mõjutaja. Inimkapital hõlmab inimese produktiivseid võimeid, oskusi, teadmisi, kogemusi ja käitumisjooni. Nii klassikalised kui ka uued teooriad rõhutavad inimkapitali eri elemente, eritledes konkreetseid produktiivsuse aspekte, mida seostatakse teatud oskuste ja võimetega. Kõikide teooriate ühisjoon on aga inimkapitali seostamine tööturukasuga. Uusimad ametipõhise ja konkreetsete tööülesannetega seotud inimkapitali teooriad (Lazear 2009, Gibbons ja Waldman 2006, 2004) rõhutavad, et üksikisiku võimekusprofiili kujundab töökoht ja profiil areneb tööülesannete täitmise käigus. Käesolev uurimistöö käsitleb kognitiivseid oskusi, kogemuspõhiseid võimeid ja nende aktiivset töös rakendamist kui tänapäevase produktiivse inimkapitali peamisi karakteristikuid.

Inimkapitali erinevused põhjustavad lõhesid tööturutulemites. Eelkõige keskendub käesolev doktoritöö kolmele töötururühmale, mille tööhõive ja palgatase on eriti tundlikud inimkapitali erinevuste suhtes. Täpsemalt on need rühmad (i) mehed *versus* naised (I uuring), (ii) sisserännanud *versus* põliselanikud (II ja III uuring) ning (iii) kodumaale naasnud *versus* paikseks püsinud töötajad (IV uuring). Iga kooslus on erinev nii inimkapitali kujunemise, lõhe põhjuse kui ka selle seose poolest palgatasemega. Seega on kolme analüüsitud koosluse peamine kontseptuaalne erinevus inimkapitali erinevuste heterogeenne iseloom. Nende fundamentaalne sarnasus seisneb aga selles, et kõigil puhkudel on üksikisiku inimkapital üks peamisi tööturukasu määravaid tegureid. Seega võib mis tahes erinevus selles põhjustada märkimisväärseid lõhesid tööturusoortuses. Tabelis 1 on kokku võetud nelja uuringu kontseptuaalne raamistik.

Analüüsitud töötururühmad on teaduse ja poliitika seisukohalt eriti tähtsad. Paljud positiivsed arengusuundumused, näiteks paranenud ligipääs haridusele ja töökohtadele, naiste suurem tööhõive, sotsiaalse teadlikkuse tõus ja soolise võrdõiguslikkuse suurenemine ühiskonnas (Blau ja Kahn 2017), on vähendanud ajalooliselt suurt soolist ebavõrdsust ühiskonnas ja tööturul. Sooline palgalõhe on aga siiski üks peamisi lahknevusi, mis enamikul tööturgudel endiselt püsib. Eestis on sooline palgalõhe ikka veel kõige päevakajalisem küsimus. Siinne korrigeerimata palgalõhe oli 2016. aastal 25,3%⁷, mis teeb Eestist suurima palgalõhega riigi Euroopas. Soolist palgalõhet Eestis on käsitlenud mitmed uurimused (sh Meriküll ja Mõtsmees 2017, Anspal 2015a, Anspal 2015c, Anspal jt 2011). Eesti juhtumiuuringute ühine tulemus on inimkapitali klassikaliste mõõtmete (haridus ja töökogemus) ning tööhõivega seotud tunnuste (amet,

⁷ Allikas: Eurostati soolise palgalõhe statistika. Kättesaadav aadressil: http://ec.europa.eu/eurostat/statistics-explained/index.php/Gender_pay_gap_statistics

tööstusala, töölepingu liik jne) piiratud selgitusvõime, sest isegi nendega kontrollimisel jääb märkimisväärne osa palgalõhest endiselt seletamatuks.

Tabel 1. Uurimistöö kontseptuaalne raamistik

Uuring	Fookusgrupp	Inimkapitali määratlus	Inimkapitali erinevuste päritolu
I	Mehed vs. naised	Inimkapitali mõõdetakse kognitiivsete võimetega kirja-, arvutamise- ja probleemi-lahendusoskuses ning formaalse haridusega. Uurimuses eristatakse sooüleseid ja soospetsiifilisi inimkapitali profile. Viimati mainitu määratlemiseks kasutatakse konkreetsete karakteristikute erinevat jaotumist meeste ja naiste puhul ning inimkapitali soospetsiifilisi kombinatsioone (oskused, haridus).	Erinevate tööturuotsuste, tööturul osalemise määra ja soonormide mõjude tõttu võivad mehed tööturul sageli teatud oskusi omandada, samas kui naistele jäävad need enamasti kättesaamatuks. Selline lõhe võib olla tingitud meeste ja naiste ameti- või tööstusepõhisest selekteerimisest, mis põhjustab süstemaatilisi soopõhiseid erinevusi töökohal omandatavates oskustes ja teadmistes ning mistõttu meeste ja naiste inimkapitali profile ei saa omavahel võrrelda.
II ja III	Põliselanikud vs. sisserrännanud	Inimkapitali mõõde hõlmab kognitiivseid oskusi kirjutamise ja arvutamise vallas, formaalset haridust ning töötamisel kasutatavate oskuste kolme mõõdet, aproksimeerides konkreetsete tööülesannetega seotud inimkapitali, nimelt kirjaoskuse (lugemine ja kirjutamine), arvutamisoskuse ning info- ja kommunikatsioonitehnoloogiatega kasutamise.	Haridusliku, kultuurilise ja majandusliku tausta erinevused ning võimalikud lahknevused töökogemuses ja töökultuuris sisserrännanute ja põliselanike vahel võivad põhjustada kognitiivsete võimete märgatavat erinevust. Inimkapitali oskuste kasutamisega seotud komponentide erinevused seonduvad peamiselt puudustega vastuvõtva riigi tööturul. Sisserrännanutel võib olla piiratud ligipääs oskusi eeldavatele ametikohtadele ning raske karjääri teha. Samuti võib neil olla vähem tingimisvõimalusi töölabirääkimistel. Need tegurid vähendavad töökohal omandatavate oskuste kasutamise võimalusi ja põhjustavad süstemaatilisi erinevusi konkreetsete tööülesannetega seotud inimkapitalis.

Uuring	Fookusgrupp	Inimkapitali määratlus	Inimkapitali erinevuste päritolu
IV	Kodumaale tagasi pöördunud vs. paikseks püsinud	Inimkapitali mõõdetakse klassikaliste teooriate alusel (Becker 1962) hariduse ja töökogemuse kombinatsioonina. Kuna tegelikku töökogemust aastates ei mõõdetud, põhineb uuring tagasipöördunute ja paikseks püsinute tööturukogemuse kaudsel erinevusel, mis on tingitud tagasipöördunute kogemusest välismaa tööturul.	Välismaal töötamise kogemus annab tagasipöördunutele konkurentsieelise kaasmaalaste ees, kellel välismaal töötamise kogemus puudub. Omades kõiki muid tunnuseid, mis on võrreldavad paikseks püsinutega, pakuvad tagasipöördunud tööandjale nii kognitiivseid (teadmised, oskused, kogemus jne) kui ka mitte-kognitiivseid lisaväärtusi (sihikindlus, tahtejõud, avatud mõtteviis jne). Peale selle ei ole välismaal töötamise kogemus üksnes positiivne signaal, sest seda võib seostada ka mõningate konkreetsete oskuste ja välismaal omandatud väärtuslike teadmistega, mida võidakse kodumaisel tööturul väärtustada.

Inimkapitalist tingitud palgalõhesid käsitletakse kirjanduses laialdaselt kui rändest tingitud tööturu erinevuste peamisi tegureid. Võttes arvesse hiljuti suurenenud sisse- ja väljarändajate voolu ning sisse- ja väljarändajate lõimimise väljakutseid Euroopa tööturul ja ühiskonnas, on sisse- ja väljarändajate profiilide, tööturupotentsiaali ja kohanemisprobleemide analüüs muutunud taas tähtsaks. Paljud uurimused on näidanud, et sisse- ja väljarändajate inimkapitaliga seotud saavutused on suhteliselt tagasihoidlikumad, mille põhjuseks on (i) väljarännu negatiivne seleksioon (Borjas 1999, 1987); (ii) formaalset haridust tõendavate dokumentide ja kodumaise töökogemuse ülekantamatus (Friedberg 2000, Chiswick 1987); (iii) vastuvõtva riigi spetsiifiliste oskuste, teadmiste ja kogemuse puudumine (Reitz jt 2014, Zibrowius 2012); ning (iv) üldiste kognitiivsete oskuste ja vastuvõtva riigi keele oskuse puudumine (Van Tubergen ja Kalmijn 2009, Nordin ja Rooth 2009). Etniline palga- ja tööhõivelõhe on Eesti majanduses eriti terav probleem, arvestades ajalooliselt suurt vene vähemust. Varasemad uurimused on osutanud märkimisväärselt ebasoodsatele palga- ja tööhõivetingimustele, millega seisavad silmitsi vähemusrühmused, sh eriti vene päritolu inimesed (Pungas jt 2012, Toomet 2011, Tammaru ja Kontuly 2011, Kroncke ja Smith 1999). Viimase 30 aasta jooksul on etnilise eesti rahvastiku palgatulu pidevalt suurenenud, kuid etniliste vähemuste puhul ei ole positiivset dünaamikat täheldatud. Selle tulemuseks on suured palgaerinevused, tööhõivelõhe ning enamus- ja vähemuselanikkonna majanduslik segregatsioon (Leping ja Toomet 2008).

Kolmas uurimisküsimus – kodumaale tagasi pöördumine – pälvib kirjan- duses üha enam tähelepanu. Kesk- ja Ida-Euroopa riigid on kogenud noorte ja kõrgharidusega põliselanike märkimisväärset väljavoolu (Martin ja Radu 2012, Kahanec ja Zimmermann 2010, Brücker 2009). Eesti väljarände määr on Euroo- pas üks kõrgeimaid (Zaiceva ja Zimmermann 2016). Mitmed uurimused on analüüsinud Eestisse tagasi pöördujate karakteristikuid ja tööalast dünaamikat võrreldes paiksena püsinutega (Masso jt 2014, Hazans ja Philips 2009). Võttes arvesse välisriigi töökogemust ning välismaal omandatud teadmisi, oskusi ja isiksuseomadusi, tundub tagasipöördunute lõimimine ja nende välismaal oman- datud inimkapitali tõhusa rakendamise lihtsustamine kodumaal iseäranis tähtis ja ühtlasi keeruline (Dustmann ja Weiss 2007, Iara 2006). Just noorte kodu- maale naasjate puhul ei ole tegelikku inimkapitali profiili veel määratletud ega tagasipöördumisjärgse tööhõivega seotud väljakutseid uuritud. Need konkreet- sed küsimused on IV uuringu keskmes.

Kuna doktoritöö toob esile inimkapitalist tingitud palgalõhed kolmes koos- luses, võimaldab see testida seost üksikisiku inimkapitali ja tööturutulemite vahel eri nurga alt. Igas uuringus kasutatakse veidi erinevat inimkapitali mõõ- det, hõlmates nii klassikalisi mõõtmeid, näiteks haridust (kõik uuringud) ja kogemust (IV uuring), kui ka empiiriliselte uudseid kognitiivsete võimete näita- jaid (I, II ja III uuring) ning konkreetsete tööülesannetega seotud kognitiivseid võimeid (II ja III uuring). Igas taustuuringus keskendutakse konkreetsetele töö- turuerinevustega seotud mõõtmetele, nimelt palgalõhele (kõik uuringud) ja ametipõhiste erinevustele (II ja IV uuring) võrdlusgruppides, mis olid igas uuringus erinevad. Ehkki iga uuring kirjeldab üksikasjalikult ühte kindlat töö- tururühma, näitavad integreeritud tulemused, et erinevates kooslustes, eri tingi- muste ja mõjude puhul eksisteerib tugev seos inimkapitali ja palgataseme/töö- alase ebavõrdsuse vahel.

Uurimistöö eesmärk ja põhiülesanne

Doktoritöö üldine eesmärk on anda empiirilisi tõendeid siiani vähe uuritud inimkapitali mõõtmete rolli kohta erinevate töötururühmade palgatulemuste puhul, keskendudes uutele mõõtmetele. Täpsemalt olid fookusgruppides mehed *versus* naised, põliselanikud *versus* sisserännanud ning kodumaale tagasi pöör- dunud *versus* kodumaal paiksena püsinud. Fookusgruppide valik võimaldab uurida seoseid inimkapitali mõõtmete ja tööturutulemuste vahel erinevates kooslustes. Lähtuvalt eesmärgist osutab uurimus, kas varem teoreetiliselt aruta- tud, kuid empiiriliselte tähelepanuta jäetud inimkapitali aspektid aitavad tegeli- kult kaasa tööturutulemuste erinevuse suurendamisele või vähendamisele fookusgrupi sees. Seega pakub doktoritöö empiiriline teostus empiirilist tõestust varasemate uurimuste teoreetilistele ja hüpoteetilistele aruteludele.

Doktoritöö põhiliseks uurimiseesmärgiks seatakse inimkapitali uute mõõt- mete määratlemine ja kvantitatiivne mõõtmine ning samuti konkreetsete mõõt- mete grupisiseste erinevuste üksikasjalik uurimine. Kuigi tööturul esinevate

lõhede analüüs heidab valgust nende inimkapitali aspektide tegelikule rollile palgaprofiilide kujundamisel, toob inimkapitaliga seotud erinevuste põhjalik uurimine esile fookusgrupisisesest erinevuste aspektid ja ulatused. Inimkapitaliga seotud lõhede analüüs iseenesest on eriti oluline, sest võimaldab kaardistada seda mõjutavad tegurid ning uurida, miks need tegurid mõjutavad iga fookusgrupi liikmeid erineval moel. Uurimistöö põhiülesanne on eriti oluline poliitika seisukohalt. Sooliste või rändest tingitud tööturulõhedega toimetulek eeldab nende põhjuste ja mõjurite põhjalikumat mõistmist. Inimkapitaliga seotud lõhed kujunevad teatud mõjutajate tõttu ja nende mõjutajate väljaselgitamine võib lõpuks aidata erinevusi vähendada.

Uurimisülesanded ja -meetodid

Uurimistöö eesmärgi saavutamiseks kasutatakse uurimistöös käsitletavate konkreetsete fookusgruppide puhul spetsiifiliste uurimisülesannete kogumikku. Tabelis 2 esitatakse ülevaade uurimisülesannetest ning ka andmete allikatest ja empiirilistest vahenditest, mida konkreetsete ülesannete täitmisel kasutati.

Tabel 2. Ülevaade uurimisülesannetest, andmeallikatest ja empiirilistest meetoditest

Uuring	Uurimisülesanne	Andmed	Meetod
	Ülesanne 1. Anda üldine ülevaade kirjandusest, mis käsitleb inimkapitali soolisi ja rändega seotud erinevusi, nende tegureid ja mõju tööturul kõigi kolme töötururühma puhul.		
I	Ülesanne 2. Hinnata soolisi erinevusi kirja-, arvutamise- ja probleemilahendusega seotud kognitiivsete oskuste puhul.	PIAAC andmed Eesti kohta	Kirjeldav analüüs
I	Ülesanne 3. Kognitiivsete oskuste soospetsiifiliste kombinatsioonide kvantifitseerimine ja kvalitatiivne analüüs.	PIAAC andmed Eesti kohta	Ñopo dekompositsioon; Oaxaca-Blinderi dekompositsioon; kirjeldav analüüs
I	Ülesanne 4. Soopõhiste palgaerinevuste hindamine, võttes arvesse soospetsiifilisi tunnuseid ja palgatulu soospetsiifilistes profiilides.	PIAAC andmed Eesti kohta	Multidimensionaalne vähimruutude meetod; tingimuslik kvantilregressioon
II	Ülesanne 5. Hinnata sisserännanute ja põliselanike erinevust kirja- ja arvutamiseoskusega seotud kognitiivsete oskuste vallas ning oskuste kasutamise erinevat taset töös (s.t konkreetsete tööülesannetega seotud inimkapitali) 15st Euroopa riigist koosnevas näidisvalimis.	PIAAC andmed 15 ELi riigi kohta (valim)	Multidimensionaalne vähimruutude meetod

Uuring	Uurimisülesanne	Andmed	Meetod
II	Ülesanne 6. Analüüsida sisserännanute kognitiivsete oskuste dünaamikat vastuvõtvast riigis veedetud aastate jooksul.	PIAAC andmed 15 ELi riigi kohta (valim)	Multidimensionaalne vähimruutude meetod
II	Ülesanne 7. Mõõta tegelike kognitiivsete oskuste osakaalu ja nende kasutamist töös (s.t konkreetsete tööülesannetega seotud inimkapitali) sisserännanute ja põliselanike palgalõhes.	PIAAC andmed 15 ELi riigi kohta (valim)	Multidimensionaalne vähimruutude meetod
III	Ülesanne 8. Hinnata sisserännanute ja põliselanike piiriüleseid erinevusi inimkapitali profiilides, mõõdetuna formaalse hariduse ning kirja- ja arvutamisoskusega seotud kognitiivsete oskuste kaudu 15 Euroopa riigi põhjal.	PIAAC andmed 15 ELi riigi kohta	Kirjeldav analüüs; multidimensionaalne vähimruutude meetod
III	Ülesanne 9. Uurida riikidevahelisi erinevusi sisserännanute kognitiivsete oskuste dünaamikas rändele järgnevate aastate jooksul.	PIAAC andmed 15 ELi riigi kohta	Multidimensionaalne vähimruutude meetod
III	Ülesanne 10. Hinnata riikidevahelisi erinevusi sisserännanute ja põliselanike kohandamata palgalõhedes.	PIAAC andmed 15 ELi riigi kohta	Multidimensionaalne vähimruutude meetod
III	Ülesanne 11. Hinnata kognitiivsete oskuste ja nende kasutamise mõju tööl (s.t konkreetsete tööülesannetega seotud inimkapitali), selgitades sisserännanute ebasoodsat palgapositsiooni 15 analüüsitava riigis.	PIAAC andmed 15 ELi riigi kohta	Multidimensionaalne vähimruutude meetod
IV	Ülesanne 12. Uurida noorte tagasi-pöördujate valimit võrreldes paiksena püsinute ja praeguste väljarännanute-ga.	Eesti tööjõu-uuringu andmed	Binaarne (logistiline) regressioon
IV	Ülesanne 13. Analüüsida noorte tagasi-pöördunute palgapreemiat pärast kodumaale tagasi pöördumist ning vaadelda selle dünaamikat tagasitulekule järgnevatel aastatel.	Eesti tööjõu-uuringu ning Eesti rahva- ja eluruumide loenduse andmed	Multidimensionaalne vähimruutude meetod (Mincer'i tüüp); Oaxaca-Blinderi dekompositsioon
IV	Ülesanne 14. Hinnata hüpoteesi, et valikumustrid ja palgapreemia dünaamika on noorte ja vanemate tagasipöördunute puhul Eestis erinevad.	Eesti tööjõu-uuringu ning Eesti rahva- ja eluruumide loenduse andmed	Binaarne (logistiline) regressioon; multidimensionaalne vähimruutude meetod (Mincer'i tüüp); Oaxaca-Blinderi dekompositsioon

Doktoritöö ülesehitus

Doktoritöö koosneb sissejuhatusest ja kolmest peatükist, mis keskenduvad ülevaate andmisele kirjandusest, empiirilistele uuringutele ja nende arutelule.

Empiirilistele uuringutele eelneb põhjalik ülevaade uurimistöö teoreetilisest ja empiirilisest taustast 1. peatükis, mis koosneb kahest osast. Alapeatükk 1.1 on pühendatud inimkapitali üldistele teooriatele, tuues esile nii klassikalised kui ka uued inimkapitali teooriad. Kuna kogu uurimistöö põhioletus on tugev seos inimkapitali erinevuste ja tööturul esinevate palgalõhede vahel, tutvustavad 1. peatüki ülejäänud osad varasemaid teooriaid ja empiirilisi tõendeid, mis kolme huvipakkuva töötururühma kontekstis seda oletust kinnitavad. Nimelt keskendub alapeatükk 1.2 inimkapitali kujunemisele ning meeste ja naiste (jaotis 1.2.1), põliselanike ja sisserännanute ning kodumaale tagasipöördunute ja paiksena püsinute (jaotis 1.2.2) inimkapitali erinevustele.

2. peatükk koosneb neljast originaaluuringust. I uuring keskendub soolisele palgalõhele Eestis soospetsiifiliste inimkapitali profiilide puhul. II ja III uuring tuginevad samale kontseptuaalsele raamistikule, kinnitades, et sisserännanute ja põliselanike vahelised inimkapitali- ja palgaerinevused püsivad mitte üksnes erinevuste tõttu formaalses hariduses ja kognitiivsetes oskustes, vaid ka nende oskuste erineva töös kasutamise määra tõttu. Viimane ehk IV uuring vaatleb noorte kodumaale tagasi pöördumist kui tööjõu liikuvuse erijuhtu. Erinevalt II ja III uuringust tegeleb IV uuring tagasipöördunute ja nende kodumaal paiksena püsinud kaasmaalaste inimkapitali- ja palgaerinevustega.

3. peatükis on kokku võetud ja arutuse all iga uuringu leiud. Alapeatükk 3.1 annab lühikese ülevaate peamistest leidudest. Alapeatükk 3.2 seob leiud sissejuhatuses püstitatud uurimisülesannetega. Lisaks arutletakse alapeatükis 3.2 olulisemate leidude üle võimalike tegurite ja poliitikamõjude kontekstis. Viimane alapeatükk, 3.3, tõstab esile iga uuringu olulised piirangud ning arutleb, mida tuleb arvesse võtta tulemuste tõlgendamisel, pakkudes välja ideid ja edasisi uurimissuundi käesoleva doktoritöö panuste ja piirangute valguses.

Uuringute kokkuvõte ja arutelu

I uuring. Tverdostup, M., Paas, T. (2017). Gender-specific human capital: identification and quantifying its wage effects. *International Journal of Manpower*, Vol. 26, nr 6, lk 1–24.

Uuring keskendub soolisele palgalõhele Eestis individuaalse inimkapitali raamistikus. Uuringu peamine panus on uudne lähenemisviis inimkapitali rollile soopõhistes palgaerinevustes. Esiteks põhineb uuring PIAAC andmebaasil, mis võimaldab mõõta individuaalseid kognitiivseid võimeid kirja-, arvutamise- ja probleemilahendusoskuse puhul tehnoloogiarikas keskkonnas. See on üks esimesi uuringuid, mis kaasavad soolise palgalõhe analüüsi konkreetsete oskuste mõõtmega. Teiseks rakendab uuring mitut erinevat metodoloogilist meetodit inimkapitali rolli väljaselgitamiseks palgalõhes. Nimelt keskendub uuring oskuste ja

formaalse hariduse soospetsiifilistele kombinatsioonidele ehk soospetsiifilisele inimkapitalile. Tuginedes Ñopo-tüüpi dekompositsioonimeetodile (Ñopo 2008), kogub ja analüüsib uurimus soospetsiifilisi profile. Niisiis on tegu esimese uuringuga, mis analüüsib empiiriliselt soospetsiifilise inimkapitali karakteristiku- kuit ja palgatulu.

Uuringus kirjeldatakse olulisi soolisi erinevusi kognitiivsetes oskustes ning meeste- ja naistespetsiifilisi profile. Tulemused näitavad, et ainult meestest koosneval alavalimil on kognitiivsed võimed tasemel, milleni naised enamasti ei küüni. Täpsemalt näitavad tulemused, et meestele ainuomane inimkapital seisneb suurel määral üksikutes ja kombineeritud numbrilistes ja probleemi- lahendusvõimetes. See annab meestele tugeva konkurentsieelise, mida naised sageli ei saavuta. Naistespetsiifilises inimkapitalis domineerib kõrge formaalne haridus, samal ajal kui kõigi kolme kognitiivse oskuse puhul saavad naised ma- dalamaid tulemusi. On oluline, et meestespetsiifilist profiili iseloomustavad madalamad haridusalased saavutused, mis kombinatsioonis silmapaistvalt kõr- gete kognitiivsete oskustega viitab oskuste ja formaalse hariduse puudulikule seosele.

Üht olulisemat uuringus käsitletud küsimust, nimelt soospetsiifiliste profii- lide rolli soolise palgalõhe kujunemisel, käsitleti klassikalise multidimensio- naalse vähimruutude regressiooni ja tingimusliku kvantiilregressiooni meetodi abil. Üldiselt annab soospetsiifiline profiil nii meeste kui ka naiste puhul suu- rema sissetuleku kui sugudevahelised võrreldavad profiilid. Palgaerinevuste analüüs näitab aga siiski, et keskmine sooline palgalõhe soospetsiifiliste profiili- dega meeste ja naiste valimis on suurem võrreldes valimiga, kus meeste ja naiste profile sai võrrelda. Lisaks näitab soolise palgalõhe analüüs terve tulude jaotuse kohta märkimisväärset erinevust nii soospetsiifiliste kui ka sugudevaha- liste võrreldavate profiilide alavalimis. Tulemused näitavad veelgi suuremat „klaaslae“ efekti naiste puhul, kelle karakteristikuid meestel ei täheldatud, võrreldes naistega, kes oma oskuste ja hariduse poolest meestega „sobitusid“.

II uuring. Tverdostup, M., Paas, T. (2018). Immigrant-Native Wage Gap in Europe: the Role of Cognitive Skills and their Use at Work. *International Journal of Manpower* (ilmumas).

Selles uuringus analüüsitakse sisserännanute ja põliselanike palgalõhet ja selle põhjust. Uuring põhineb varasematel empiirilistel ja teoreetilistel tõenditel, mis käsitlevad inimkapitali rolli sisserännanute ja põliselanike erinevustes tööturul. Varasemas kirjanduses on räägitud erinevustest inimkapitali saavutustes, mis on üks peamisi tulude diferentseerimise mõjutajaid. Empiiriliste andmete puudu- mise tõttu on enamik varasemaid uurimusi kasutanud väga ebatäpseid inim- kapitali mõõtmise aluseid, mida on ühtlustatud formaalse haridusega ning pari- mal juhul vastuvõtva riigi keele oskamisega.

Uuring annab panuse tööturuteemalisse kirjandusse, kaasates kognitiivsed oskused kirja- ja arvutamisoskuse vallas, et aproksimeerida individuaalset inim- kapitali. Peale selle hõlmab inimkapitali mõõde isiku enda nimetatud sagedusi

oskuste kasutamise kohta tööl konkreetsetel tööülesannetel põhineva inimkapitali aproksimeerimiseks. Nimelt hõlmab oskuste kasutamise mõõde kirjaoskust (lugemis- ja kirjutamisoskust), arvutamisoskust ning info- ja kommunikatsioonitehnoloogia mõõdet. Seega seisneb käesoleva uurimistöo metodoloogiline panus inimkapitali teooria vaatepunktist inimkapitali multidimensionaalse mõõtme lisamises. See hõlmab nii klassikalisel teoorial põhinevaid aspekte, näiteks haridust ja kognitiivseid oskusi, kui ka mõõtmeid, mis lähtuvad uutest teoreetilistest lähenemisviisidest, nimelt tööl kasutatavaid ülesandepõhiseid oskusi.

Uuringus käsitletakse kolme peamist uurimisküsimust, mis põhinevad PIAAC andmetel 15st Euroopa riigist koosneva valimi kohta (Belgia, Hispaania, Iirimaa, Kreeka, Madalmaad, Norra, Prantsusmaa, Rootsi, Sloveenia, Soome, Suurbritannia, Taani ja Tšehhi Vabariik). Uurimistöo metoodiline tugevus seisneb OECD välja pakutud hindamisprotseduuri rakendamisel PIAAC andmetel põhinevas analüüsis. Nimelt tugineb uurimus kümnele tuletatud tunnusele iga oskustevaldkonna puhul ning kasutab nn Jackknife'i replikatsiooni meetodit, et õigesti hinnata standardvigu 80 replikatsioonikaaluga ning samuti populatsioonikaaludega täpsete keskväärtuste saamiseks.

Esiteks keskendub uurimus sisserännanute ja põliselanike kognitiivsete oskuste erinevustele, leides, et vastavalt varasematele uurimustele (Bonikowska jt 2008), saavutavad sisserändajad madalamaid tulemusi nii kirjaoskuse kui ka arvutamisoskuse vallas. Kognitiivsed võimed on aga erinevalt formaalsest haridusest siiski üsna dünaamilised ja tööturuga tihedalt seotud. Seega võivad sisserännanud vastuvõtvast riigis veedetud aja jooksul oma oskusi parandada, mis viib sisserännanute ja põliselanike kognitiivsete oskuste järkjärgulise ühtlustumiseni (Chiswick jt 2005). Sisserändajate kognitiivsete oskuste dünaamika vastuvõtjariigis moodustab käesoleva uurimistöo teise fookuspunkti. Sisserännanute rändejärgse kirja- ja arvutamisoskuse dünaamika näitab suuri puudujääke mõlemas oskuses vastuvõtjariiki saabudes. Uuringu leiud annavad tunnistust oskuste positiivsest dünaamikast vastuvõtjariigis veedetud aastate jooksul, kuid üksnes kõrgeima haridustasemega (kolmanda taseme hariduse, bakalaureuse-, magistri- või doktorikraadiga) sisserännanute puhul. Madala ja keskmise haridustasemega sisserännanud on vähem aldis vastuvõtjariigis veedetud aastate jooksul oma oskusi parandama.

Järgmine tähtis uurimisküsimus puudutab sisserändajate ja põliselanike kognitiivsete oskuste erinevust ja oskuste kasutamise erinevat määra etniliste palgalõhede selgitamisel. Tulemused näitavad, et ehkki kirja- ja arvutamisoskusega (lisaks demograafiaale, haridusele ja tööhõivekarakteristikutele) kontrollimine vähendab palgalõhet, ei selgita need veel täielikult palgaerinevusi, mis endiselt püsivad. Tõendid kinnitavad, et sisserännanud, kellel on samal tasemel kognitiivsed oskused, demograafilised karakteristikud, haridustase ja ISCO kategooria kui põliselanikel, teenivad ikkagi vähem. Kui aga analüüs võtab palgaregressiooni puhul arvesse kõikide oskuste kasutamist tööl, ei jää järele statistiliselt märkimisväärset erinevust sisserännanute ja põliselanike sissetulekutes. Seega kinnitavad järeldused ühelt poolt, et kõrgesti haritud sisserännanud

on aldis vastuvõtjariigis veedetavate aastate jooksul oma oskusi arendama ja parendama. Teisalt osutab uurimus, et ehkki sisserännanud omandavad oskusi põliselanikega võrreldaval tasemel, kasutavad nad neid tööl harvemini, sõltumata oma haridustasemest.

III uuring. Tverdostup, M., Paas, T. (2018). Skills heterogeneity and immigrant-native wage gap in European countries. *International Journal of Economic Sciences* (ilmumas).

Uurimus tugineb samale kontseptuaalsele raamistikule kui II uuring, kuid püstitab erinevad eesmärgid. III uuringu põhifookus on uurida üksikasjalikult sisserännanute profiile, nende oskusi ja sellega seonduvat palgalõhet iga riigi puhul eraldi. Seega on uurimuse peamine väljund PIAAC andmetel põhinev sisserännanute deskriptiivne analüüs ja palgalõheprofili väljaselgitamine 15 Euroopa riigi puhul.

Esiteks viitab uuring sisserändajate deskriptiivsele profiilile igas analüüsitava riigis. Osutatakse, et sisserändajate demograafilised ja tööhõivekarakteristikud on vaadeldavates riikides suhteliselt homogeensed. Uuringus leiti, et enamikus analüüsitud riikides on sisserännanutel sagedamini kui põliselanikel kõrgem hariduskraad (välja arvatud Hispaanias, Itaalias ja Sloveenias), kuid nad saavutavad keskmiselt madalamaid tulemusi kirja- ja arvutamisoskuse hindamisel ning kasutavad oskusi tööl süstemaatiliselt harvem kui põliselanikud.

Teiseks uuritakse sisserändajate kognitiivseid oskusi vastuvõtjariigis veedetud aastate kestel. Uuringus leiti positiivne ja statistiliselt märkimisväärne seos oskuste taseme ja vastuvõtjariigis veedetud aastate vahel üksnes Põhjamaade puhul (Norra, Rootsi, Soome ja Taani).

Kolmandaks uuritakse töös sisserännanute ja põliselanike palgalõhet analüüsitavates riikides. Üldiselt näitavad tulemused sisserännanute ja põliselanike palgalõhe suuruse märgatavaid erinevusi ja selle põhjusi. Enamikus riikides selgitab oskuste tasemega ja eelkõige oskuste töös kasutamise intensiivsusega kontrollimine suuresti palgalõhe majanduslikku ja statistilist tähtsust. Seevastu Eesti ja Iirimaa on ainsad riigid valimis, kus umbes 10%-line palgakaristus püsib endiselt, kui kontrollida nii oskuste taset kirja- ja arvutamisoskuse vallas kui ka konkreetsetel tööülesannetel põhinevaid oskusi, mida mõõdetakse oskuste tööl kasutamise abil. See näitab, et nendes riikides on sisserännanud mitmete jälgimata karakteristikute poolest potentsiaalselt erinevad kui teistes riikides. Samuti võib lisafaktoriks olla sisserännanute ajalugu ja rajasõltuvus, mis selgitab püsivat palgalõhet, iseäranis Eestis.

Study IV. Tverdostup, M., Masso, J. (2016). The Labour Market Performance of Young Return Migrants After the Crisis in CEE Countries: The Case of Estonia. *Baltic Journal of Economics*, Vol. 16, No. 2, 192–220.

Doktoritöö viimane uuring keskendub Eestisse tagasi pöördunud noortele ning määratleb nende profiili ja välisriigis töötamise kogemusest saadava palgatulu. Noored tagasipöördujad on Eesti jaoks eriti olulised. Analüüs tugineb kahele

allikale. Esimene neist, Eesti tööjõu-uuringu paneelandmed aastate 2007–2013 kohta, võimaldab täpselt tuvastada välismaal töötanud tagasipöördujad, kasutades andmete töötlemisel roteeruva paneeli põhimõtet. Teine andmeallikas, 2011. aasta Eesti rahva- ja eluruumide loendus kombineerituna Eesti Maksu- ja Tolliameti andmebaasiga üksikisikute palgamaksude kohta, võimaldab tuvastada palju suurema arvu kodumaale tagasipöördunud ja jälgida tagasipöördujate palgapreemia dünaamikat aja jooksul.

Analüüsi esimene osa põhineb Eesti tööjõu-uuringul ja keskendub noorte tagasipöördujate puhul peamiste tegurite väljaselgitamisele ja tagasitulekumustrite valikule. Põhiküsimus on, kes need noored Eesti tagasipöördujad on ja kuidas nad erinevad jäädavalt välismaale elama asunutest ja kodumaale jäänutest. Tulemused näitavad, et tagasipöördujad erinevad oluliselt nii praegustest võõrsil elajatest kui ka paiksena püsinutest. Noored tagasipöördujad on enamjaolt mehed, kes töötavad valdavalt teenussektoris ning on suhteliselt nooremad kui need, kellel välismaal töötamise kogemus puudub. Võrrelduna aga praegu võõrsil elajatega, on tagasipöördujad sagedamini naised ja kalduvad kodumaisele tööturule uuesti sisenema vanemas eas. Haridusvalik annab huvitavat teavet, sest võrreldes kodumaale jäänutega on tagasipöördujatel sageli kõrgem hariduskraad. Ent praeguste võõrsil elajatega võrreldes näitab valim, et bimodaalseid jaotusmustreid (positiivset valimit nii madalama kui ka kõrgema hariduse puhul) täheldatakse ainult koguvalimis, mitte aga konkreetselt tagasipöördujate puhul.

Analüüsi teine osa käsitleb tagasipöördujate palgapreemiat ja selle dünaamikat. Üldised andmed palgapreemia kohta, mis põhinevad Eesti tööjõu-uuringul, näitasid tagasipöördujate märkimisväärseid palgapreemiaid pärast Eestisse naasmist, kuid eri haridusgruppide lõikes on tulud ebahühtlased. Uuring kinnitab 15,4% palgapreemiat 15–24-aastaste tagasipöördujate puhul ning 12,6% palgapreemiat 25–35-aastaste vastanute puhul. Tagasipöördujate palgapreemia põhjalikuks uurimiseks ning tagasipöördujate ja paiksena püsinute palgalõhe peamiste mõjutajate kindlakstegemiseks kasutati uuringus klassikalist Oaxaca-Blinderi dekompositsiooni meetodit. Noorte rühmas (15–35-aastased) püsib selgitamata palgalõhe osakaal kõrge, viidates sellele, et lisaks demograafilisele taustale, haridusele, ametile ja tööstusharule on muid tähtsaid mõjutajaid, mida mudel ei hõlma. Nende hulka võivad kuuluda välismaal omandatud tegelikud oskused ja võimed ning samuti välismaise töökogemuse määrav mõju.

IV uuringus käsitletud viimane uurimisküsimus on tagasipöördumisjärgse palgapreemia dünaamika. Tuginedes Eesti rahva- ja eluruumide loenduse andmetele, osutab uuring, et tagasipöördujate palgapreemia varieerub eri vanusegruppides drastiliselt. Nimelt võib noorte tagasipöördujate statistiliselt märkimisväärset positiivset palgapreemiat näha kolme aasta möödudes pärast tagasipöördumist ning see suureneb järgnevatel aastatel jooksul veelgi. Vanemad tagasipöördujad aga saavad kõige kõrgemat hüvitist vahetult pärast kodumaale naasmist; kolmandaks aastaks pärast tagasipöördumist on nende palgapreemia juba ligikaudu kaks korda väiksem ja neli aastat pärast kodumaale naasmist muutub see statistiliselt tähtsusetuks.

Kokkuvõte ja arutelu

Soospetsiifiliste profiilide üksikasjalik analüüs *I uuringus* koos järeldustega soolise palgalõhe kohta näitab, et oskusi väärtustatakse tööturul rohkem kui formaalset haridust, seega aitavad meeste parem arvutamisoskus ja probleemilahendamisevõime saavutada neil kõrgemat palka, hoolimata madalamast formaalsest haridusest. Seega on haridusse tehtavad investeeringud üksisiku vaatepunktist mõnikord alakasutatud, sest iseenesest ei too kõrgem formaalne haridus kaasa kõrgemat sissetulekut. Need leiud osutavad, et kognitiivsed oskused ja nende kooslused erinevad suurel määral meeste ja naiste puhul, viidates sellele, et selline sooline ebavõrdsus kujuneb läbi tööturukogemuse ning ka muude tegurite, mis ei ole seotud formaalse hariduse abil mõõdetavate algsete investeeringutega inimkapitali. Poliitika vaatepunktist viitavad uurimistöö tulemused sellele, et soolise palgaerinevuse vähendamiseks tehtavad toimingud peaksid edendama naiste tööturule kaasamist (osaajaga töö mitteaktiivsuse asemel; paindlik tööaeg ja -koht), ning toetama ka taskukohaste ja kättesaadavate lapsehoiuvõimaluste pakkumist. Need sekkumised võiksid aidata kaasa naiste osalemisele tööturul ning kajastuda positiivselt ka nende oskustes ja palkades.

II ja III uuringu tulemused näitavad, et isegi põliselanikega võrreldavate põhioskuste puhul kipuvad sisserännanud kujundama inimkapitali, mis ei põhine konkreetsetel tööülesannetel ja nende kasutamisel töös. Kui aga sisserännanud saavutavad oskuste kasutamise taseme, mis on võrreldav põliselanikega, muutub n-ö palgakaristus tähtsusetuks. See näitab, et isegi madala ja keskmise haridustasemega sisserännanud, kes rakendavad oskusi samal tasemel kui põliselanikud, saavutavad põliselanikega võrreldava palgataseme. Üksikasjalik riikidevaheline analüüs osutab ühelt poolt, et Põhjamaades on sisserännanud aldis arendama ja parendama oma oskuste profiili vastuvõtjariigis veedetava aja jooksul. Teiselt poolt osutab III uuring, et sisserännanud, isegi kui nad saavutavad põliselanikega võrreldavad oskused, kasutavad neid töös harvemini. Selle erinevuse arvestamine palgaanalüüsis muudab sisserännanute ja põliselanike palgalõhe statistiliselt tähtsusetuks kõigis riikides peale Eesti ja Iirimaa ning näitab seega, et erinev oskuste kasutamise määr töös mängib olulist rolli sisserännanute ja põliselanike palgaerinevuste selgitamisel. Need leiud osutavad sotsiaalse ja kultuurilise lõimimise tähtsusele majandusliku assimilatsiooni edendamisel. Seega peaks poliitiline tegevus edendama sisserännanute kursiviimist vastuvõtjariigi tööturu, töötamisvõimaluste ja sotsiaalvõrgustiku loomise eripäradele.

IV uurimuse tulemused dokumenteerivad, et noored tagasipöördunud moodustavad Eesti tööturul erilise rühma. Nad erinevad oluliselt nii paiksena püsivusest, sama vanuserühma praegustest võõrsil elajatest kui ka vanemate vanuserühmade tagasipöördunudest nii jälgitavate karakteristikute kui ka naasmisjärgse tööturusoorituse poolest. Kokkuvõttes näitavad tulemused, et just noorte rühmas väljendub välismaal töötamise kogemus palgakasus – välismaal omandatud oskuste ja pädevuste rakendamisel saadakse positiivset palgapreemiat. Kodumaale tagasi pöördumine kujutab positiivset välismõju põhjalikult dokumenteeritud soolisele palgalõhele, sest uuring näitab, et välismaal töötamise kogemus

vähendab noorte eestlaste soolist palgalõhet. Poliitika vaatepunktist aitab tagasi-pöörduvate töötüsingute hõlbustamine ja noorte tagasipöörduvate kutseoskuste tõhusam rakendamine kodumaal vältida võõrsil omandatud väärtuslike oskuste ja teadmiste raiskamist.

Kõike eelnevat arvesse võttes näitavad doktoritöö tulemused, et inimkapitali kujundamise ja tööturukasu vahelised seosed ei ole ilmselged ning eri tööturu-rühmade puhul mõjutavad neid suuresti spetsiifilised tegurid ja mõjud. Uuringu-tes püstitatud uurimisülesanded ja hüpoteesid tuginevad varasematele empiiri-listele ja teoreetilistele järeldustele. Ometi näitavad käesoleva doktoritöö tule-mused, et palgatulu ja inimkapitali vahelised seosed on keerukamad ning neid võivad suuresti mõjutada tööturuvälised tegurid. Teatud juhtudel (eriti soolise palgalõhe puhul) leiti, et inimkapitali komponentide selgitusvõime on piiratud. Töötururühmade erinevused võimaldavad aga paremini mõista meeste ja naiste, põliselanike ja sisserännanute, kodumaale tagasipöörduvate ja paiksenä püsi-nute erinevusi. Lisaks võimaldab uute inimkapitali komponentide empiiriline määratlemine kvantifitseerida varem jälgimata inimkapitali tunnuste mõjusid ning tuvastada nende suhtelist tähtsust tööturu ebavõrdsuse kujundamisel.

Ettepanekud edasiseks uurimistööks

Kokkuvõttes osutavad doktoritöö tulemused mitmele tähtsale aspektile edasises uurimistegevuses. Eelkõige tõid nelja empiirilise juhtumiuuringu tulemused välja, et seos inimkapitali ja tööturu vahel ei ole alati kooskõlas olemasolevate teooriatega või ei ole nende abil piisavalt selgitatav. See näitab, et inimkapitali ja tööturu taustteooriaid tuleb edasi arendada, võttes arvesse olulisimaid tegu-reid. Need olulised tegurid on eelkõige kindlaks määratud andmete kaudu ning käesolevas doktoritöös toodud empiirilised uuringud toovad esile neist mõned. Esiteks peavad teooriad, mis käsitlevad inimkapitali rolli tööturul, hõlmama produktiivset inimkapitali, s.t mõõtmeid, mida tööturul aktiivselt kasutatakse ja mis toovad positiivset palgatulu. Formaalne haridus ja põhioskuste pagas oma-vad küll väärtust, kuid tööturu vaatepunktist on kõige tähtsam see, kui tõhusalt ja täielikult neid teadmisi ja oskusi töös kasutatakse.

Teiseks peavad teooriad arvestama mitmesuguste kontekstuaalsete teguritega. Eelistuste rolli eiramine soolise palgalõhe puhul või maitsepõhise diskrimi-neerimise tähelepanuta jätmise väljarände puhul viib lihtsustatud teoreetiliste mudeliteni, mis kajastavad reaalsust puudulikult. Doktoritöö järeldused, iseäranis soolise palgalõhe puhul, näitavad selgelt, et seni jälgimata tegurid moonutavad suurel määral seost inimkapitali (kognitiivsete oskuste) ja palkade vahel. Seega, et paremini mõista inimkapitali rolli meeste ja naiste palgatulu kujundamisel, tuleb arvesse võtta kaasnevaid mõjusid, mis on suurel määral seni tähelepanuta jäänud ja vajavad teoreetilist põhendamist. Ühed tähtsaimad tegurid, mis tuleks edaspidi uurimistegevusse kaasata, on isiksuseomadused, käitumuslikud tegurid ja eelistused. Ehkki empiirilised juhtumiuuringud annavad olulise panuse maailma praeguse olukorra mõistmiseks, aitab taustteooriate arendamine mõista praegust olukorda kujundavaid tegureid, nende olemust ja mehhanisme.

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- Lectures: Quantitative Methods in Economics, Research Methods in Business and Economics (University of Tartu, School of Economics and Business Administration); Risk Theory, Simulation Methods in Financial Mathematics (University of Tartu, Institute of Mathematics and Statistics)
- Pro-seminars: Intermediate Microeconomics (University of Innsbruck, Department of Public Finance)
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2018 Terviseökonomika suvekool, Kölni Ülikool
2018 Euregio Majanduse Workshop, Innsbrucki Ülikool
2018 SFB talvekool “Credence Goods”, Kühtai, Austria
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2015 Dünaamiliste süsteemide kvalitatiivse teooria lühikursus, Urbino Ülikool
2015 8th Nordic Econometric Meeting, Aalto Ülikool, Soome
2015 “Spatial Econometrics” lühikursus, Viini Ülikool

- 2015 “Multi-level modelling” intensiivkursus, Università della Svizzera Italiana, Šveits
- 2013 Talvekool “Applications of Mathematical Models. Recent Investigations in the Ruin Theory”, Pühajärve, Eesti

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- Loengud: Kvantitatiivsed meetodid majanduses, Uurimismeetodid ettevõtluses ja majanduses (Tartu Ülikool, Majandusteaduskond); Riskiteooria, Finantsmatemaatika simulatsioonimeetodid (Tartu Ülikool, Matemaatika ja Statistika Instituut)
- Pro-seminarid: Kesktaseme mikroökonomika (Innsbrucki Ülikool)
- Õppetootetus: Rakenduslik mikroökonomieetria (Aalto Ülikool); Sissejuhatus tarkvarasse R (Tartu Ülikool, Majandusteaduskond)

Peamised uurimisvaldkonnad:

- Tööjõu ökonomika
- Pere ökonomika
- Eksperimentaalne mikroökonomika
- Käitumuslik majandus
- Rakenduslik mikroökonomieetria

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